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A PORTION OF:

NRDL RAD-SAFE SUPPORT FOR OPERATION REDWING

R

September 24, 1956

From: L. A. Carter

To: J. E. Law, U.S. Naval Radiological
Defense Laboratory,
San Francisco 24, California

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NRDL SUPPORT - Rad-Safe For
Operation Redwing

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BY AUTHORITY OF DOE/OC

J. D. Day 2/20/91

DATE
BY
LTA JNA SWISHER TD
DOE MA-225, 7-8-90

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Chapter III - Bikini Operations

On June 16, 1956, the 2.10 monitoring force at Bikini Atoll consisted of the following personnel:

- Health Physicist
- Health Physicist (TRFD to YAG on 7-13-56)
- HM 2 (TRFD to LST-611, 7-8-56)
- HM 2
- Civilian Monitor
- HM 1
- Civilian Monitor
- Civilian Monitor

C. (Event Number 3) Nowoko 7-11-56

1. Project 2.61

No surveys were made for project 2.61.

PRIVACY ACT MATERIAL REMOVED

2. Project 2.63

History

accompanied a party to the YFNB 29 to recover samples from the forward tower. The background was 80 mr/hr at 3'. Max. reading on samples 20 mrad/hr incl. 12 mr/hr.

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accompanied a party to How (N) to recover samples from the tower and the chan cone. The background at How (N) was 80 mr/hr at 3'. The sample from the collector read 200 mrad/hr incl. 28 mr/hr @ 2".

accompanied personnel to HCN (N) to monitor the standard pattern. The background was 55 mr/hr @ 3'. On the evening of N day, a heavy rain fell.

N + 1

assisted in recovery of samples from the rafts. The readings were as follows:

Raft #1	Bkg. 18 mrad/hr incl 6 mr/hr	Sample - Bkg.
Raft #2	" 18 " " " 12 "	Sample - 40 incl 8
Raft #3	" 40 " " " 18 "	sample - Bkg

and party recovered samples from the aft tower of the YFVB 29. The background was 6 mr/hr at 3', and the samples read up to 16 mrad/hr incl 6 mr/hr @ 2". The party then recovered the samples from the YFVB 13 with a background of 30 mr/hr at 3', and a maximum sample reading of 35 mrad/hr incl 70 mr/hr @ 2".

assisted in recovery of chan cone samples on Charlie and George, the readings as follows:

- Charlie Background - 1000 mrad/hr incl 480 mr/hr @ 3'
- Ground - 1800 mrad/hr incl 600 mr/hr max. @ 6"
- George Background - 520 mr/hr incl 250 mr/hr @ 3'
- Ground - 1200 mrad/hr incl 300 mr/hr @ 6"

The Charlie samples read up to 10 mr/hr, and the George samples 100 mrad/hr incl 10 mr/hr.

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then monitored a party rearming the chan cone on KOW (1). The background was 30 mrad/hr incl. 20 mr/hr @ 3'. The ground read 10 mrad/hr incl. 20 mr/hr @ 6".

N + 2

assisted in rearming the YFNB 29 towers. The background was 6 mr/hr at 3', and the main deck aft read 30 mrad/hr incl. 8 mr/hr at 3".

assisted in rearming the HOW(N) tower, and monitored the standard pattern. The background in the tower was 18 mrad/hr incl. 6 mr/hr at 3'. The maximum contamination level in the tower was 500 mrad/hr incl. 100 mr/hr at 2". The standard pattern read as follows:

Sta 1 - 15 mr/hr	7 - 16 mr/hr	a - 8 mr/hr
2 - 14 "	8 - 10 "	b - 12 "
3 - 14 "	9 - 11 "	c - 10 "
4 - 12 "	10 - 11 "	d - 12 "
5 - 13 "	11 - 10 "	e - 13 "
6 - 14 "	12 - 10 "	f - 13 "

N + 3

assisted in rearming YFNB 13. The maximum background existed on the main deck (aft) - 10 mrad/hr incl. 20 mr/hr at 3'. The maximum contamination level was observed at the oil tanks on the stern - 250 mrad/hr incl. 50 mr/hr @ 3".

Child samples were received at the recovery tent. The maximum reading on the samples was 22 mrad/hr incl. 7 mr/hr @ 2".

The chain cones were rearmied on HOW, Charlie, and George. The readings were as follows:

	<u>Background</u>	<u>Ground</u>
HOW	10 mr/hr @ 3'	15 mr/hr @ 3"
Charlie	250 mr/hr @ 3'	230 mr/hr @ 3"
George	110 mr/hr @ 3'	130 mr/hr @ 3"

3. Project 8.1

Project 8.1 had been completed.

[REDACTED]

During this period the sample recovery center was monitored by Zwicker.

This was a comparatively clean shot and no difficulties were experienced.

D. (Event Number 4) Tewa 7-21-56

1. Project 2.61

No surveys were made for project 2.61. **PRIVACY ACT MATERIAL REMOVED**

2. Project 2.63

T day

Person assisted in early recovery of samples from YFNB 13 at 1330 hours. The copter had read 3 r/hr at 3', 4.1 r/hr @ 3". The aft washdown station read 2.2 r/hr @ 3', and the forward washdown station read 2 r/hr @ 3'.

The stay time was 20 minutes. Samples read as follows:

54 - 2 r/hr @ 3"	58 - 2.6 r/hr @ 3"
55 - 2.2 r/hr @ 3"	59 - 2.0 r/hr @ 3"
55A - 1.2 r/hr @ 3"	59A - 2.0 r/hr @ 3"
56 - 3.4 r/hr @ 3"	60 - 2.4 r/hr @ 3"
57 - 1.1 r/hr @ 3"	

The party then departed for HCV (N) to make the early recovery and monitor the retention pattern. The arrival time was 1356 hrs., and the stay time was 15 minutes. The samples read as follows:

62 - 220 nr/hr @ 3"	65 - 260 nr/hr @ 3"
61 - 240 " "	66 - 240 " "
63 - 250 " "	67 - 210 " "
64 - 120 " "	

The standard pattern read as follows:

1 - 220 nr/hr @ 3"	1 - 240 nr/hr @ 3"
2 - 230 " "	1 - 250 " "
3 - 200 " "	2 - 240 " "
4 - 200 " "	11 - 210 " "
5 - 200 " "	12 - 240 " "
6 - 200 " "	

On returning to Wan, personnel in party were found to have at least 350 nr/hr on the sides of the suits, and about 20 nr/hr on the hands. [REDACTED]

covers and canvas gloves were worn but were inadequate because of the large amount of water on the YFNB 13. Hands were reduced to permissible levels with soap and water. ██████████ had performed this recovery dressed in Getoks under his shoe covers. His feet were grossly contaminated necessitating chemical decontamination by TU7 Personnel. By abrasion mainly, his feet were reduced to permissible levels by 1800 hours. Shoes worn by the party read up to 5 rads/hr incl. 1.4 r/hr @ 3" at 1800 hrs. On T + 2, the shoes were still greater than 20 mr/hr @ 3".

At 1615 hrs., ██████████ accompanied a party to HCM (N) to monitor the standard pattern; stay time 15 minutes. Readings were as follows:

1 - 220 mr/hr @ 3'	7 - 200 mr/hr @ 3'	a - 190 mr/hr @ 3'
2 - 210 " "	8 - 160 " "	b - 150 " "
3 - 220 " "	9 - 190 " "	c - 160 " "
4 - 190 " "	10 - 180 " "	
5 - 180 " "	11 - 140 " "	
6 - 210 " "	12 - 220 " "	

Background was 2000 mrad/hr incl. 200 mr/hr @ 3'. The ground was contaminated to 1000 mrad/hr incl. 100 mr/hr @ 3".

All the above samples were surveyed by ██████████ at the sample recovery center at Man, and the Readings were as shown below:

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YFNB-13

E 54/L037A	610 mrad/hr, incl. 400 mr/hr
55/L136A	1000 " " 800 "
55A/L051	360 " " 84 "
56/L012A	1010 " " 1020 "
57/1C	460 " " 120 "
58/L036A	1010 " " 1000 "
59/L122A	900 " " 300 "
59A/L047	190 " " 65 "
60/L038A	480 " " 300 "

Raft 2 - $\left\{ \begin{array}{l} 10 \text{ mrad/hr, incl. } 6 \text{ R/hr @ } 3' \\ 10 \text{ mrad/hr, incl. } 8 \text{ R/hr @ } 3' \\ \text{Bottle, Hose \& Funnel } 45 \text{ mr/hr @ } 2' \\ \text{Dosage received during recovery } 500 \text{ mr.} \end{array} \right.$

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Raft 3 - $\left\{ \begin{array}{l} 6 \text{ rad/hr, incl. } 200 \text{ mr/hr @ } 3' \\ 8 \text{ rad/hr, incl. } 300 \text{ mr/hr @ } 3' \\ \text{Bottle, Hose \& Funnel } 12 \text{ mr/hr} \\ \text{Dosage received during recovery } 17 \text{ mr.} \end{array} \right.$

The skiffs were recovered on T + 1 and T + 2, monitored by

Results were as follows:

Sta #	Skiff #	Deck & Fittings	Film Pack	<u>mrad/hr/mr/hr</u>				Inside Skiff
				Toad	Funnel	Sample	Hose	
9	19	10/0	0	0	0	0	0	
1	17	120/10	-/5	-	1/1	1/1	-/1	6/6
2	5	210/11	0/3	0	3/1	2/2	1/1	6/2
15	6	200/200 (After Decon. 310/50)	-/82	-	300/38	11/7	-/5	28/11
11	7	3800/380 (After Decon. 1500/150)	-/450	-	230/32	L2/6	160/98	84/54
5	6	3000/320 (After Decon. 1000/110)	-/200	-	110/16	16/6	32/8	-
13	12	36/11	-/10	-	26/5	55/6	-/1	-
3	2	12/1	0	0	0	0	0	0
15	21	64/10	-/5	-	2/2	1/2	-/2	20/0
5	15	8/0	-/1	0	0	0	0	0

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T + 1
T + 2

20	2	1200/80	-/32	-	160/12	74/70	-/22	-
19	23	720/110 (After Decon. 120/92)	-/10	-	50/10	42/22	-/26	50/32
18	21	1100/110 (After Decon. 260/11)	-/58	-	100/34	100/80	-/2	80/50
1	22	710/160 (After Decon. 510/100)	-/30	-	12/10	90/16	-/10	60/36

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Sta #	Skiff #	Deck & Fittings	Film Pack	Mrad/hr/hr			Hose	Inside Skiff
				Toad	Funnel	Sample		
14	2	580/120 (After Decon. 400/90)	-/100	-	76/16	48/32	20/8	20/44
10	10	800/200 (After Decon. 300/84)	-/140	-	100/18	28/56	-/8	80/40
12	16	140/38	-/30	-	-	12/8	-/6	-

7 + 2

assisted a party in the rollup of HCF (1) tower, and monitored the standard pattern. The background in the tower was 40 mr/hr @ 3', 200 mr/hr at 2". The standard pattern read as follows:

1 - 36	my/m @ 3'	7 - 34	my/m @ 3'	a - 32	my/m @ 3'
2 - 36	"	8 - 30	"	b - 32	"
3 - 38	"	9 - 30	"	c - 28	"
4 - 36	"	10 - 32	"	d - 32	"
5 - 34	"	11 - 28	"	e - 32	"
6 - 38	"	12 - 32	"	f - 32	"

... monitored a party during the recovery of samples from YFMB-29, ... 7 to 0915 hrs. Readings were as follows:

- Center pad @ center of deck - 2 R/hr @ 3', 2 R/hr @ 2"
- Deck aft - 1.2 R/hr @ 3'
- Deck fwd. - 1.2 R/hr @ 3'
- Blkg. in fwd. tower - 600 mr/hr @ 3'
- Blkg. in aft tower - 1.1 R/hr @ 3'
- Fwd. tower samples - Max. 1.8 R/hr @ 2"
- Aft tower samples - Max. 5.0 R/hr @ 2" (except for "whim" samples)

On receipt at the sample recovery center, the samples read as follows:

Sample #	Mrad/hr, incl	incl	mr/hr	Sample #	Mrad/hr, incl	incl	mr/hr
68	140	380		G-32	400	200	
69	150	400		G-33	300	200	
70	160	400		G-34	300	200	
71	200	600		75	1500	1000	
72	1000	1000		76	1500	600	
73	500	300		77	2000	1500	
74	400	300		78	200	200	
75	600	600		79	1000	1500	
76	400	300		80	1000	1000	
77	600	600		81	1000	900	
78	400	200					



[REDACTED]

A "whim" sample was discovered which read 50 R/hr at approximately 4". This sample, consisting of coral sand from the ~~AFT~~ tower, had been collected without the knowledge of the monitor. An investigation showed that one member of the party had carried this small container in his hand

30 to 60 seconds. The direct reading Dosimeters read as follows:

- 2000 mr
- 600 mr
- 400 mr
- 500 mr

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Dosimeter had received about 1500 mr from the source which was roughly 12 inches from the dosimeter. Mission badges were processed immediately with the following results:

- 2030 mr
- 1555 mr
- 650 mr
- 565 mr

It was felt that Eason had probably exceeded his allowable hand dose, and the recommendation was made to project personnel that he be removed from necessary operations. This recommendation was not well received by project personnel, but was ultimately enforced.

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Smith monitored a party recovering samples from YFW-13 at 1725 hrs.

Readings were obtained as follows:

- Main Deck - ave. 25 mr/hr @ 3', Max. 33 mr/hr @ 3'
- Copter Pad - ave. 25 mr/hr @ 3', Max. 33 mr/hr @ 3'
- Tower - ave. 30 mr/hr @ 3'

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3
Eason assisted a party in performing Rolling work on YFW-13. The background on deck was 12 mr/hr at 3', and the background in the tower was 30 mr/hr @ 3'. Pools of water on deck read 40 mr/hr @ 3"

~~TOP SECRET~~

Carter monitored the recovery of Chan cone samples from George and Charlie.

Stay time on George - 3 minutes
 Bkg at cone 1100 mr/hr @ 3'
 Ground contamination up to 1600 mr/hr @ 3"

Stay time on Charlie - 2 minutes
 Bkg at cone 2 R/hr @ 3'
 Ground contamination up to 11 R/hr @ 3"

Chan cone samples processed at the Nan Recovery Center read as follows:

Sample	George			Charlie		
	Bottle	Hose	Funnel	Bottle	Hose	Funnel
AA	12 mrad/hr incl. 2 mr/hr	4 mrad/hr incl. 1 mr/hr	300 mrad/hr incl. 21 mr/hr	150 mr/hr	10 mrad/hr incl. 5 mr/hr	50 mrad/hr incl. 10 mr/hr
BB	110 " " 200 "	10 " " 5 "	18 " " 18 "	5 mr/hr		
CC	110 " " 100 "	13 " " 4 "	28 " " 4 "	8 mrad/hr incl. 4 mr/hr		
DD	110 " " 60 "	4 " " 2 "	28 " " 20 "			
EE	30 " " 24 "	20 " " 6 "	28 " " 20 "			
FF	30 " " 28 "	78 " " 30 "	94 " " 24 "			
GG	10 " " 10 "	30 " " 10 "	96 " " 22 "			

Rollup

Assisted in the Rollup of YFMB-29. The following readings were taken:

Main deck	700 mrad/hr incl. 60 mr/hr	@ 3'
Main deck	600 " " 150 "	@ 3"
Exterior Deckhouse	20 " " 20 "	@ 3'
Walkways	180 " " 60 "	@ 3'
Ventilation Covers	10,000 " " 1000 "	@ 3"
Top of Deckhouse	150 " " 40 "	@ 3'
Center Pod	70 " " 20 "	@ 3'
1st Inst. Room	10 " " 10 "	@ 3'
2nd Tower	40 " " 30 "	@ 3'
2nd Collector	200 " " 40 "	@ 3"
3rd Tower	120 " " 50 "	@ 3'
3rd Collectors	300 " " 100 "	@ 3"

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Miller surveyed the standard pattern at RCN (N) at 0835. Readings were as follows:

1 - 21 mr/hr @ 3'	7 - 23 mr/hr @ 3'	a - 15 mr/hr @ 3'
2 - 21 " "	8 - 16 " "	b - 17 " "
3 - 22 " "	9 - 15 " "	c - 15 " "
4 - 20 " "	10 - 19 " "	d - 21 " "
5 - 20 " "	11 - 16 " "	e - 21 " "
6 - 25 " "	12 - 18 " "	f - 20 " "

3. Project 2.6

On T + 2, Spicker assisted project 2.6 personnel in recovering samples from YWB-29. The following readings were obtained:

Copter Pad	- 2 R/hr
Eng at work	- 200 to 1000 mr/hr
Sample Box 1	- 200 mr/hr @ 2"
" " 2	- 120 " "
" " 3	- 80 " "
" " 4	- 800 " "
" " 5	- 80 " "

4. Project 1.1

Project 1.1 had been completed.

Secondary Fallout

At the request of Evan G. D. Jr., periodic background readings were taken on Man Island during the time of Nevada + 1. The readings obtained are given below:

SAN BRUNO IBC

	<u>Date</u>	<u>Weather</u>	<u>mr/hr Background</u>
7-11-56	1900	Clear	0.4
	1930	Clear	0.2
	2100	Clear	0.3
	2135	Clear to Rain	0.2
	2300	Rain to Clear	3.0
	2323	Clear to Rain	2.5
7-12-56	0100	Rain	9.5
	0130	Rain	10.0
	0300	Drizzle	8.5
	0340	Drizzle	7.0
	0610	"	5.5
	0640	"	1.0
	1030	Clear	1.1 (8)
	1315	Clear	2.5
	1450	Clear	2.5
	1600	Clear	1.4
	1900	Clear	1.4
	2040	Clear	1.4
	2140	Clear	1.2
2200	Clear	1.6	
2300	Clear	1.7	
2400	Clear	1.0	

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<u>Time</u>	<u>Weather</u>	<u>Mr/hr Background</u>
7-13-56 0100	Clear	2.0
0200	Clear	1.8
0300	Clear	1.8
0400	Clear	1.8
0500	Clear	1.2
0600	Clear	1.0
0700	Clear	1.1
0800	Clear	0.5

Readings taken after Tewa gave no indication of secondary fallout during the period Tewa through Tewa + 2.

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Operations were completed and personnel left Bikini on dates shown:

July 26 to Elmer
July 22 to Elmer
July 26 to "
July 26 to "
July 26 to "
July 26 to "

PRIVACY ACT MATERIAL REMOVED

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Chapter VI - Conclusions and Recommendations

A. Training Program

1. Although three weeks is not enough time to adequately train a monitor, the men performed surprisingly well in the field. In comparison with typical army monitors, our trainees, whether in 2.10 or TU7 were well trained. They obviously had not absorbed the details that were presented at the school, but had a good understanding of the principles of contamination and radiation dose control.

2. Less time should be taken up in the training course with detailed explanations of techniques which will be used by only one or two people. More time should be given to the fundamental principles. Several monitors^{stated} that much of the detailed lecture material only served to confuse them. Although I personally enjoyed the T.I. two-week course, I believe that it is of very little value to a monitor. More time should be spent on contamination control. I feel that this is an area in which we were very weak. Most of our troubles at Bikini were the result of poor, or rather nonexistent contamination control. **SAN BRUNO ERG**

B. Reducing Rad-Safe

1. TU7 personnel and officers could not cope with the contamination resulting from Tewa. The decontamination facility almost completely broke down because of lack of adequate preparation and supplies, and a very poor traffic flow pattern.

The protective clothing provided was inadequate for work on wet, contaminated decks. Had rubber gloves and boots been provided, almost all of our Hand and Shoe contamination would have been avoided.

[REDACTED]

On several occasions, TU7 personnel dosage records were found to be in error. Addition was the problem here.

did an excellent job of keeping project leaders informed of the radiation status of their people.

SAN BRUNO ERC

2. The film badge used in the Redwing operation appeared to be satisfactory, and I have nothing specific to offer with regard to possible improvement.

PRIVACY ACT MATERIAL REMOVED