410720

17 May 1973

ENVIR[illegible] [illegible] [illegible]E [illegible] ATOLL CLEANUP

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

The te[illegible]ting [illegible] testing grounds that, among other facto[illegible] remote fr[illegible] areas. Previously, two tests had been con[illegible] Bikini [illegible] and July 1946 under Operation [illegible] and [illegible] Alamogordo, New Mexico on 16 July 1945 a[illegible] Trinit[illegible] for a continuing program of testin[illegible] suffered [illegible] in that the land areas [illegible] to the prevailing winds to permit c[illegible] of a [illegible].[1] This led to the selection of Eniwe[illegible] for testin[illegible] detonations, a selection administratively approved [illegible] Truman on 2 December 1947.

BEST AVAIL[illegible]

The selecti[illegible] Atoll [illegible] a study of possible ocean sites made [illegible] Deputy Director of the Division of Military A[illegible], [illegible] K. Froman of the Los Alamos Scient[illegible]. [illegible] possible fallout, Eniwetok Atoll was [illegible] of miles of open sea lying from the Ato[illegible] westward [illegible] of the prevailing winds.

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

The [illegible] nuclear [illegible] tests on Eni[illegible] ing on [illegible] October 1947. Calle[illegible] purposes of personnel [illegible] having significant ground facil[illegible] Seven operated from their many s[illegible] were mad[illegible] 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], date, time, location, height of burst [illegible] ground surface, or underwater) of nuclear expl[illegible]

In prepar[illegible] nuclear tests, the Atomic Energy Commissi[illegible] further testing by improving groun[illegible] more adequate technical facilities at [illegible] 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 UCR[illegible] clearing house for Federal [illegible])
5. Reference [illegible]
6. Reference [illegible]

On 31 January [illegible] President [illegible] the decision to develop a thermo[illegible] of course, was to have great impact on [illegible] such large increases in yield and fall[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 Gr[illegible][1] [illegible] was [illegible]tionally established in the autumn of [illegible] in a 1951 series starting on 27 Ja[illegible]

The Eniwetok [illegible] test series [illegible] for 1951 was designated as Operation Gree[illegible] and included [illegible] tests, activities related to thermo[illegible] research, but [illegible] involving a full thermonuclear explosion. Between [illegible] and 24 Ma[illegible] four tests from towers were conducted at Eni[illegible] East announced as 47 kiloton yield.[4,7]

A full therm[illegible] the following year in the 1952 test series [illegible] Iv[illegible],[4,8] This involved only two tests, but the [illegible] had [illegible] and consequence. The first was Te[illegible] the first [illegible] detonation and a ground level explosion [illegible] to [illegible] of 10.4 million tons of high explosive [illegible] island, Elugelab (Eluklapin in Marshallese, [illegible], at the north end of the Atoll. Being a [illegible] large yield, Test Mike actually removed [illegible] in. A large reinforced conc[illegible] large island of Engebi to test effects [illegible] The second test of

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

Opera[illegible] from [illegible] 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 pre[illegible] south [illegible] southeast,[9] and so most of the rad[illegible] 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] Nevada Proving Grounds in 1953, thereupon starting [illegible] at the Nevada Proving Grounds or the Pacific [illegible] each [illegible] years. The next series of tests in the Pa[illegible] 1954 [illegible] Operation Castle. It involved a task force, whic[illegible] the number [illegible] Seven of the 1947 force. Five out of the [illegible] Bikini Atoll, which had not been used for nucl[illegible] 1946 [illegible] of these had consequences affecting all test[illegible] megaton thermonuclear tests Bravo in this seri[illegible] conducted on [illegible] in Bikini Atoll on 28 February 1954 [4,10] BEST AVA[illegible]

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] radio[illegible] out on the inhabited atolls of Rongelap, Ailingin[illegible] Rongerik [illegible] Japanese fishing ship (Lucky Dragon). These e[illegible] resulted in [illegible] renewed interest in radiological consequences, with [illegible] focus on [illegible] series of tests. The Atomic Bomb Casua[illegible] on which [illegible] established after the atomic bombing of Ja[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]

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

By 1954 [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] ve 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] test [illegible] was positioned on the land surface. This Se[illegible] crater [illegible] of the remainder of Bokou Island. The other [illegible] Redwing was Test Lacrosse, which formed a crater at [illegible] Yvonne is the U.S. code name) in the tide [illegible] the [illegible] island.

11. John H. Harl[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] [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. moratorium [illegible] 1958 and was followed in a few days by a [illegible] end of all nuclear tests at [illegible] years until the present time have allowed some nat[illegible] affected islands and have provided the time [illegible] residual radioactivity resulting from the [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). This [illegible] Southwest of the La Crosse crater

Further tests [illegible] in the vicinity of Johnston Is[illegible] [illegible] 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] [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 con[illegible] the cont[illegible] States and at Amchitka in Alaska, none hav[illegible] [illegible]toll.

In these test [illegible] total of [illegible] detonations or attempts at nuclear detonat[illegible] made [illegible] Atoll. The number of tests either on ind[illegible] lands or [illegible] these islands is as follows for the total of 43 [illegible] Enewetak [illegible]

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

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

The p ... osives before

detonation fo ...

... of tests

What happened to the tests?

Of course, land sur... ...ative to the physical condition of the islands by ... removing an island entirely. All ... side usually off the islands of Runit (Yvonne) ... generally west of these islands, the tests produced ... prevailing winds from the northeast generally carried ... the lagoon.

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

1 ... the fission of the ... nuclear explosive, with ... cesium-137 and strontiom-90. ... respectively, roughly ... do not decay appreciably ... nor do they decay sufficiently ... radioactivity.

[illegible] used for towers, [illegible] waiting times [illegible]

[illegible] capture of [illegible]

[illegible] the nuclear [illegible] when nuclear [illegible] int" safety tests), [illegible] for assembling these [illegible].

[illegible] from thermonuclear [illegible] (However [illegible] the water in the ocean [illegible]

Misfir[illegible] one-point" safety tests of nuclear explosi[illegible] activity, as mentioned in Item 4. [illegible] uranium or plutonium is deposited over [illegible] the case of the spread from a nuclear explo[illegible] spread in the former case, but worldwide [illegible] A particular concern in these cases [illegible] lower radiological hazard of [illegible] radiological concern when used [illegible] concern is complicated by its long 2[illegible] which is far too long to enable [illegible] hazard.

Just such [illegible] ation have occurred around Runit [illegible] in Operation Hardtack [illegible] was planned only to explode [illegible] for explosion. Local spr[illegible] narrow island.

NUCLEAR DETONATIONS AT ENIWETOK ATOLL

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]							
Zebra	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		Barge	[illegible]	[illegible]	
[illegible]							
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[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'?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°19'32"	
Osage	11/6/56	2114	680	Air Drop	11°32'48"	162°21'33"	
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	GEOGRAPHICAL COORDINATES EAST LONG	YIELD	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

17 May 1973

ENVIRONMENT ... ATOLL CLEANUP

3g Present ... logical Survey

Introduction

The rad[illegible] ... entirely from the nuclear exp[illegible] ... 1958. Some radioactivity resul[illegible] ... tests conducted elsewhere in the ... nificant compared to radioactivity ... The minimum radioactivity observ[illegible] ... 1973 was more than an order ... world-wide fallout and of local ... (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 te[illegible] ...

Only after ... 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 purp[illegible] [illegible] and
in further [illegible] many
to [illegible] radiological [illegible] the
islands [illegible]
world in [illegible]

Radioactiv[illegible]

The [illegible] well
are present[illegible]:

- Cesium-[illegible] fission product. When pres[illegible] gamma rays externa[illegible] whole-bo[illegible] inhabitants. 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] provides only a beta ra[illegible] deposits on the top surfa[illegible] similar to calcium, it deposits [illegible] body via the food chain, [illegible] the principally the risk [illegible]

• Plut[illegible] 24,000 years [illegible] r

[illegible] the

nucl[illegible]

tran[illegible]

complet[illegible] content

of the [illegible] alpha

partic[illegible] 24,000 [illegible] is

of very [illegible] The concern

is that [illegible] to the

lung [illegible] the subsequent

hazar[illegible] of plutonium-239

via the [illegible]

Other [illegible] result of the

various tes[illegible] are insigni-

ficant compared [illegible] plutonium-239 and

furthermore are [illegible] the several existing

guidelines [illegible] general public.

These les[illegible] processes

during the test[illegible]

• Other [illegible] explosions.

• Isotopes [illegible] other materials

nearby [illegible] explosion, for

example [illegible], barges, and

[illegible] from neutron

capt[illegible]

* [illegible] in [illegible]

[illegible]

[illegible] ... radio-

activ[e] par[ticles] [illegible] th[e]

much [illegible]

the [illegible] [w]ater [or] [u]nder

water [illegible] [nu]clear

explo[s]ion[s] [illegible] materials.

Due [illegible] [fi]reball and

cloud. [illegible] and [illegible] condense

onto [illegible] and

conden[s]ation [illegible] [vap]oriza-

tion temperatur[e] [illegible] fi[ss]ion products

that are ga[s]e[ous] [illegible] [pa]rent

element before [illegible] a daughter element)

adher[e] [illegible] during these

processes.

[I]n general, [illegible] to

fallout [illegible] [f]rac-

tionation is [illegible] [l]and s[ur]face

burst the [illegible] at [earl]y times

and are [illegible] [prop]erties [d]ifferent

from the small[er] [illegible] [l]ater

ti[illegible] important

pe[illegible]

str[illegible] product

activ[illegible]

the [illegible]

frac[illegible]

dep[illegible] to

other [illegible] the

nucl[illegible] EST [illegible]

As examp[illegible] analyses of the particles in [illegible] 197[illegible] La Crosse was [illegible] Island. The sample [illegible] meters at 2.6 hours after [illegible] radioactive disentegration [illegible] particle was found to [illegible] the following factors when [illegible] as compared with a smaller [illegible] relation was found in [illegible] sizes ranging between 0.5 and [illegible]

Radionu[illegible]	[illegible] for 9 microns / [illegible] for 50 microns
stront[illegible]	[illegible]
promet[illegible]	[illegible]
uran[illegible]	[illegible].47

[illegible] higher

tem [illegible]

pro [illegible]

uran [illegible]

of [illegible]

[illegible], however,

pri [illegible] ed

above. [illegible]

semi [illegible] takes

this [illegible] world-

wide and [illegible] is con-

sidered to [illegible] in diameter, the

interm[illegible], and the world-

wid[illegible] percentage

of the total [illegible] that deposits

in local [illegible] estimated to be

differs North & South P.

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

On th[illegible] large

explosions [illegible] the

combined [illegible] is

la[illegible] ation,

and [illegible]

radi[illegible] ition

of the radi[illegible]

explosions [illegible] testing 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 fall-

outs from [illegible] at the [illegible] surface.

An example [illegible] large tests

is provided [illegible] the Tewa test

at Bikini Atoll [illegible] analyzed was

taken at 16,000 [illegible] Nathans, 1970).

Radionuclide	[illegible]	8.2 microns / [illegible] microns
strontium-[illegible]		
prometh[illegible]		
uranium		

Leaving aside [illegible] particle size,

an analysis [illegible] particle sizes

(Freiling, 196[illegible] little strontium-90

and cesium-137 [illegible] above.

In [illegible] fallout. The retention [illegible] with the refractory [illegible] fraction [illegible] properties [illegible] are refractory [illegible] gases [illegible] particle sizes [illegible] including [illegible] However [illegible] interest [illegible] local and remote fallout.

The [illegible] explosion residue [illegible] early fall-out is [illegible] radioactivity [illegible] water surface explosions, [illegible] However, for land surface [illegible] higher, with estimates [illegible] in environmental and [illegible] variations in these fractions [illegible] 457).

We now [illegible] from surface explosions [illegible] is largely CaO and [illegible] particles from the surface [illegible] properties depending on [illegible] fireball from the nuclear explosion [illegible] 1960 [illegible]).

[illegible] not to [illegible] particles [illegible] [illegible] [illegible]. Frac- [illegible] that [illegible] the [illegible] hotter [illegible].

On the [illegible] are formed from [illegible] of the fire- ball. These [illegible] particles, with the result [illegible] proceeds at [illegible] logi- cally [illegible] material and [illegible] have been in contact [illegible]

Particle Size[illegible]

Fallout pa[illegible] smaller than fine sand, i.e., ap[illegible] 10[illegible] distant portions of the [illegible] i.e., roughly 1 [illegible] Glasstone, 1964, p. 41[illegible] the size of the fallout [illegible] distribution law with th[illegible] with mass median [illegible] of 30[illegible] standard dev[illegible] (K[illegible] 19[illegible]). With the [illegible] deposited [illegible] particles [illegible] of explo[illegible] particle size [illegible] particle [illegible] particle were [illegible] which w[illegible] diameter [illegible] around 2.9 [illegible]

The [illegible] fallout whose size [illegible] 15-megaton [illegible] fishing vessel [illegible] 300-micron [illegible] and 400 microns.

As [illegible] sizes of local [illegible] particle sizes of the cloud. [illegible] for which the cloud [illegible] after the nuclear [illegible] were observed, [illegible] of the [illegible] early cloud centered around [illegible] fallout particle[illegible] p. 2[illegible].

For [illegible] contain [illegible] all [illegible] of [illegible] oxide [illegible] particles.

The part [illegible] is si[illegible] ft, 1970, [illegible]

Weathering

The [illegible] the fallout [illegible] islands will decrease [illegible] also from weathering [illegible] fallout from one location [illegible] of this action at Eniwetok Atoll [illegible] repositioning [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] of the fallout [illegible] Strucker, et al., 1965 [illegible] the radioactivity over a period [illegible] Eniwetok Atoll, the future [illegible] difficult to estimate even [illegible] nuclear

explo[illegible]

weathe[illegible]

leachi[illegible]

as con[illegible]

in fir[illegible]

have [illegible] C

it is [illegible]

at Eni[illegible]

been removed, [illegible]

much higher [illegible] experi-

ments. [illegible] significantly

hasten [illegible]

However [illegible]

upon many va[illegible] 1965).

Distri[illegible]

The [illegible] the sea after

having been [illegible] horizontal

distan[illegible] distri-

bution is alt[illegible] organisms

in and out [illegible]

The [illegible] determined

primarily [illegible] horizontal

dispersion [illegible] density gradients.

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

therm[illegible] ... in the layer of [illegible] ... zone

[illegible] ... of [illegible] ... tempera-

ture [illegible] ... layer [illegible] ... fairl[illegible] ... requi[illegible] ...

contrast, [illegible] ... layer [illegible] turbu-

lent [illegible] ... layer [illegible] high

stabi[illegible].

BEST AVAILABLE COPY

In st[illegible] ... Atoll, analyses

were [illegible] ... particulate and

colloidal-[illegible] ... considered in

these studies [illegible] ... colloidal-soluble

fraction [illegible] ... after the nuclear

explosion, [illegible] ... concentrated

at the 100-m [illegible] ... Logically,

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] ation about the [illegible] are not expected to [illegible] apply to the [illegible] Enewetak Atoll [illegible] 60 meters [illegible] depth of the [illegible] deeper than the [illegible] of the [illegible] line. The results [illegible] indicate that [illegible] the particular [illegible] ter from the [illegible] within weeks after [illegible] explosion, [illegible] to the bottom [illegible] fallout [illegible] ocean.

Early [illegible]

[illegible] now only [illegible] have long since [illegible] included here for [illegible]

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

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

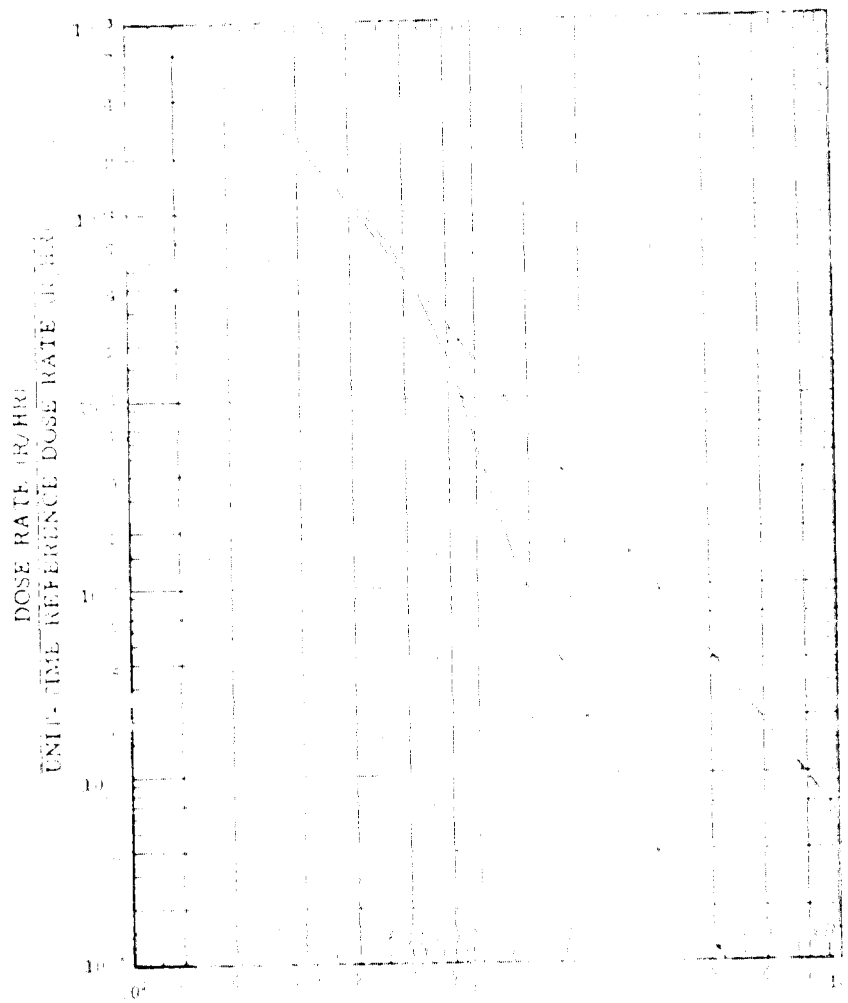

Figure [illegible]

9.17 [illegible]

of this reference ... possible to est... at any time at... 24 hours after... setting 24 ho... onto the plot... quired dose r... rate, i.e., 0.1...

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 ... taken as 1.0... rate in the ... quantity of ... actual dose r... known, the ... obtained by ...

RELATIVE T...
VARI...

the [illegible] of the [illegible]
stab[illegible] [illegible] of the [illegible] which [illegible]
feet in [illegible]

[illegible] range of [illegible]
[illegible] to [illegible]
the point [illegible]
fallout [illegible]
concent[illegible] downwind [illegible] the
same order [illegible] (Glasstone,
1962, p. [illegible]).

The [illegible] significant
amounts of rad[illegible] the radiation
from this [illegible] (see the copy)
shows the [illegible] after the
explosion [illegible] R/hr
(Roentgens [illegible] and down-
wind posit[illegible] essentially
zero at [illegible] p. 40).

Alth[illegible]
measurements [illegible] the nuclear
explosion [illegible] namely
those in the [illegible]

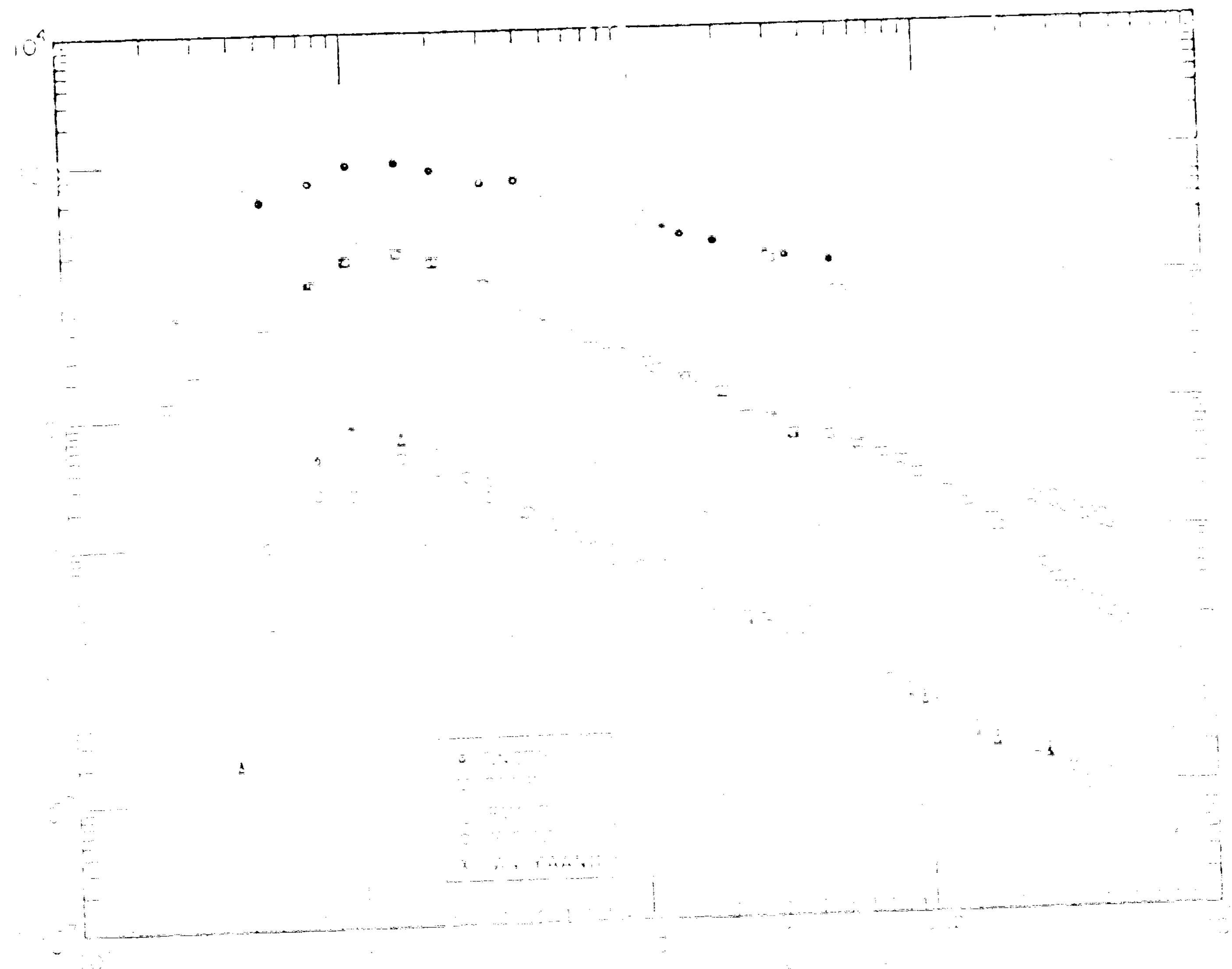

Fig. 6 - Mike fall-out intensity versus time.

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

<u>Test</u>	Site location	Radioactivity
Cactus	[illegible]	[illegible] 1.[illegible]; [illegible]
Butternut	[illegible] Yvonne	[illegible] 0.0[illegible]; [illegible]; Leroy 0.04
Koa	[illegible]	[illegible]; Mary [illegible]; Leroy [illegible]
Holly	[illegible] Yvonne	[illegible] 0.[illegible]; [illegible] 0.2; [illegible] 0.0[illegible]
Yellowwood	[illegible] Janet	[illegible]; Janet [illegible]; Mary 0.02
Magnolia	[illegible] Yvonne	[illegible]; Leroy [illegible]
Tobacco	[illegible] Janet	[illegible]; Helen [illegible]; Janet 38; [illegible]
Rose	[illegible] Yvonne	[illegible] 0.[illegible]; Leroy [illegible]
Walnut	[illegible] Janet	[illegible]; Janet [illegible].8; Mary 0.04
Linden	[illegible] Yvonne	[illegible] 0.2; Janet 0.02
Elder	[illegible] Janet	[illegible]; Janet 0.4; Leroy 0.04
Oak	[illegible]	[illegible] 0.3; Helen 0.05
Sequoia	[illegible] Yvonne	[illegible]; Leroy [illegible]
Dogwood	[illegible] Janet	[illegible]; Janet [illegible]; Leroy 0.02
Pisonia	[illegible] Yvonne	[illegible]; Leroy [illegible]2
Olive	[illegible] Janet	[illegible]; Janet [illegible]; Wilma 0[illegible]
Pine	[illegible] Janet	[illegible]; Janet [illegible]; Leroy 0.02

The decay hist[illegible] radioactivities might have [illegible] of [illegible] ies at four hours after [illegible].

[illegible] COPY

Aeon. [illegible] Zuni [illegible] northern [illegible] the [illegible] along with [illegible] determined [illegible] tests. The early [illegible] can [illegible] the eastern [illegible] ton. The other [illegible] direction, is largely [illegible] the south. The table shows [illegible] the other of [illegible]

Sea-Based Surveys

Much of [illegible] in the oceanic areas around [illegible] lagoon has been obtained from [illegible] Laboratory of the University [illegible]

In June [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] representation broaden [illegible] repr[illegible] feeding plate of [illegible] (Donaldson [illegible] Bikini [illegible]. In 1947 collections were [illegible] Atoll [illegible] in the [illegible] of [illegible] (Operation [illegible]) Atoll [illegible] though [illegible] collected ([illegible] 65). A [illegible] survey by [illegible] Laboratory [illegible] Atoll [illegible] 1949, p. 94) [illegible] the April [illegible] Operation [illegible] of [illegible] algae, invertebrate[illegible] the [illegible] results of 1948 [illegible] significant [illegible] generally as expected [illegible] survey [illegible] of 1949 [illegible] the [illegible] Atoll [illegible] Likiep. The Eniwetok [illegible] plants [illegible] shore.

Prior [illegible] Atoll [illegible] October 1952, the Ap[illegible] Laboratory [illegible] collections at Eniwetok [illegible] 1952), [illegible] Between 3 and 8 November [illegible] southern islands [illegible] at Rojoa Island [illegible] 2 to 2.5 R/hr. [illegible] of vegetation remained. [illegible] per minute [illegible] 5 million d/min/g at that [illegible] of [illegible] increase in act[illegible] with 360,000 [illegible]

3,3

The [illegible] tests of [illegible] 195[illegible]

[illegible] Bikini [illegible] sharply

inc[illegible] in

195[illegible] the Japanese [illegible] during

[illegible]

dete[illegible] of radioactivity [illegible] marine

life [illegible]. The [illegible] of

prec[illegible] natural 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 activi[illegible] several hundred meters

depth.

BEST AVAI[illegible]

[illegible] survey ship, the

U.S. [illegible] activity samples

(Har[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] to

14[illegible] 3.5 [illegible] for

ash [illegible] more than one [illegible] of the [illegible] level [illegible] that [illegible] the activity [illegible] radio-[illegible] [illegible] the [illegible] of fish [illegible] a few percent [illegible] level [illegible].

[illegible]

by [illegible] was [illegible] an area then [illegible] fication.

The next [illegible] and [illegible]ember 1956 during the [illegible] Atoll and Eniwetok [illegible] 1962, [illegible] and Lowman, [illegible] surface layer. [illegible] Atoll, radioactivity was high. [illegible] for plankton was 1.2 million [illegible] level of [illegible] d/min·g was almost [illegible] Operation Troll in 1955. [illegible] the [illegible] to the Shunk[illegible] attempting to [illegible] At these later times [illegible] the radioactivity [illegible] d/min·g eight[illegible] miles [illegible].

For [illegible] both [illegible] for radioact[illegible] (Seymour, [illegible]). Plankton radioactivity was [illegible] explosion on [illegible] and

35

squ[illegible] the day [illegible] Dat[illegible]

of r[illegible]ivity [illegible] following the

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

[illegible]

a [illegible] (Ob[illegible]

p. [illegible] radioactivity w[illegible] 25,000 d/m[illegible]

110 [illegible]

Land-[illegible]

A [illegible] or both

of the [illegible] Atolls [illegible] 1954,

1955, [illegible] detonations.

However, [illegible] thus relatively

less [illegible] the [illegible]

radioactivit[illegible] although [illegible] these

expedition[illegible] test

operation[illegible] instantaneous

radioa[illegible] the [illegible] for the

month[illegible]

Studies [illegible] 1954 following the

13 March 195[illegible] large test

located [illegible] of the island.

The external [illegible] May 1954

two days after [illegible] year after

the t[illegible] could be attributed

to h[illegible] radiation

effec[illegible] hermit crabs

Coenz [illegible] apro- [illegible]

[illegible] commencing [illegible] follows [illegible]

te[illegible] day and [illegible]

a[illegible]

v[illegible] ters

and [illegible] collection [illegible]

a [illegible] ivit[illegible]

three [illegible] d/m [illegible] 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] ations

(Welander [illegible] broad range of

organisms [illegible] at the

Universit[illegible] y

[illegible] meters at

three feet [illegible] observations:

[illegible] in eR/[illegible]

Island	Average	Maximum
[illegible]	[illegible]	1.0 (four craters at north)
[illegible]	0.04	
[illegible]	0.10	0.23
[illegible]	0.2?	0.70

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

[illegible] Force Weapons [illegible] islands were [illegible], Aomon [illegible]. In gen[illegible]/hr, the la[illegible] of beta- and gamma-[illegible] spaced tra[illegible] highest reading was [illegible].

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

Fo[illegible] 1972, about [illegible] the AEC and [illegible]

[illegible]

(38)

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- [illegible] analyzed in laboratory [illegible] samples [illegible] test for plutonium in the [illegible] detectable activity, but did record [illegible] 0.76 d/min [illegible] particle activity and 28.4 d/min [illegible] full-time workers i[illegible] than a very small [illegible]. A consequence of these findings [illegible]

[illegible] for the island.

S. G. [illegible]

E. [illegible]

BEST AVAIL[illegible]

E. C. F[illegible]

R. E. H[illegible]

E. C. Fr[illegible]

[illegible]

(40)

BEST AV[illegible]

F. G [illegible]

G. R. C. [illegible]

41

U.C [illegible]

[illegible]

Anil [illegible]

[illegible]

R.F [illegible]

[illegible]

[illegible]

[illegible]

Th[illegible] 19[illegible]
[illegible]

Thom[illegible] 1971
[illegible]
[illegible]
[illegible]

Ka[illegible]
[illegible]