[redacted]

411123

RADIOLOGICAL SAFETY

FINAL REPORT

RG 374 DEFENSE NUCLEAR AGENCY
Location WNRC
Access No. 66A-3264 Box 7/7
Folder RADIOLOGICAL SAFETY-FINAL REPORT-OPERATION HARDTACK-VOL. II

CLASSIFICATION CANCELLED
WITH ...
BY AUTH ... *
J. Diaz 3/9/92
* Ltr DNA Swisher to OCTP
See Ltr dtd 10/30/91
Kahn 3/18/92

OPERATION HARDTACK

[redacted]

BEST COPY AVAILABLE

VOL. II

~~CONTAINS ... COORD... DNA~~

[redacted]

~~JTF-7 NR S-80020/8 Vol II~~
~~CY __ OF 10 CYS ___ PAGE(S)~~

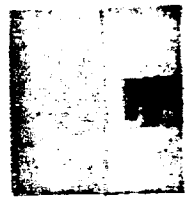
[redacted]

VOLUME II

INDEX

DNA

[redacted]



DNA

INDEX

TAB

[redacted]

REDWOOD EVENT

OPERATION HARDTACK

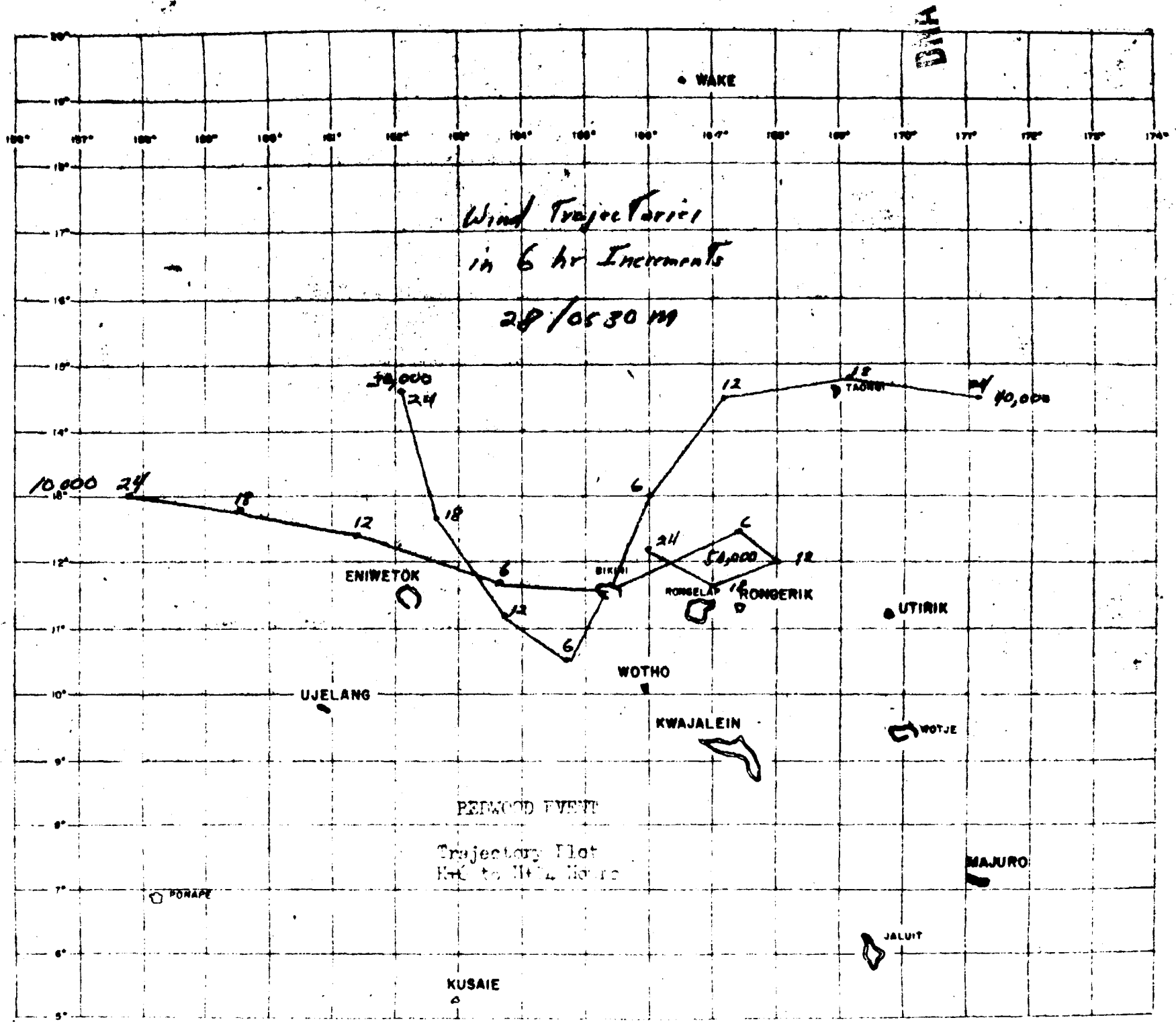
1. The REDWOOD device was detonated on a barge north of Fox Island, Bikini Atoll, at 0530M, 28 June 1958. RadSafe operations were controlled through the USS Benner, located in the Bikini Lagoon. The yield was approximately [redacted] The cloud rose immediately to [redacted] and it was reported stabilized at [redacted] by the B-52 at 0610M; the base was estimated at 28,000 feet.

2. The cloud moved out of the lagoon area rapidly, and at 0600M the P2V (Wildroot #13) commenced his radiological survey at 1,000 feet. Only background was obtained with the exception of the area adjacent to ground zero. Dog Island read 25 mr/hr, and George Island read 47 r/hr at 0630M.

3. The helicopter commenced the survey at 0650M, and re-entry hour was declared at 0700M. The only significant readings were obtained near the ground zero. They were: Charlie Island, 500-600 mr/hr at 100 feet; the crater, 5 r/hr at 100 feet at 0720M.

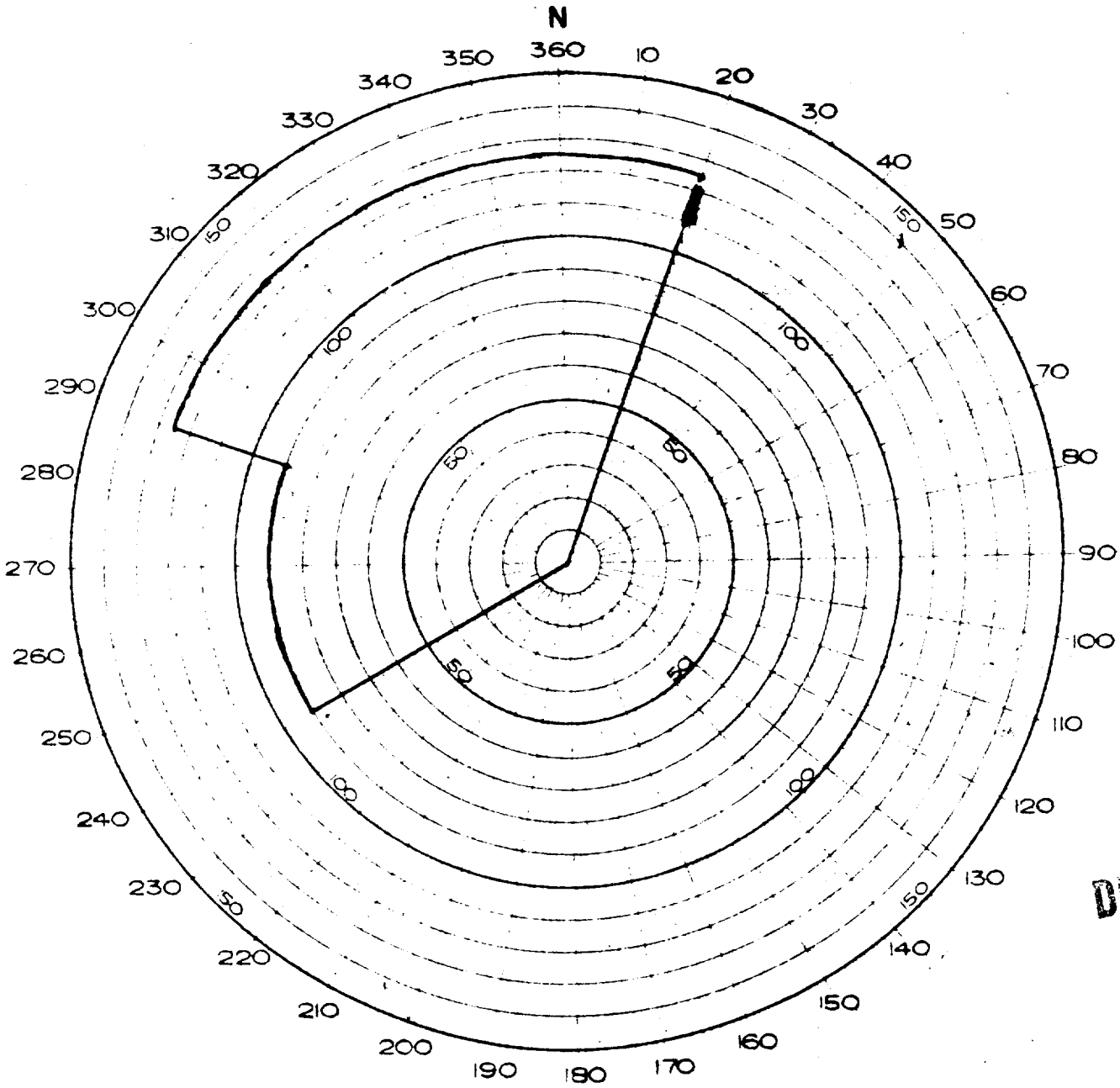
4. The P2V was then vectored on radials of 260 degrees, 270 degrees, and 090 degrees from Bikini for 100 miles as a barrier patrol. The fall-out pattern was forecast on mean bearings of 270 degrees and 360 degrees. The P2V found no fallout north and east of this predicted area, and it was released at 1100M.

[redacted]



HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



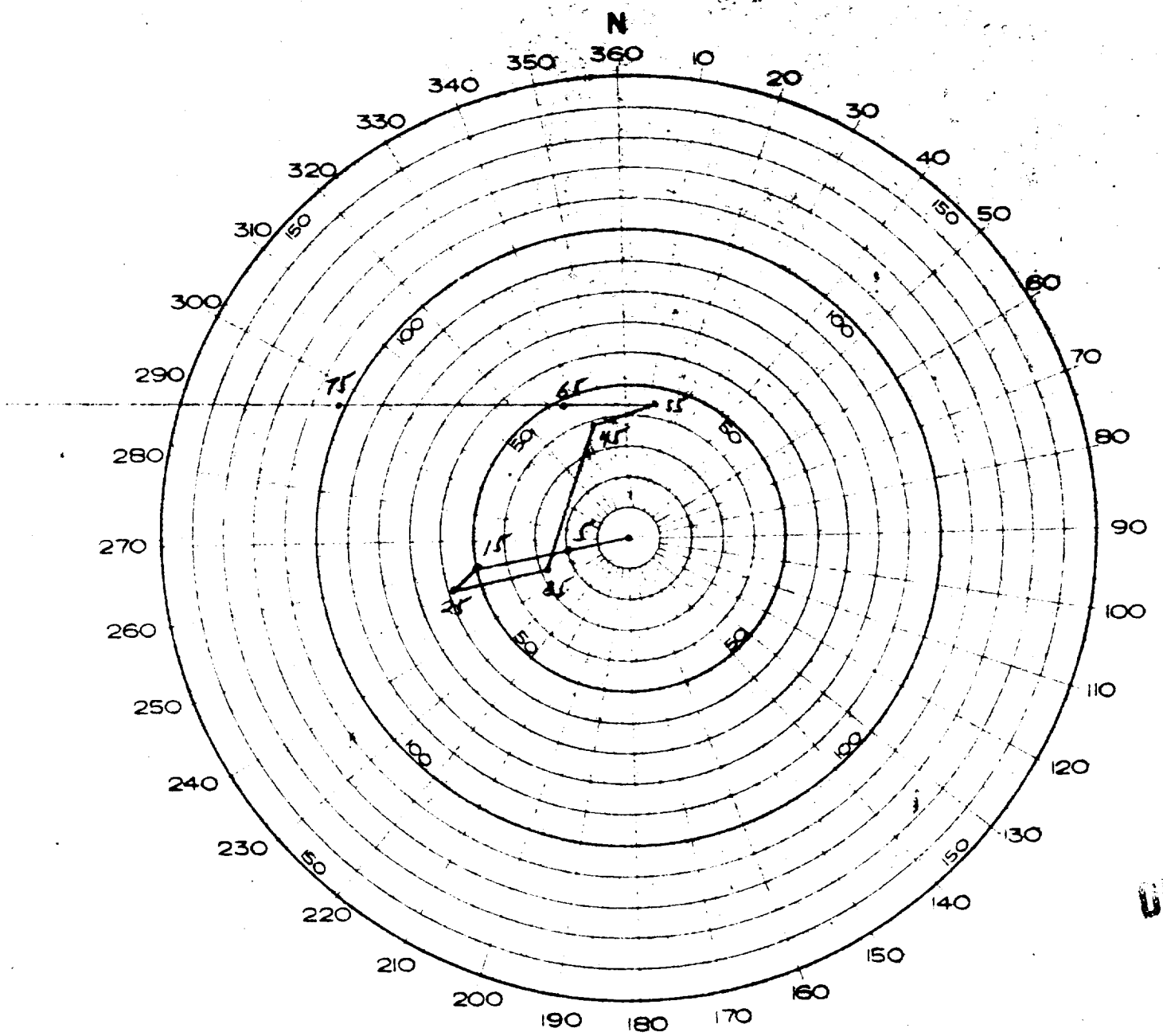
DNA

REDWOOD EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX

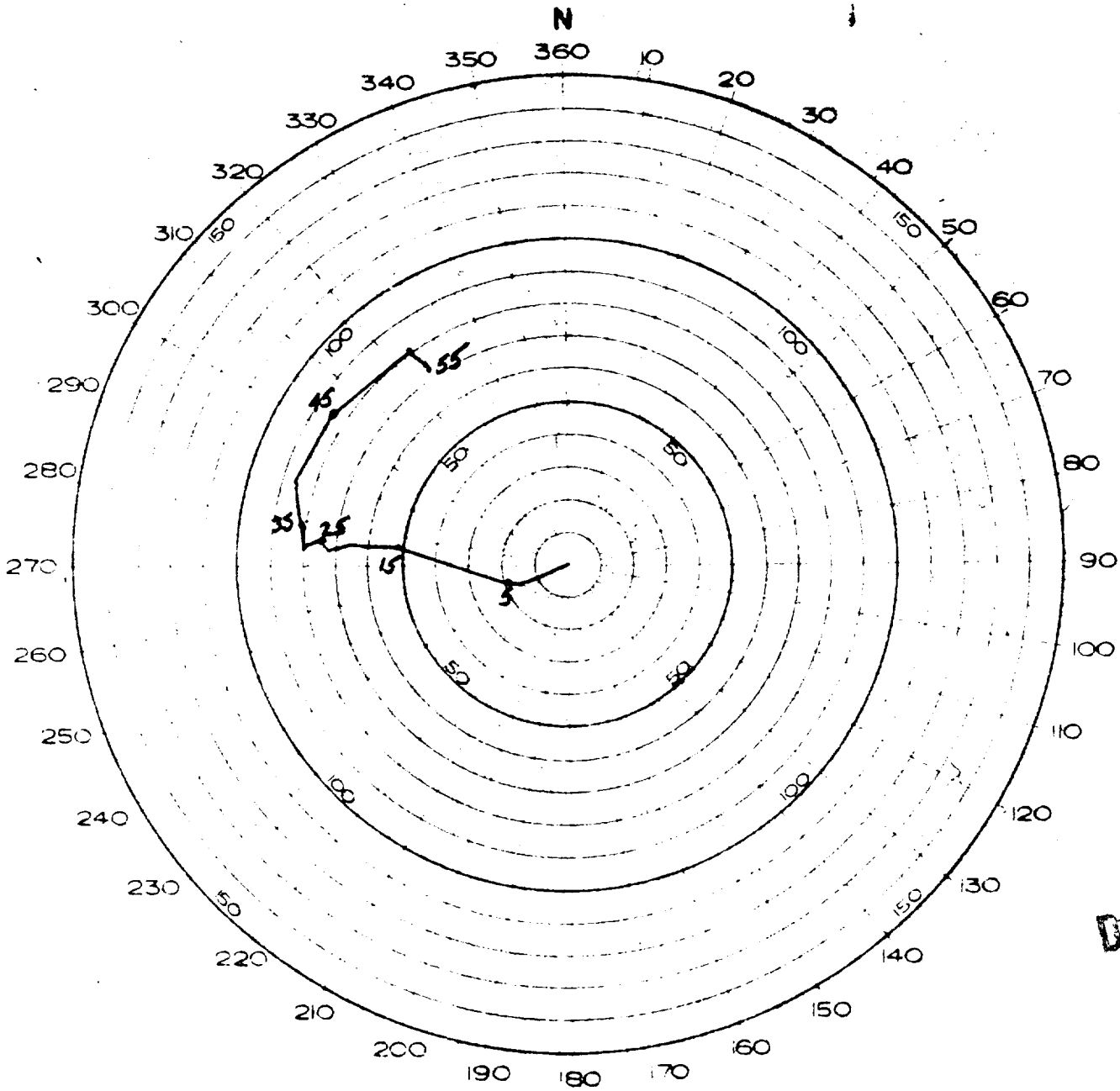


REDWOOD EVENT

Forecast Hodograph

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



REDWOOD EVENT

Shot-time Hodograph

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

29 JUNE 1958

REDWOOD

BIKINI OBSERVED WEATHER FOR 28 JUNE 1958

SURFACE WEATHER:

Sea Level Pressure	1010.1 mbs
Free Air Surface Temperature	81.2 °F
Wet Bulb Temperature	79.2 °F
Dew Point Temperature	78.5 °F
Relative Humidity	92%
Surface Wind	065° 10 knots
Visibility	10 miles
Weather	None

CLOUDS:

Broken (6/10) cumulus, bases unknown

AREA WEATHER SUMMARY FROM AIRCRAFT:

Scattered (5/10) cumulus, bases unknown. Broken (7/10-8/10) cirrus, bases 35,000 feet, tops 40,000 feet.

STATE OF THE SEA:

Open Sea; Waves 4-5 feet high, period 4-5 seconds, length 50-75 feet.

Lagoon Side: Waves less than 1 foot, period 2-3 seconds.

REDWOOD

BIKINI RADIOSONDE OBSERVATION

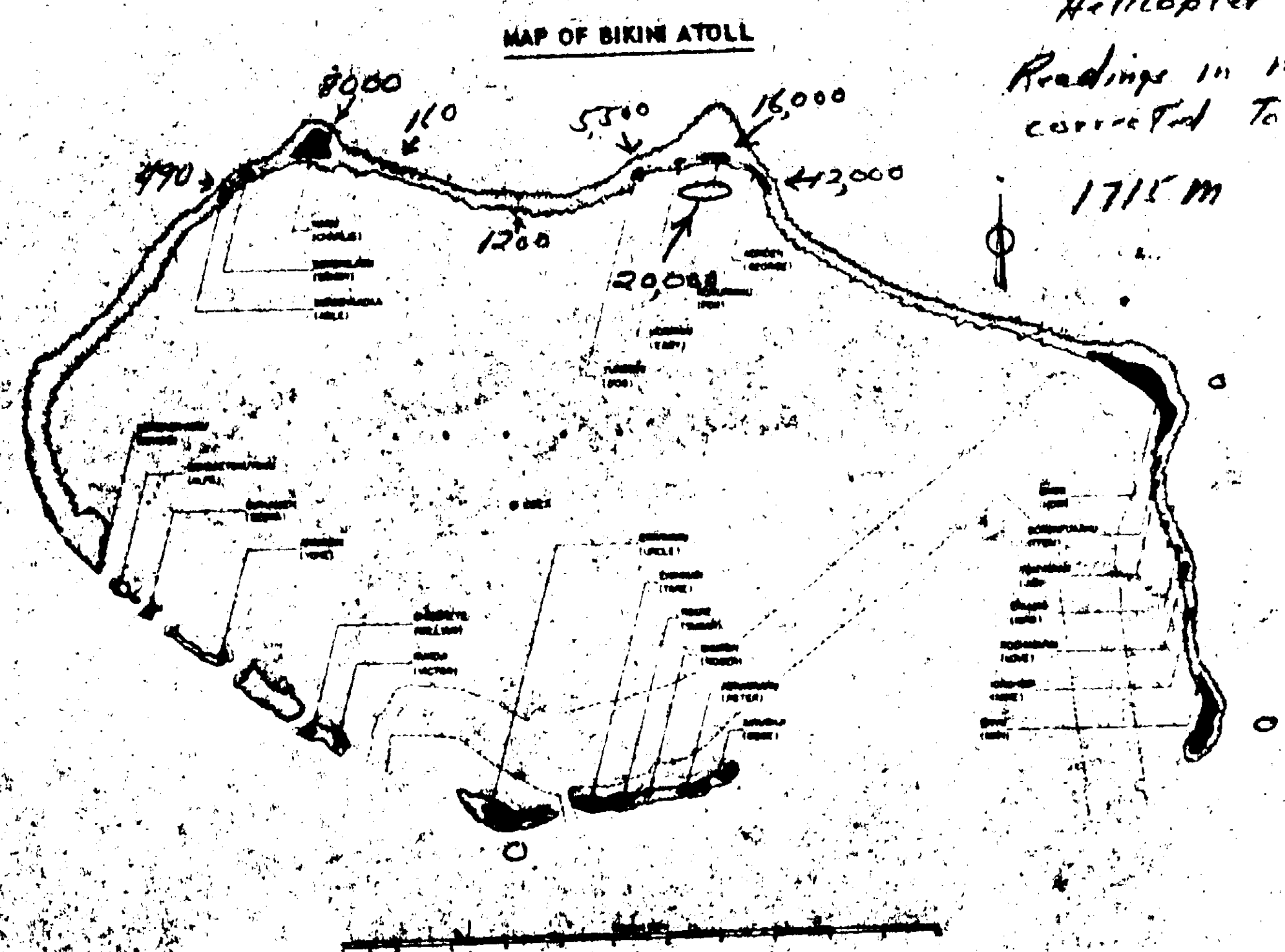
Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1008	Surface	28.2	24.8
1000	250	28.2	23.5
919	2,657	20.8	18.2
850	4,890	17.2	12.2
807	6,365	14.5	08.2
778	7,415	15.8	01.5
760	8,030	13.2	05.2
740	8,760	12.2	-02.5
712	9,810	10.2	-00.5
700	10,260	09.8	-07.2
696	10,433	09.8	-12.2
652	12,205	08.0	Miss
600	14,410	02.5	Miss
566	15,978	-01.0	Miss
500	19,170	-05.5	Miss
400	24,820	-15.2	Miss
300	31,~~772~~ 720	-29.8	Miss
250	35,880	-40.0	Miss
200	40,750	-52.8	Miss
150	46,310	-68.2	Miss
112	52,100	-79.0	Miss
100	54,330	-73.0	Miss
091	56,069	-72.0	Miss
058	64,731	-65.0	Miss
050	67,860	-63.0	Miss
030	78,340	-56.0	Miss
025	82,120	-57.2	Miss
010	97,868	-43.0	Miss

REDWOOD

BIKINI WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	070	20
1,000	070	20
2,000	070	22
3,000	070	20
4,000	070	17
5,000	080	16
6,000	100	18
7,000	100	19
8,000	110	19
9,000	110	20
10,000	110	20
12,000	110	18
14,000	110	17
16,000	100	16
18,000	090	14
20,000	100	16
22,000	150	12
24,000	100	10
26,000	160	10
28,000	130	07
30,000	070	05
32,000	030	03
34,000	200	04
36,000	100	02
38,000	170	06
40,000	170	14
42,500	210	17
45,000	210	22
47,500	200	14
50,000	230	21
52,500	310	13
55,000	310	06
57,500	010	04
60,000	130	07

DNA



REDWOOD EVENT

Radiological Surface Survey

Helicopter Survey
Readings in mr/hr
corrected to ground
1715M 28 June 1958

DNA

INDEX

TAB

[redacted]

ELDER EVENT

OPERATION HARDTACK

1. ELDER was detonated at 0630M on a barge one mile southwest of Janet Island, Eniwetok Atoll, on 28 June 1958. The cloud rose more rapidly than usual and passed beyond the upper limit of the weather radar (50,000 feet) at H+2 minutes and 50 seconds. No cloud height observations from aircraft were readily available, and it was not until H+50 minutes that a cloud sampler reported the top at [redacted] This figure would indicate that the initial cloud height was probably well over [redacted]

2. Cloud movement was generally to the north, with stem movement to the west-northwest. Net movement was slow; in fact, the upper cloud (above 50,000 feet) could be observed directly over the atoll for several hours.

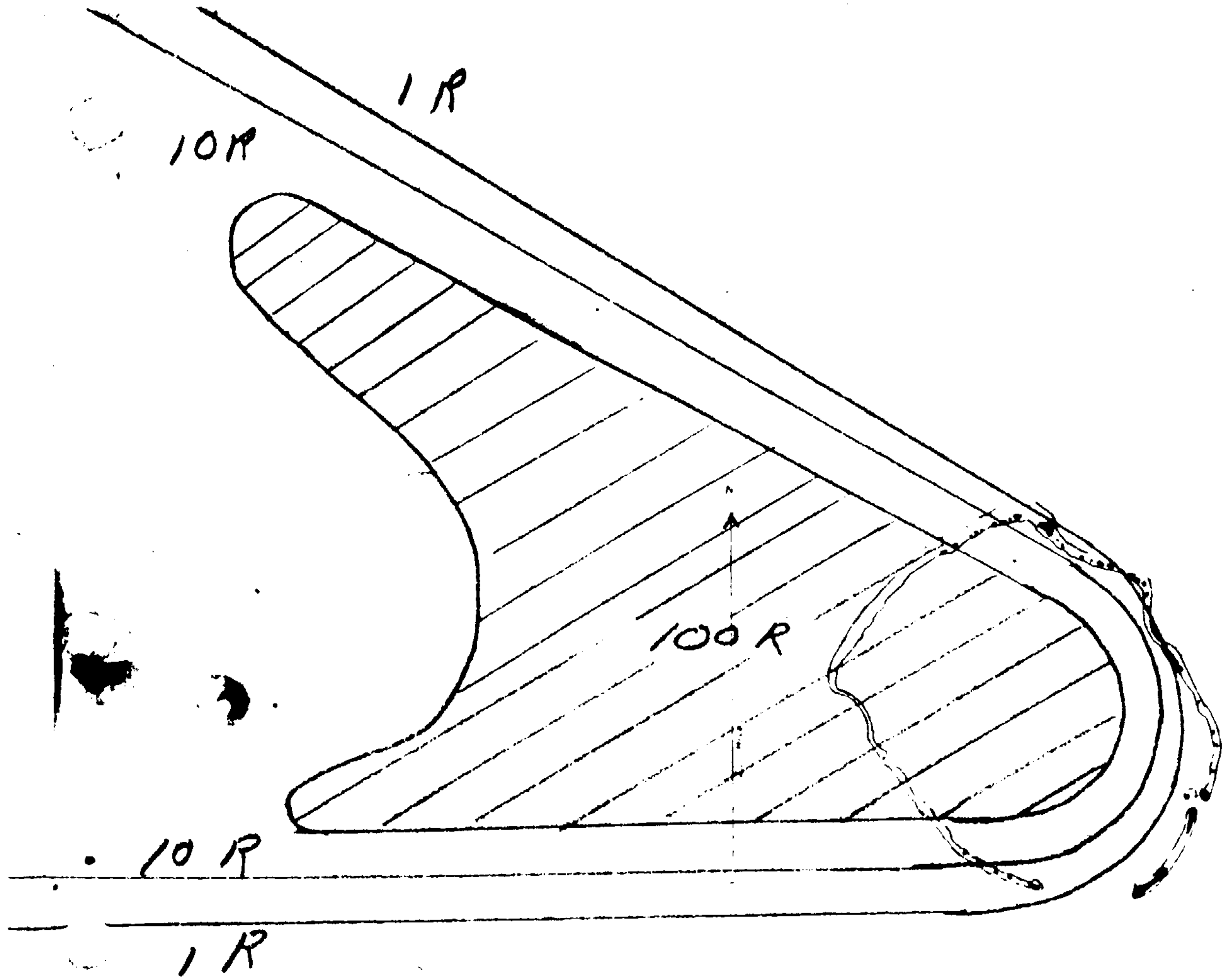
3. The P2V arrived at H+30 minutes and cleared the lagoon south of a line from Yvonne to Leroy by H+1. The rest of the lagoon was cleared by H+2½ except for the islands from Alice to Wilma, and re-entry hour was declared by H+3.

4. FOFU predicted a fallout plot between the radials 270 degrees to 320 degrees. The actual pattern was from 260 degrees to 010 degrees, with the extent essentially as predicted.

DNA

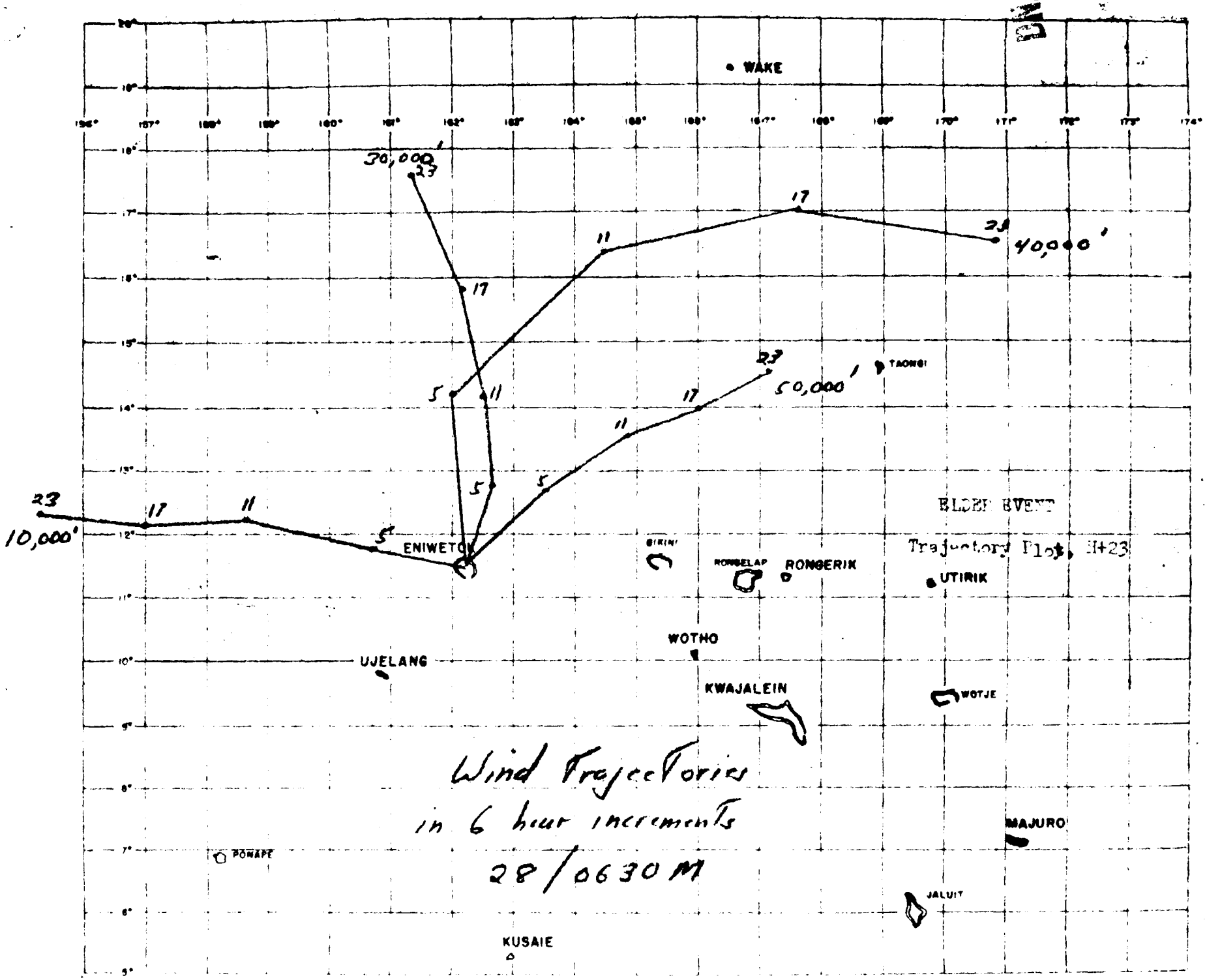
TAB A

[redacted]

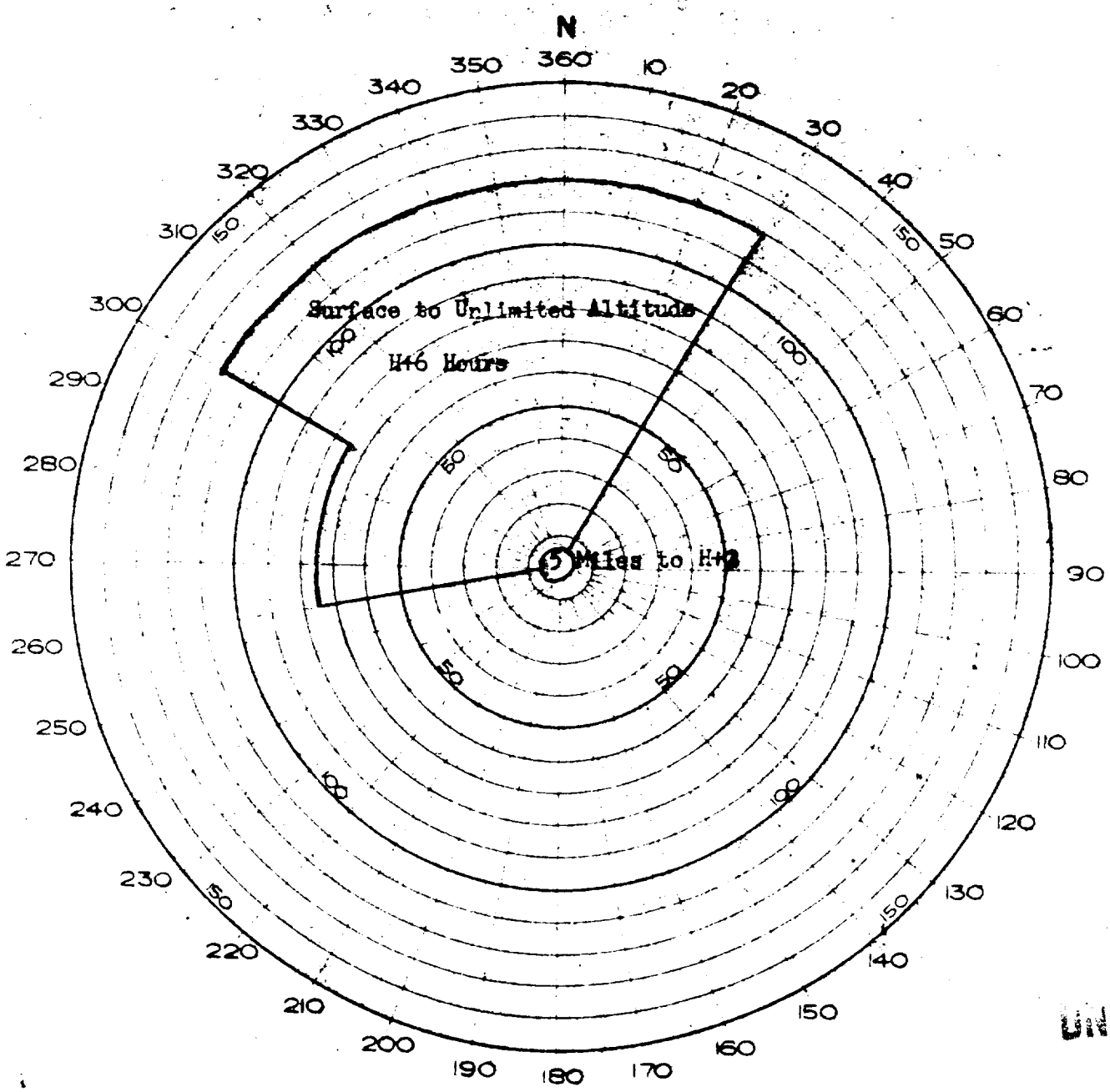


ELDER EVENT

Forecast Fallout Plot



HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



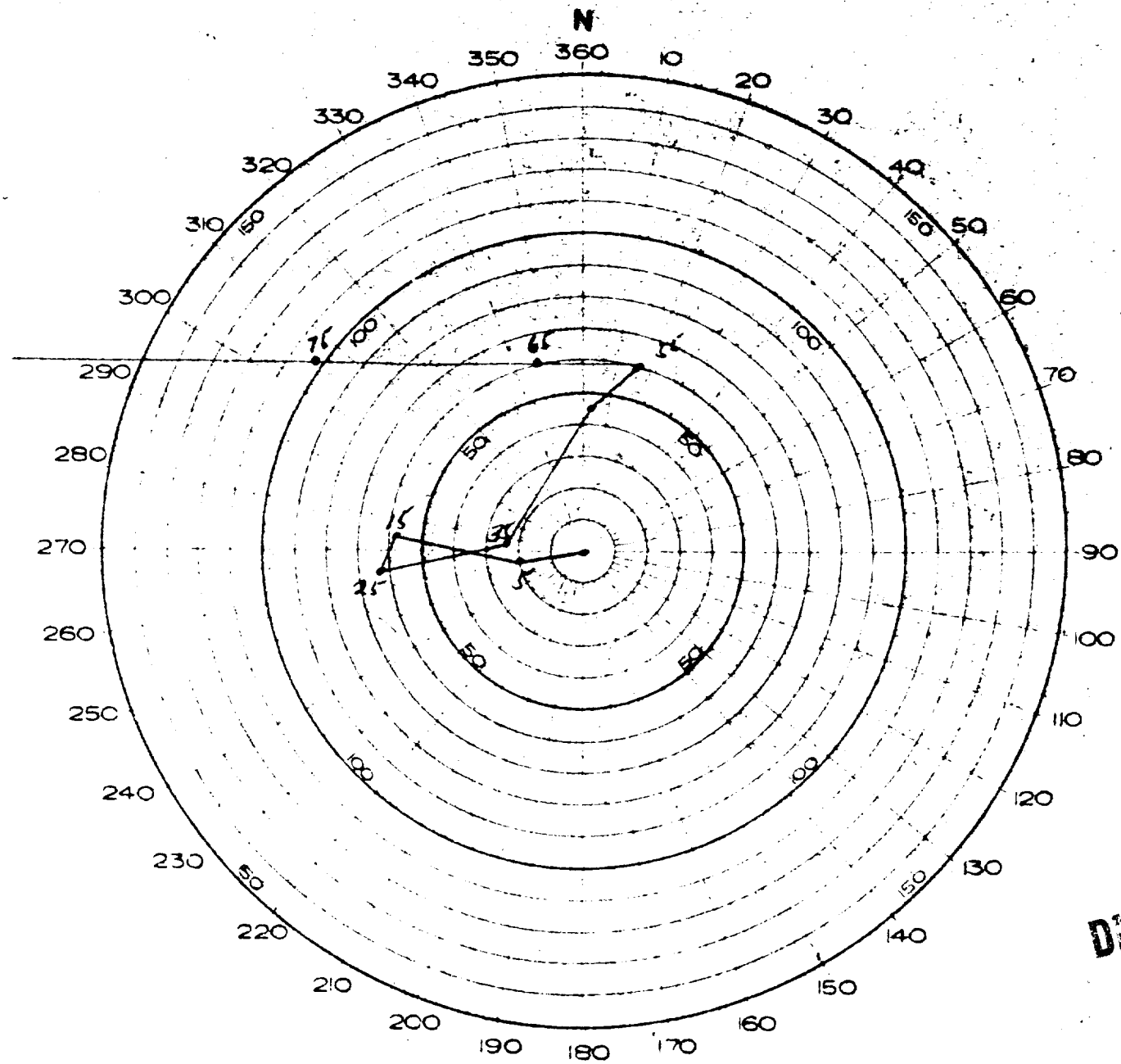
UNA

ELDER EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



DNA

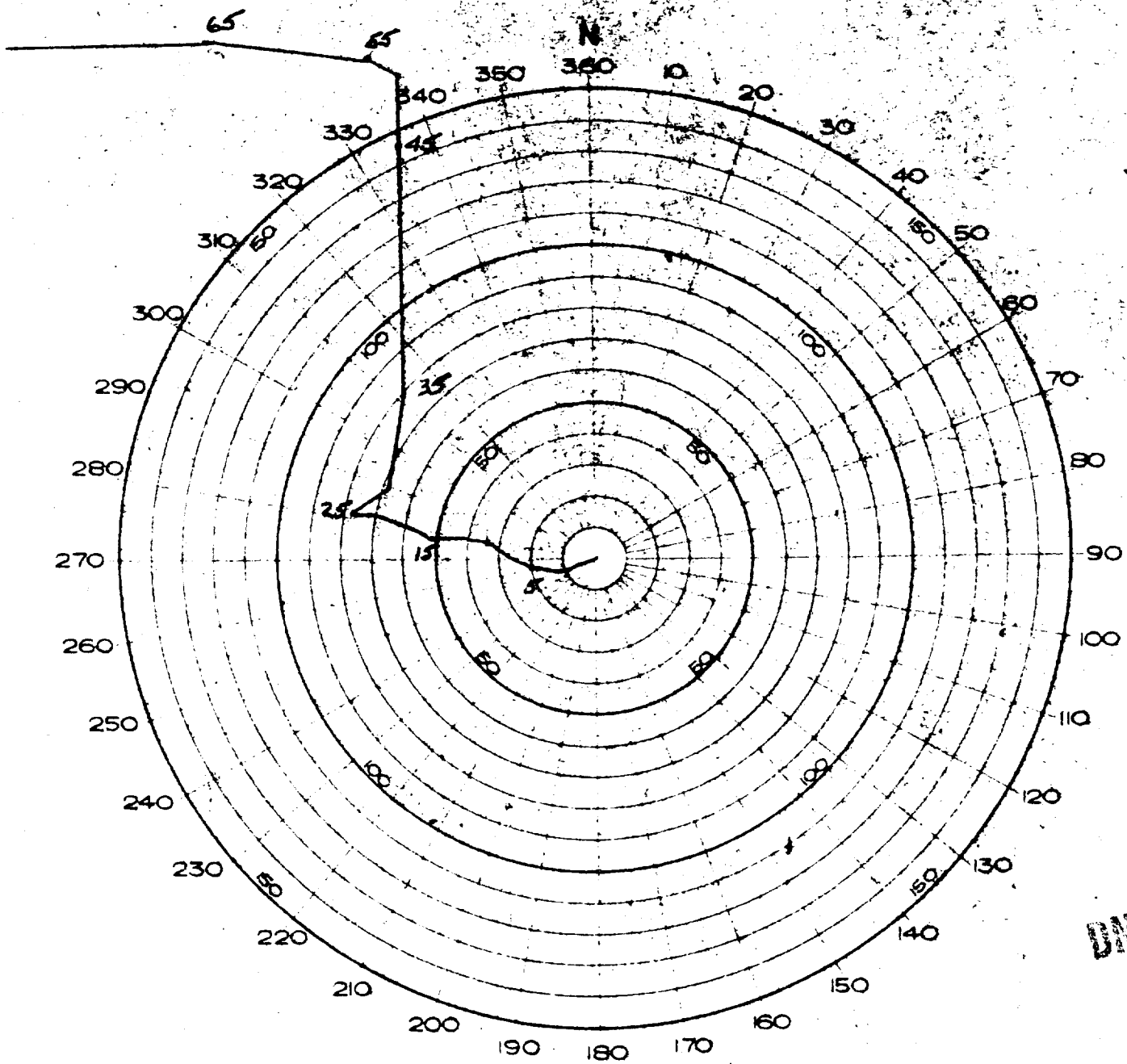
ELDER EVENT

Forecast Hodograph

TAB E-1

21

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



DNA

ELDER EVENT

Shot-time Hodograph
280630M June

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

28 June 1958

ELDER
ENIWETOK OBSERVED WEATHER FOR 28 JUNE 1958

SURFACE WEATHER:

Sea Level Pressure	1008.7 mbs
Free Air Surface Temperature	81.3° F
Wet Bulb Temperature	80.0° F
Dew Point Temperature	74.0° F
Relative Humidity	78%
Surface Wind	090° 17 knots
Visibility	10 miles
Weather	None

CLOUDS:

Scattered (2/10) cumulus, bases 1800 feet. Thin overcast (10/10) cirrostratus, bases unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT

Scattered (2/10-4/10) cumulus, bases 1,800 feet. Scattered to broken (5/10-9/10) cirriform, bases 35,000 feet, tops 40,000 feet.

STATE OF THE SEA:

Open Sea: Waves 5 feet high, period 5 seconds, length 80 feet.
Lagoon side: Waves less than 1 foot high, period 1-2 seconds.

ELDER

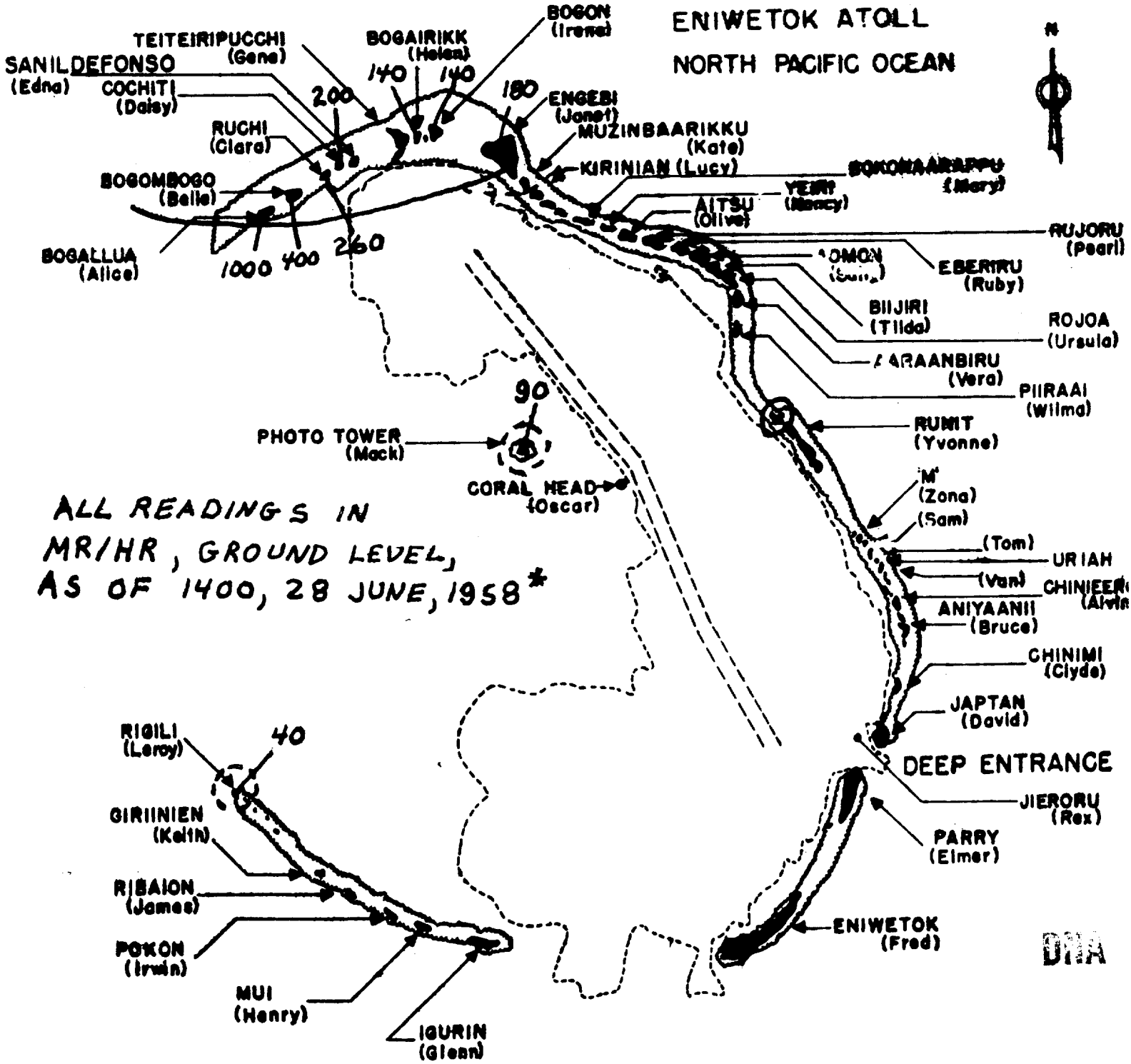
RHINEVETOK RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1008	Surface	28.2	24.8
1000	250	28.2	23.5
919	2,657	20.8	18.2
850	4,890	17.2	12.2
807	6,365	14.5	08.2
778	7,415	15.8	01.5
760	8,030	13.2	05.2
740	8,760	12.2	-02.5
712	9,810	10.2	-00.5
700	10,260	09.8	-07.2
696	10,433	08.8	-12.2
652	12,205	08.0	Miss
600	14,410	02.5	Miss
566	15,978	-01.0	Miss
500	19,170	-05.5	Miss
400	24,820	-15.2	Miss
300	31,720	-29.8	Miss
250	35,880	-40.0	Miss
200	40,750	-52.8	Miss
150	46,610	-68.2	Miss
112	52,100	-79.0	Miss
100	54,330	-76.0	Miss
091	56,069	-72.0	Miss
058	64,731	-65.0	Miss
050	67,860	-63.0	Miss
030	78,340	-56.0	Miss
025	82,120	-57.2	Miss
010	97,868	-43.0	Miss

ELDER

ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	20
1,000	070	23
2,000	070	23
3,000	080	21
4,000	090	19
5,000	090	19
6,000	100	19
7,000	~~130~~ 120	20
8,000	130	18
9,000	130	19
10,000	~~130~~ 120	17
12,000	090	17
14,000	090	16
16,000	110	14
18,000	120	11
20,000	110	14
22,000	120	12
24,000	090	13
26,000	090	12
28,000	150	08
30,000	230	14
32,000	230	23
34,000	210	26
36,000	190	31
38,000	190	37
40,000	180	41
42,500	180	40
45,000	180	39
47,500	230	24
50,000	180	20
52,500	190	08
55,000	120	11
57,500	120	06
60,000	100	23
65,000	100	24
70,000	060	40
75,000	100	41
80,000	090	53
85,000	090	67
90,000	090	81
95,000	090	78
97,000	090	78



ELDER EVENT

Radiological Surface Survey, H+7 Hours

DNA

INDEX

TAB

[redacted]

OAK EVENT

OPERATION HARDTACK

1. OAK was detonated on the reef nine miles north of Leroy Island, Eniwetok Atoll, at 0730M, 29 June 1958. The yield of 9 MT produced a cloud which pierced the trepopause at 55,000 feet in well under two minutes. No actual observations on the initial cloud height were made because no aircraft were in position; however, it is estimated that initial height was probably near 78,000 feet. The first reading was obtained at H+3 hours when a sampler aircraft reported the stabilized height of the cloud at 67,000 feet.

2. Initial movement of the lower portion (below 50,000 feet) was to the west, with a net velocity of slightly over fifteen knots. The lagoon was swept with more than usual caution due to the size of the detonation. Re-entry hour was declared at 1000M after a thorough P2V sweep at 1,000 feet. The atoll was free of contamination except for the islands Alice through Daisy (closest to ground zero), which averaged 35 mr.

3. The portion of the cloud at approximately 55,000 feet remained in the vicinity of ground zero for several hours, then moved slowly to the southwest. This cell was reported 60 miles southwest at nightfall with an intensity of 350 mr/hr measured by the sampler aircraft. This cloud was again detected early the next morning at 200 miles southwest of Fred and was measured at 40 mr/hr. No further information on this part of the cloud became available.

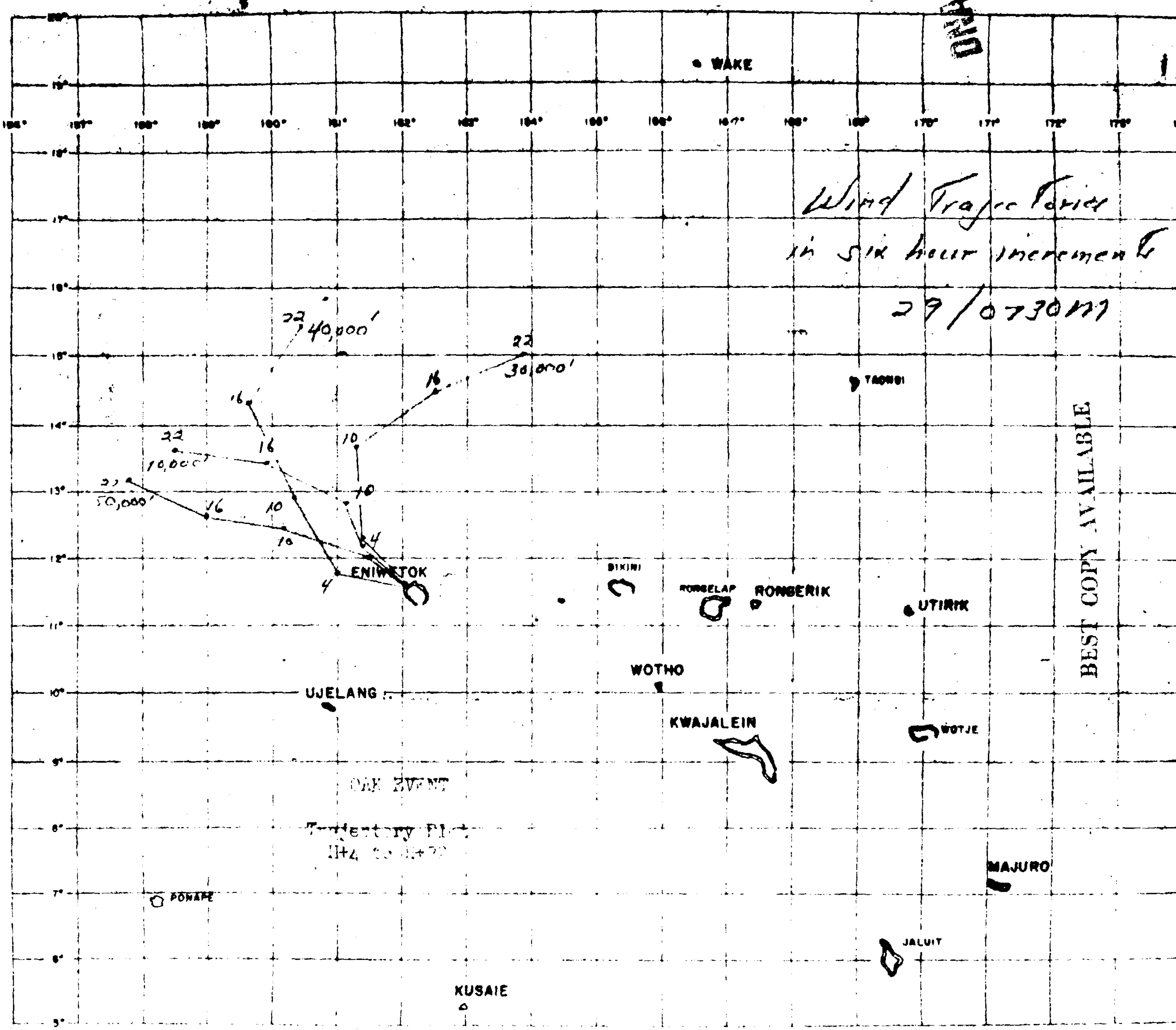
[redacted]

4. Helicopter surveys at H+3 and D+1 both confirmed the information obtained by the P2V lagoon survey.

5. The predicted fallout pattern was oriented between the radials 280 degrees and 320 degrees. The actual pattern was more westerly, with some contamination reported as far south as Ujelang. FOPU had predicted close-in values of 100 r for a six-mile radius and 10 r for a 12-mile radius upwind of ground zero, but the initial P2V survey indicated that this prediction was not borne out.

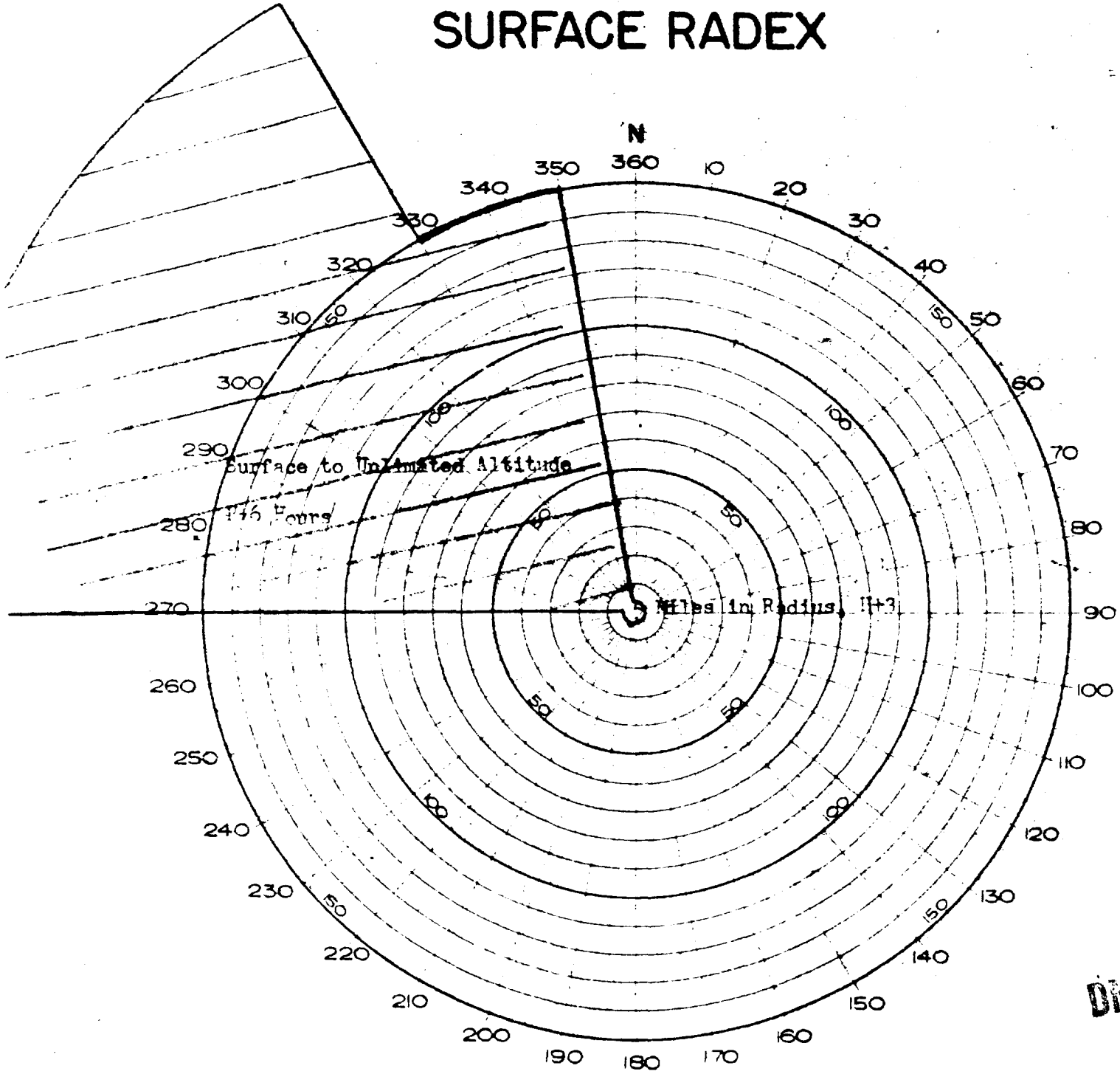
BEST COPY AVAILABLE

DNA



TAB C

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



DNA

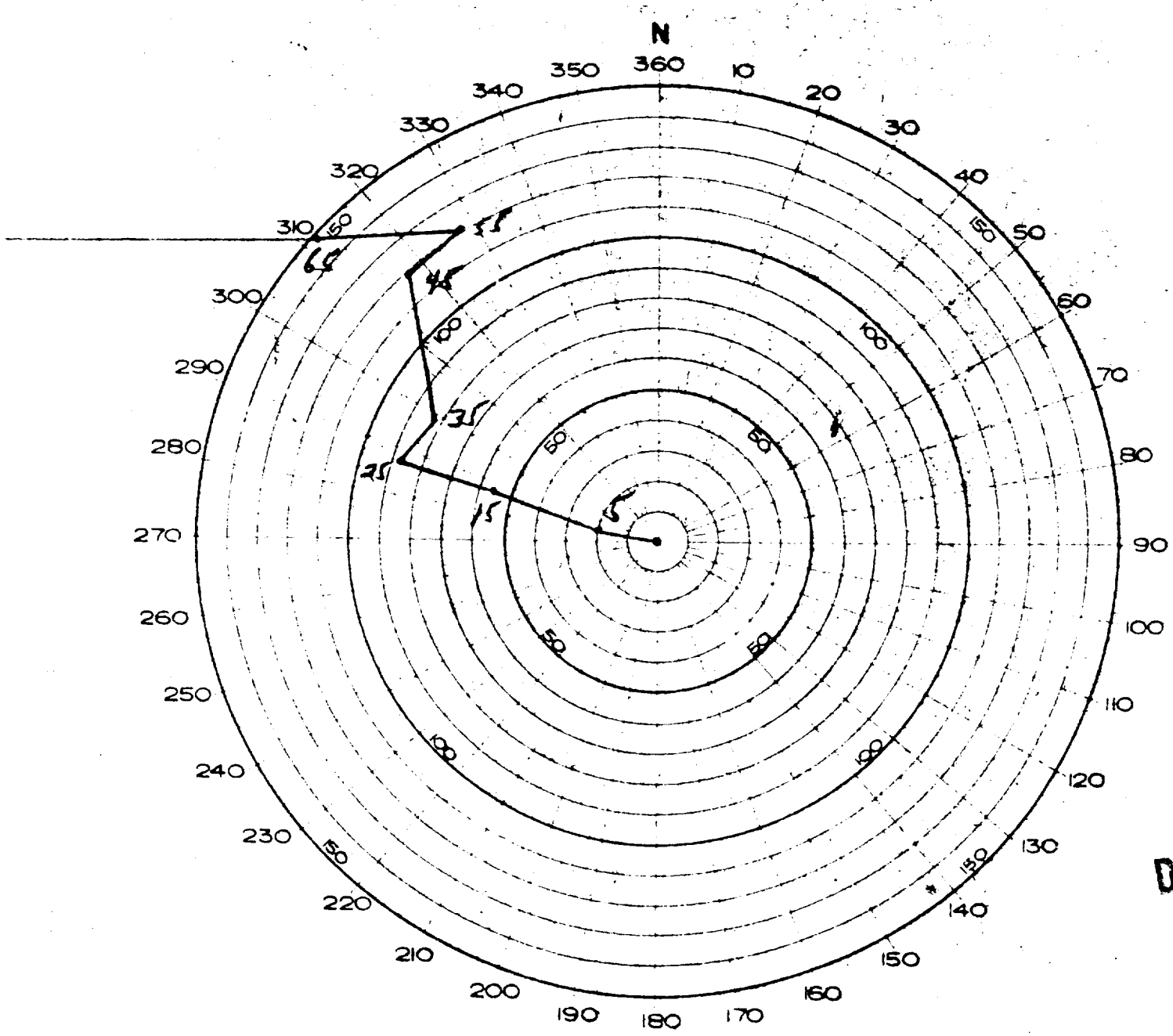
OAK EVENT

Surface and Air Radex

TAB D

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



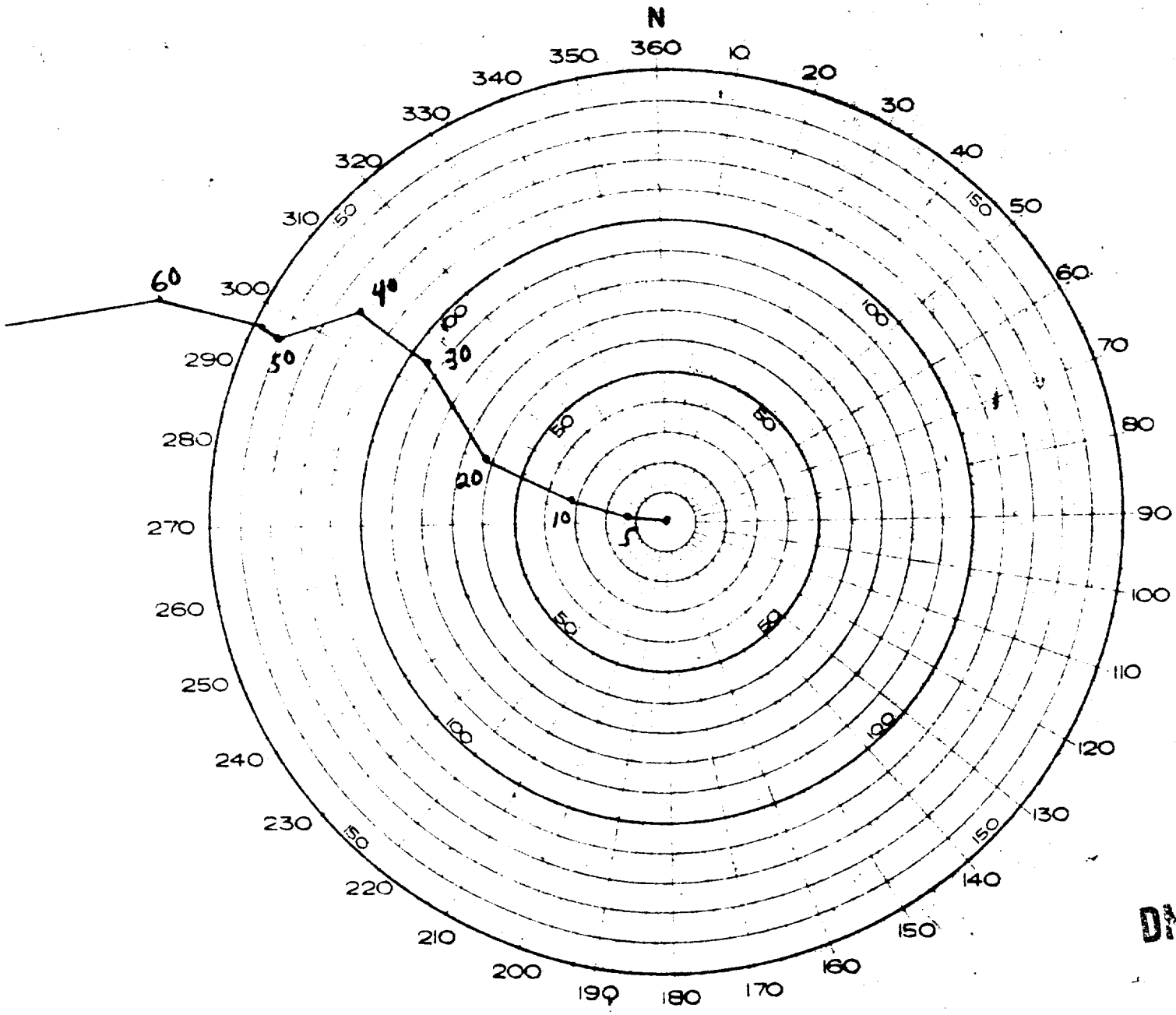
OAK EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



DNA

OAK EVENT

Shot-time Hodograph

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

30 JUNE 1958

CAK

ENIWETOK OBSERVED WEATHER FOR 29 JUNE 1958

SURFACE WEATHER:

Sea Level Pressure	1009.5 mbs
Free Air Surface Temperature	81.1° F
Wet Bulb Temperature	77.9° F
Dew Point Temperature	76.5° F
Relative Humidity	87%
Surface Wind	120° 14 knots
Visibility	10 miles
Weather	None

CLOUDS:

Scattered (5/10) cumulus, bases 2,000 feet. Scattered altostratus (3/10) bases 14,000 feet. Broken (8/10) cirriform, bases unknown. Towering cumulus West, distance unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT :

Scattered (4/10-5/10) cumulus, bases 3,000 feet, tops 7,000 feet. Broken (8/10) thin cirriform, bases 22,000 feet. Heavy rain showers in the lagoon area southeast through north and the east northeast. Multiple layers of clouds in shower areas. Light to heavy turbulence south.

STATE OF THE SEA:

Open Sea: Waves from 080 deg, period 4 seconds, height 4 feet.
Lagoon Side. Waves from 080 deg, period 3-4 seconds, height 1.5 feet.

OAK

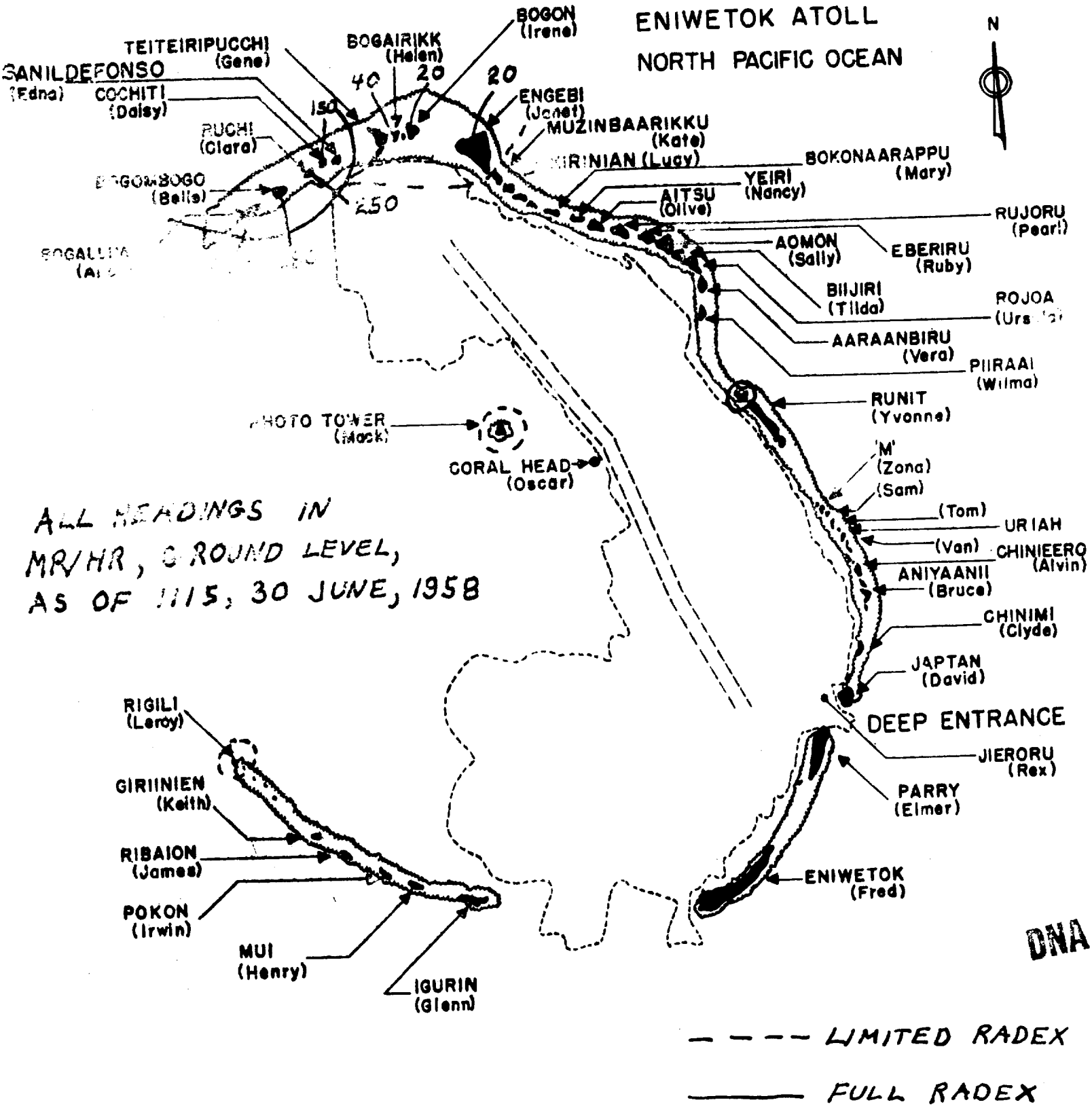
EMMETON RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1009	Surface	25.5	22.5
1000	280	25.2	22.2
880	3,900	16.8	14.5
850	4,890	15.5	13.2
700	10,210	07.2	03.5
600	14,320	-00.2	-02.8
500	19,050	-07.2	-09.8
400	24,640	-17.8	-23.8
300	31,490	-32.8	-45.2
299	31,560	-33.2	-45.5
250	35,620	-42.2	Miss
200	40,440	-55.2	Miss
176	42,910	-62.0	Miss
150	46,270	-68.2	Miss
131	48,850	-74.0	Miss
124	49,740	-77.0	Miss
119	50,590	-71.0	Miss
100	56,050	-74.8	Miss
083	57,590	-78.0	Miss

OAK

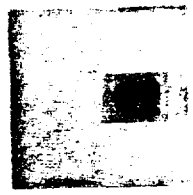
ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	120	~~10~~ 04
1,000	090	19
~~2~~,000	100	21
3,000	100	21
4,000	100	21
5,000	110	19
6,000	110	17
7,000	120	17
8,000	120	17
9,000	130	16
10,000	140	15
12,000	150	14
14,000	130	16
16,000	130	15
18,000	130	15
20,000	130	16
22,000	140	15
24,000	140	18
26,000	150	20
28,000	140	17
30,000	140	14
32,000	130	15
34,000	130	12
36,000	130	13
38,000	120	16
40,000	120	17
42,500	120	16
45,000	090	20
47,500	070	14
50,000	090	11
52,500	160	05
55,000	150	04
57,500	~~130~~ 110	10



OAK EVENT

Radiological Surface Survey, D+1 Day



DNA

INDEX

TAB

DNA

[redacted]

HICKORY EVENT

OPERATION HARDTACK

1. The HICKORY device was detonated on a barge off the west end of Tare Island, Bikini Atoll, at 1200M, 29 June 1958. RadSafe operations were controlled through the USS Benner, located in Bikini Lagoon. The yield was approximately [redacted] The cloud rose immediately to [redacted] the base was estimated at 12,000 feet.

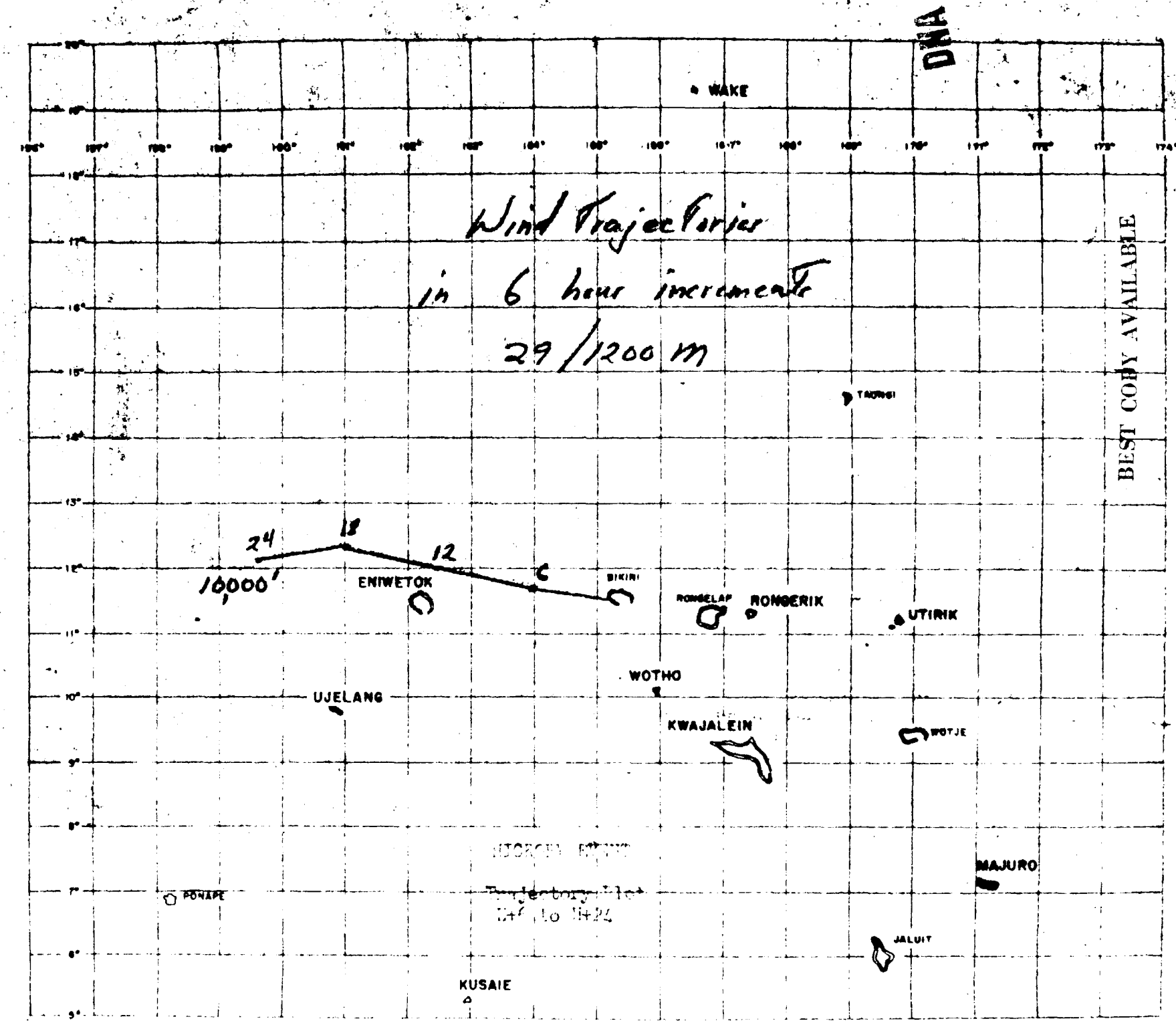
2. The P2V aircraft (Wildroot #5) reported over Nan at 1230M, and the cloud position had moved outside the northwestern corner of that atoll. Negative readings were obtained on the eastern side of the atoll, but some isolated hot rain showers were encountered in the vicinity west of ground zero. Maximum intensity in rain was recorded over Roger: 800 mr/hr, at 1305M.

3. The RadSafe helicopters took off at 1305M, and re-entry hour was declared at 1330M. The highest readings were obtained west of Tare Island at 100 mr/hr at 1335M.

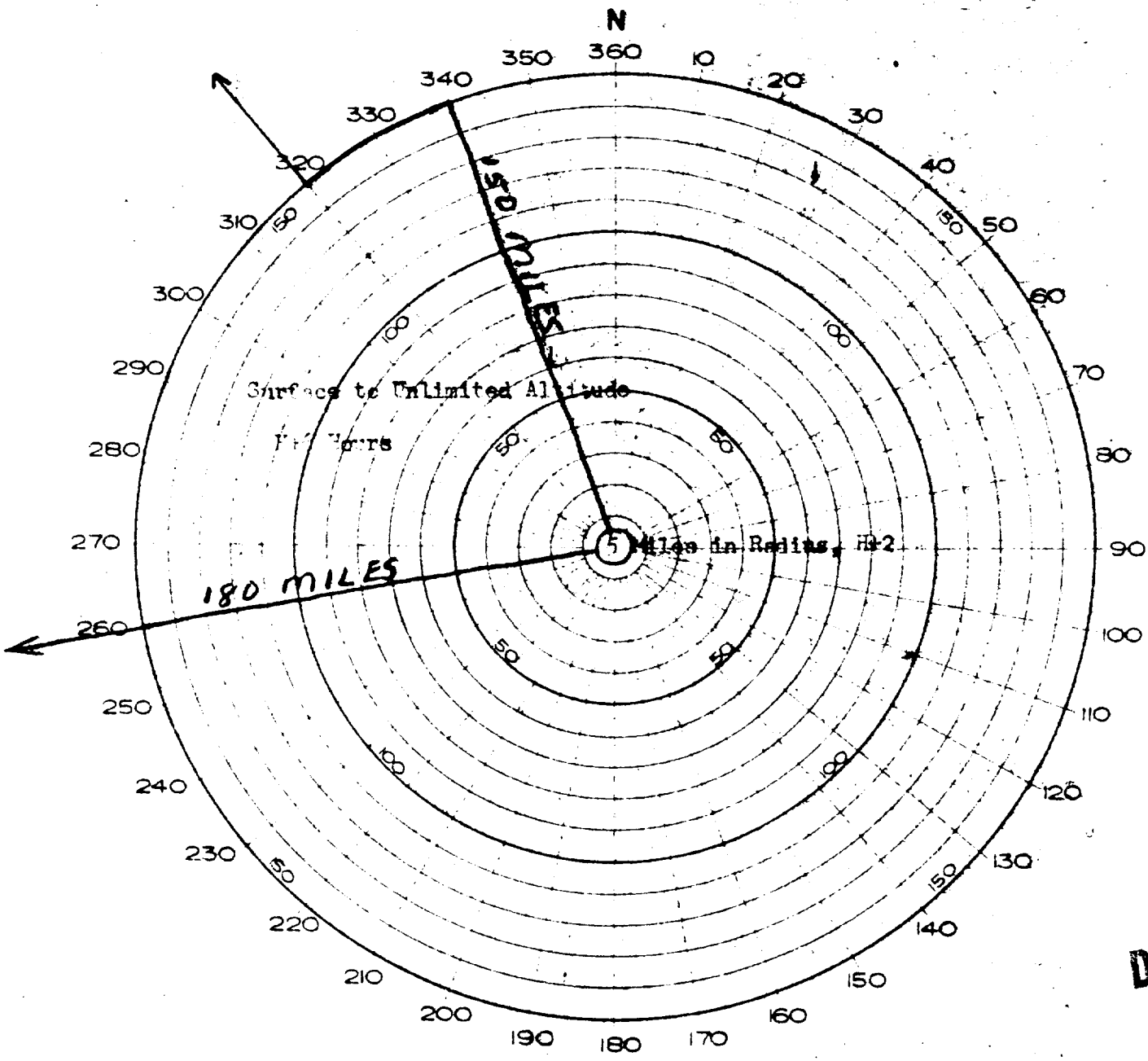
4. The P2V was vectored on bearings of 260 degrees from Bikini for 75 miles and north for 30 miles, 50 miles out, to confirm the western-most extent of the fallout pattern. Fallout was predicted along a bearing of 290 degrees, but it is estimated that the position was more southerly: 265 degrees. This is based upon P2V readings of 25 mr/hr made at 1600M, due west of Bikini at 5,000 feet.

TAB A

[redacted]



HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



DNA

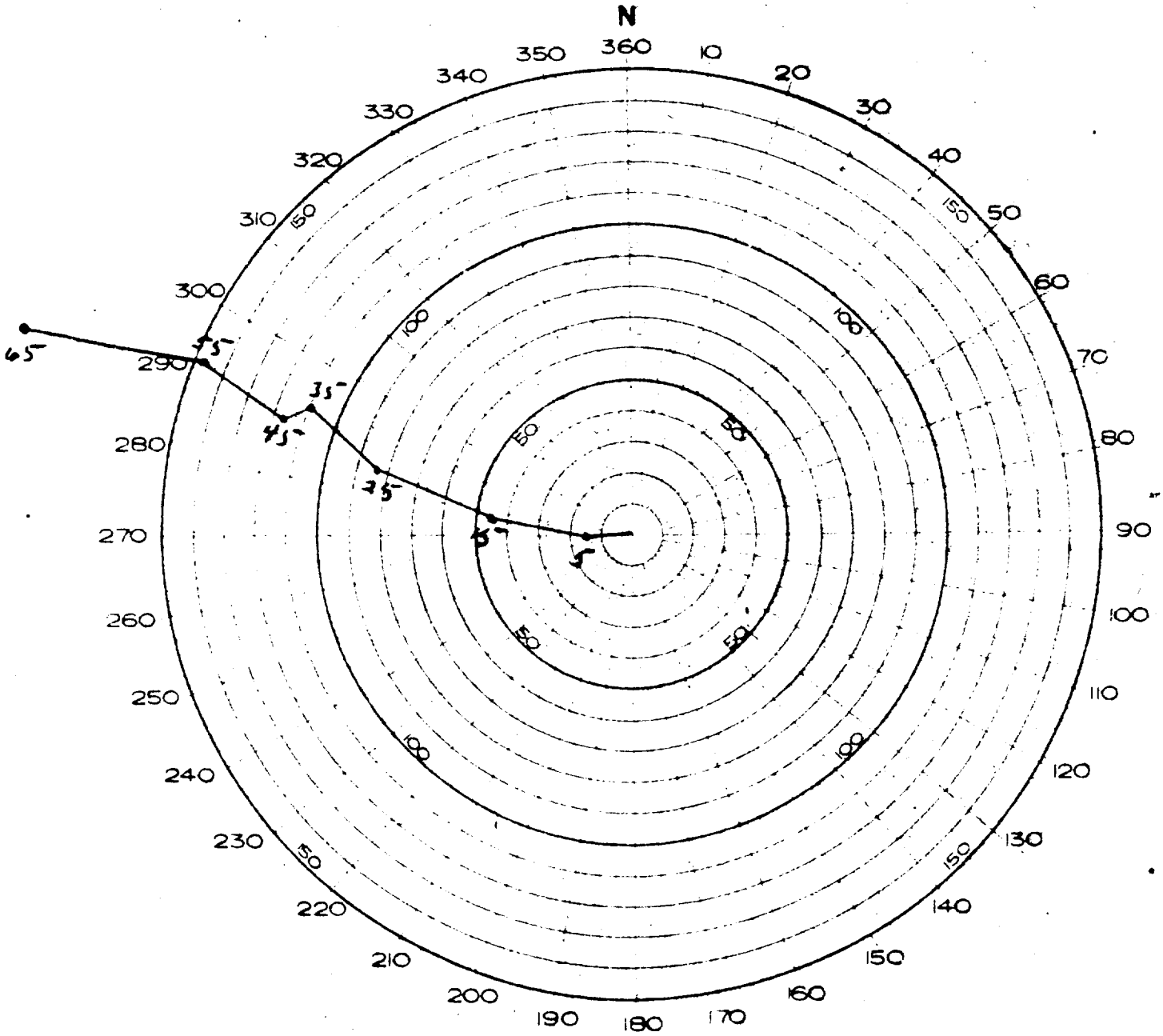
HICKORY EVENT

Surface and Air Radex

TAB D

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX

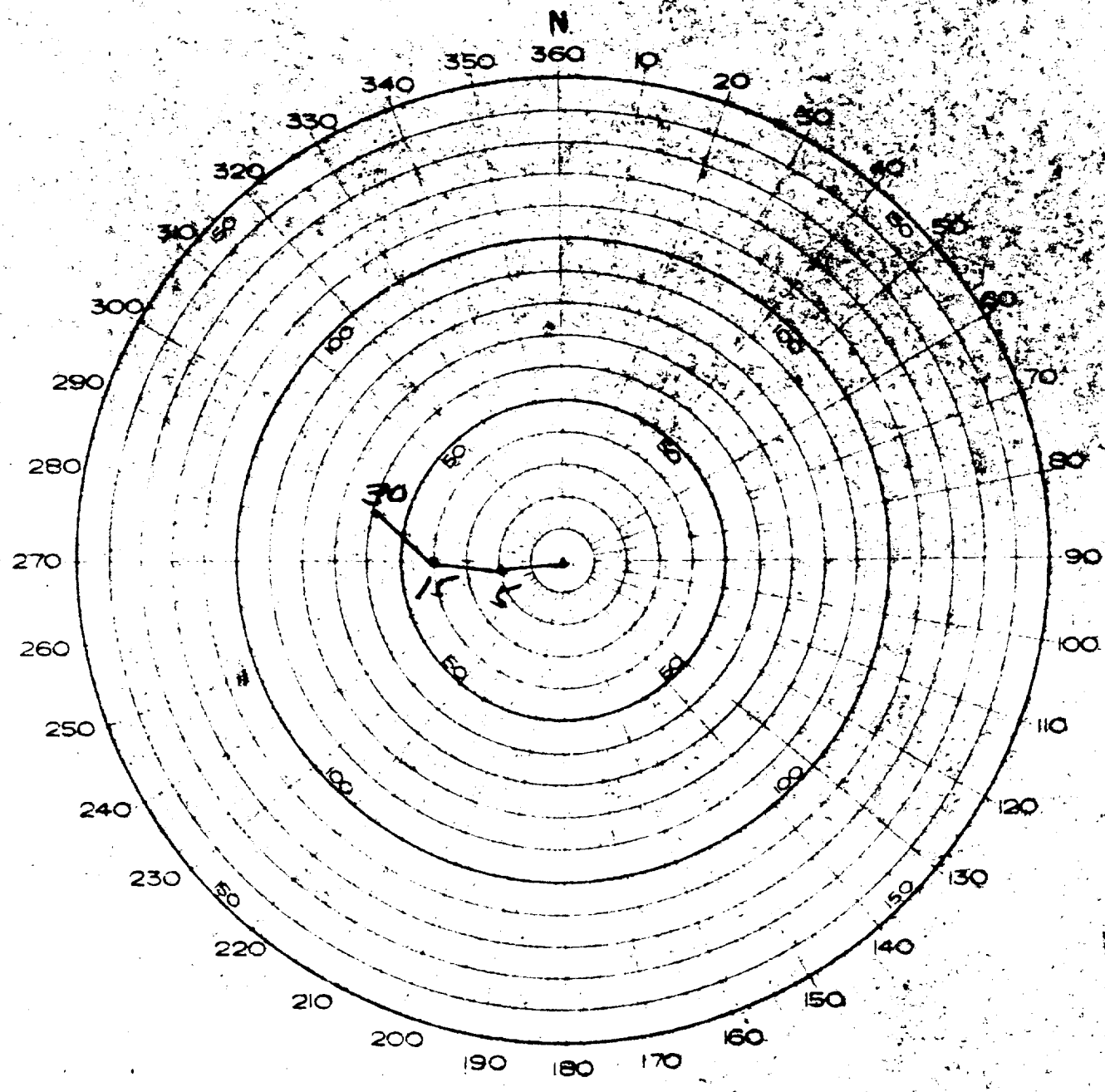


DNA

HICKORY EVENT

Forecast Hodograph

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



DNA

HICKORY EVENT

Shot-time Hodograph

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

3 JULY 1958

HICKORY

BIKINI OBSERVED WEATHER FOR 29 JUNE 1958

SURFACE WEATHER:

Sea Level Pressure	1010.1 mbs
Free Air Surface Temperature	82.0° F
Wet Bulb Temperature	81.5° F
Dew Point Temperature	81.3° F
Relative Humidity	84%
Surface Wind	090° 08 knots
Visibility	10 Miles
Weather	None

CLOUDS:

Scattered (3/10) cumulus, bases 2,000 feet, tops unknown. Scattered (3/10) altocumulus, bases unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

Broken cirrus (6/10-8/10), bases 30,000 feet, tops 47,000 to 48,000 feet. Widely scattered showers west of Bikini.

STATE OF THE SEA:

Open Sea: Waves 6 to 8 feet high, period 5 to 6 seconds, length 75 to 110 feet.

Lagoon side: Waves 1 to 2 feet high, period 2 to 3 seconds.

HICKORY

BIKINI RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1009	Surface	27.2	22.5
1000	280	26.8	22.2
850	4,950	21.2	14.2
800	9,665	19.2	11.8
700	10,380	11.5	05.8
600	14,550	03.2	-01.5
500	19,310	-05.2	-09.5
423	23,665	-12.8	-16.8
400	24,970	-15.0	-23.0
389	25,656	-16.2	-26.5
300	31,900	-30.2	-40.5
250	36,060	-40.2	-55.5
200	40,920	-53.0	Miss
150	46,770	-66.2	Miss
118	51,476	-76.0	Miss
100	54,560	-76.5	Miss
082	58,202	-77.0	Miss
070	61,384	-72.0	Miss
066	62,533	-65.0	Miss
050	68,030	-65.0	Miss
046	69,718	-60.0	Miss
038	73,589	-64.0	Miss
036	74,803	-55.0	Miss
025	82,380	-50.5	Miss
015	93,396	-46.0	Miss

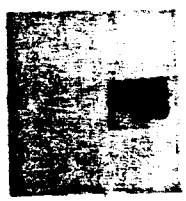
DNA

HICKORY

BIKINI WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	10
1,000	080	20
2,000	080	20
3,000	080	22
4,000	090	21
5,000	090	21
6,000	090	18
7,000	090	19
8,000	090	17
9,000	090	15
10,000	100	16
12,000	100	12
14,000	110	14
16,000	100	17
18,000	110	18
20,000	110	10
22,000	110	09
23,000	100	08
24,000	050	09
25,000	060	05
26,000	040	05
28,000	100	02
30,000	Calm	
32,000	050	06
34,000	140	05
35,000	160	07

BEST COPY AVAILABLE



DNA

INDEX

TAB

DNA

[redacted]

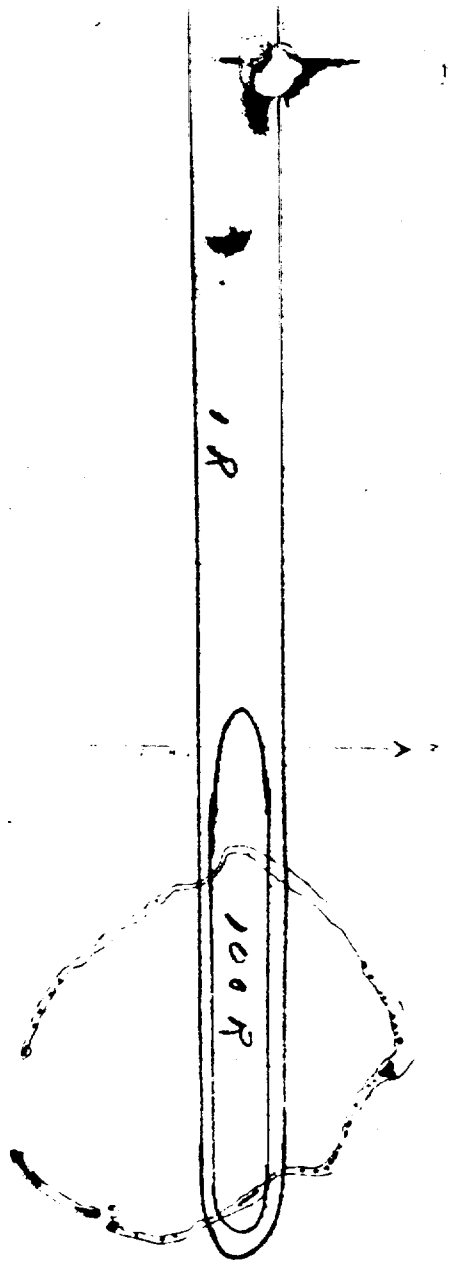
SEQUOIA EVENT

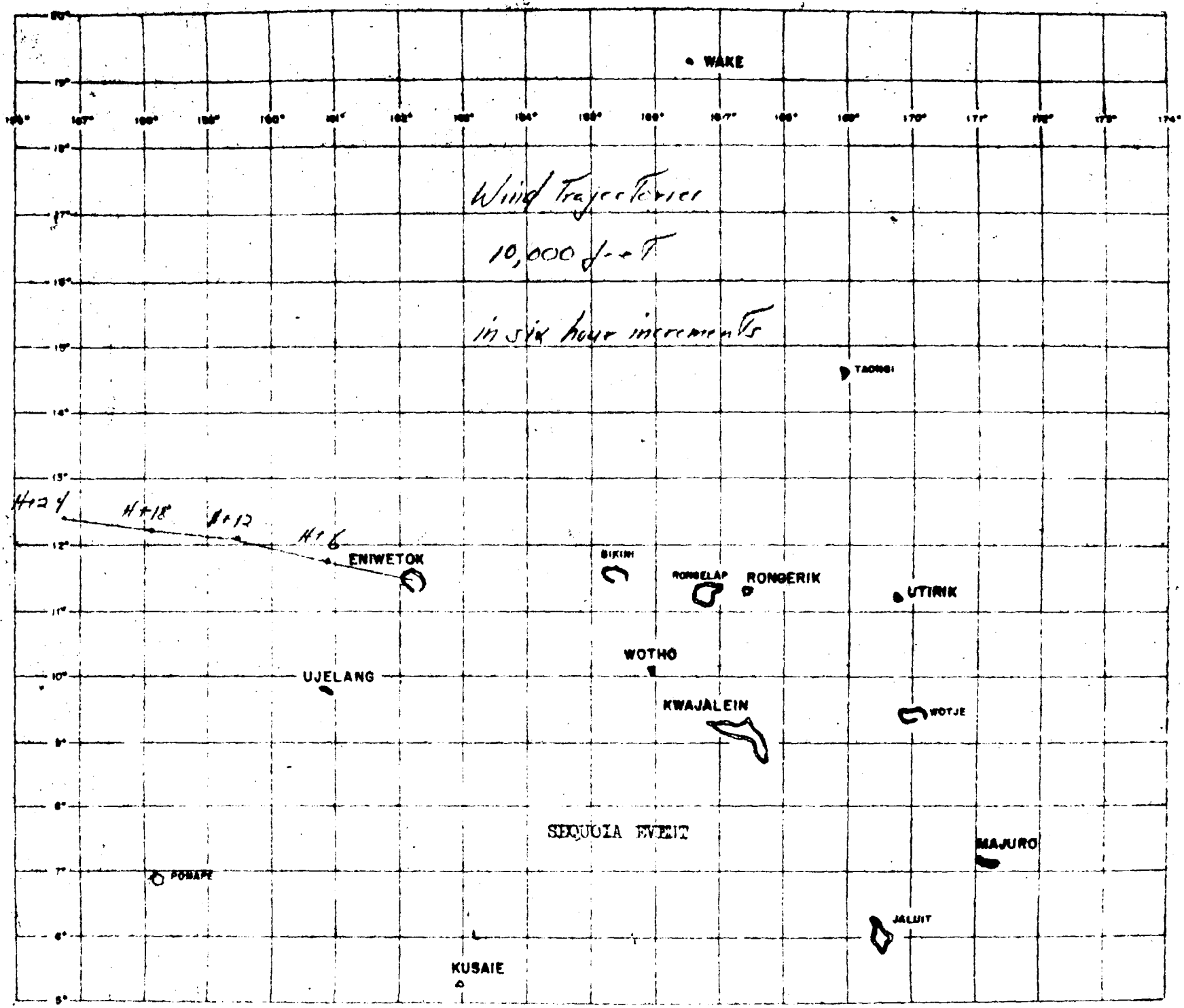
OPERATION HARDTACK

1. SEQUOIA was detonated on a barge one-half mile west of Yvonne Island, Eniwetok Atoll, at 0630M, 2 July 1958. The cloud rose initially to 1,700 feet, then stabilized at [redacted] Movement took place within the trade wind level and averaged 275 degrees at 17 knots.

2. The P2V reported early and started the lagoon survey at 0648M. Readings of 30 to 40 mr/hr were taken over debris in the water west of Yvonne. A reading of 12 r was found over the Yvonne air strip at 0725M. No other significant readings were obtained, so re-entry hour was declared at H+2 hours.

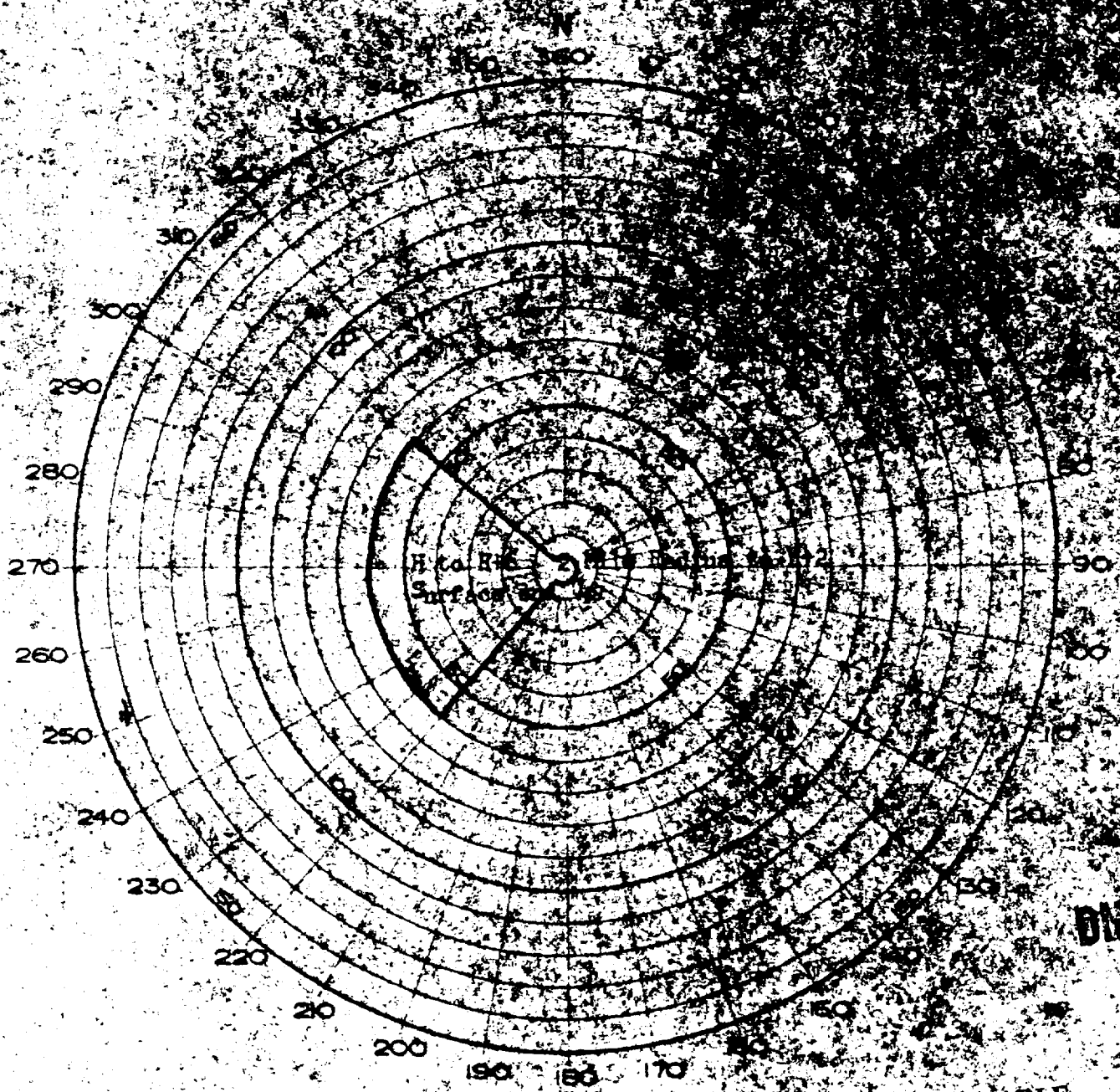
3. The fallout pattern lay between the radials 260 degrees to 290 degrees from ground zero and extended for eighty miles. Essentially all of the fallout came down within the forecast radex area.





TAB C

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



DNA

BEST COPY AVAILABLE

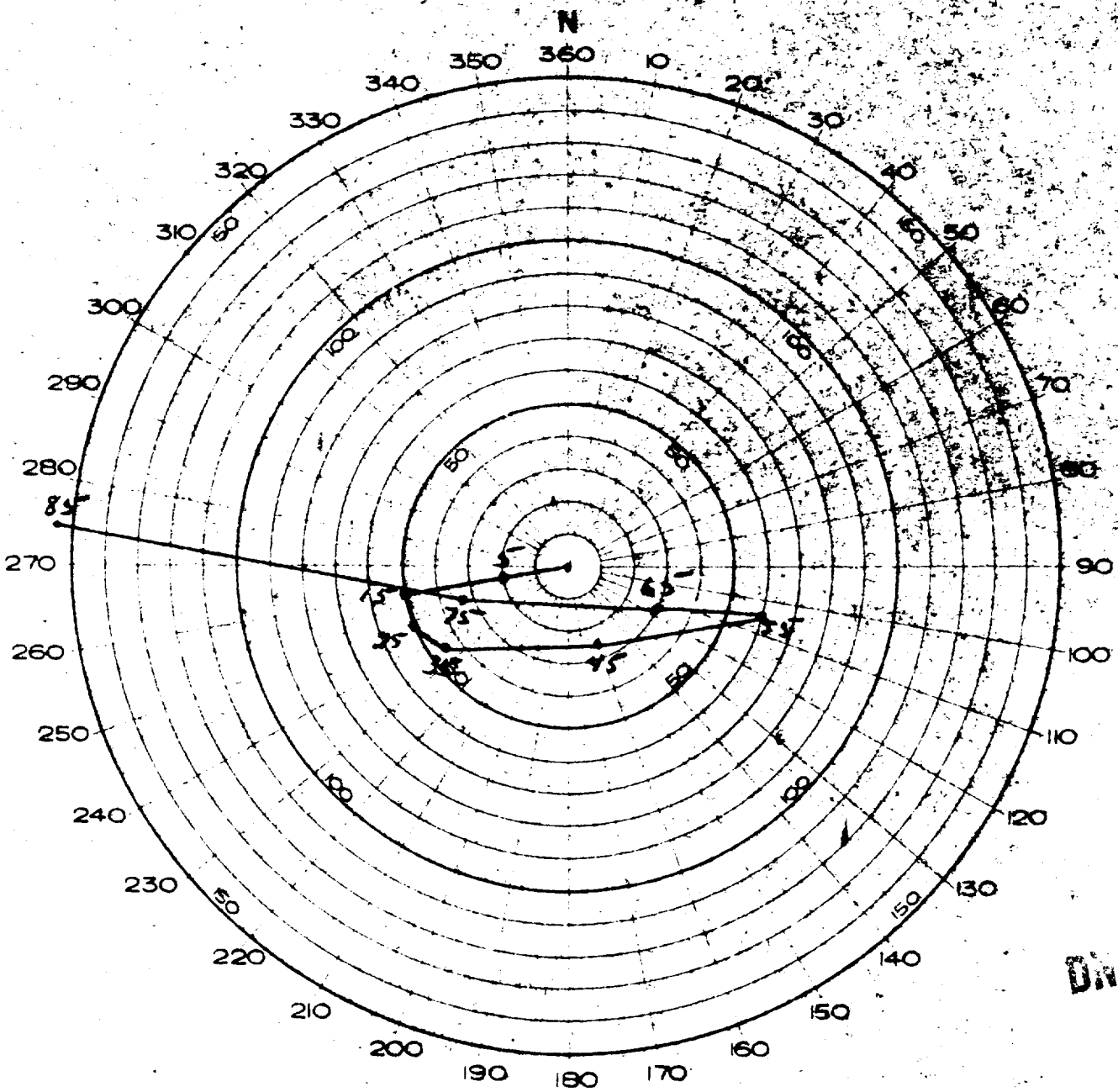
SEQUOIA EVENT

Surface and Air Radex

TAB D

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX

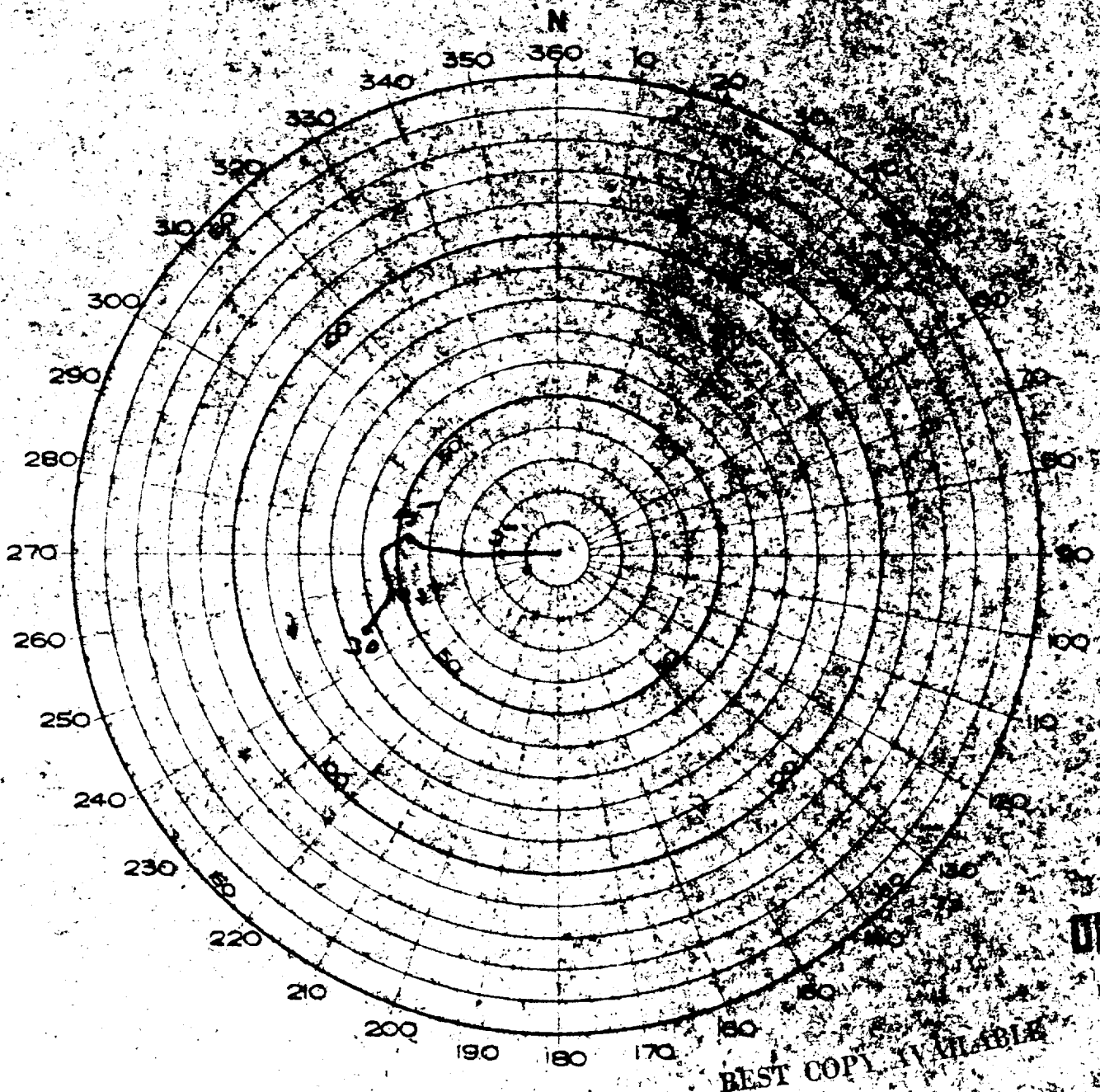


SEQUOIA EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



SEQUOIA EVENT

Shot-time Hodograph

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

SEQUOIA 3 JULY 1958

ENIWETOK OBSERVED WEATHER FOR 2 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1007.3 mbs
Free Air Surface Temperature	80.9° F
Wet Bulb Temperature	77.0° F
Dew Point Temperature	76.0° F
Relative Humidity	83.5%
Surface Wind	090° 17 knots
Visibility	10 Miles
Weather	RW- Increasing to RW+

CLOUDS:

Scattered (3/10) cumulus, bases 1,400 feet, tops unknown, increasing to broken (8/10) cumulus, bases lowering to 500 feet in heavy rainshowers tops unknown. Broken (6/10) cirriform, bases unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

None.

STATE OF THE SEA:

Open Sea: Waves 4 to 6 feet high, period 4 to 5 seconds, length 50 to 75 feet.

Lagoon side. Waves 1 foot high, period 1 to 2 seconds.

SEQUOIA

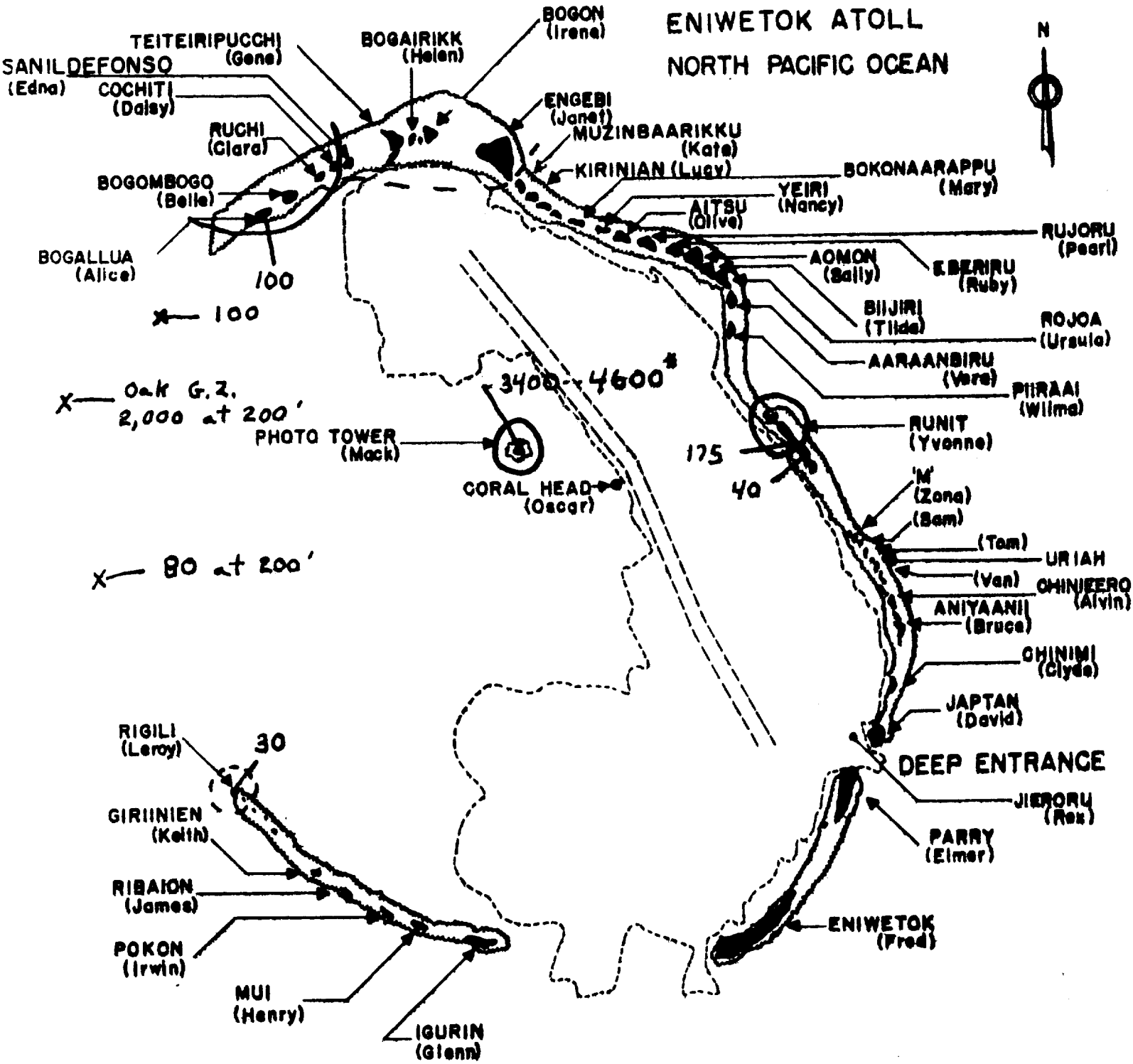
ENIWETOK RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (° C)
1006	Surface	27.5	22.8
1000	190	27.2	23.2
862	4,462	18.5	16.2
850	4,850	18.5	15.2
777	7,349	14.5	11.5
706	10,039	12.5	-11.8
700	10,240	12.2	-10.8
600	14,410	03.2	-13.2
564	16,043	-01.5	-15.2
541	17,126	-01.2	-20.5
500	19,180	-04.8	Miss
440	22,507	-11.5	-28.5
419	23,753	-13.2	-19.5
400	24,820	-15.8	-22.2
324	29,954	-26.5	-40.5
300	31,730	-31.0	Miss
250	35,860	-42.1	Miss
200	40,680	-55.1	Miss
150	46,530	-66.0	Miss
115	51,837	-75.0	Miss
100	54,730	-71.4	Miss
080	59,052	-72.0	Miss
050	68,360	-63.0	Miss
042	72,014	-61.0	Miss
037	74,606	-56.0	Miss
036	75,131	-54.0	Miss
025	82,790	-52.9	Miss

SEQUOIA

ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	10
1,000	090	17
2,000	090	19
3,000	100	19
4,000	100	23
5,000	100	20
6,000	100	19
7,000	100	19
8,000	100	22
9,000	100	18
10,000	100	16
12,000	110	17
14,000	130	13
16,000	120	09
18,000	050	06
20,000	040	11
22,000	320	16
24,000	360	20
26,000	320	14
28,000	330	11
30,000	010	13
32,000	010	15
35,000	020	16
36,000	020	16
38,000	010	21
40,000	010	24
42,500	020	32
45,000	020	31
47,500	010	21
50,000	270	23
52,500	310	22
55,000	010	16
57,500	090	12
60,000	080	12
65,000	100	24
70,000	090	36
75,000	100	48
80,000	090	49
85,000	100	63
90,000	090	68
95,000	090	78
100,000	090	85
105,000	100	85
109,000	110	82



ALL READINGS IN MR/HR, AS OF 1300, 2 JULY, 1958

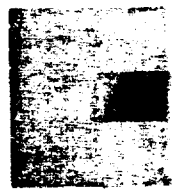
* Lower Platform - 3400
Upper Platform - 4600

---- LIMITED RADEX

——— FULL RADEX

SEQUOIA EVENT

Radiological Surface Survey, H+8 Hours



DNA

INDEX

TAB

[redacted]

CEDAR EVENT

OPERATION HARDTACK

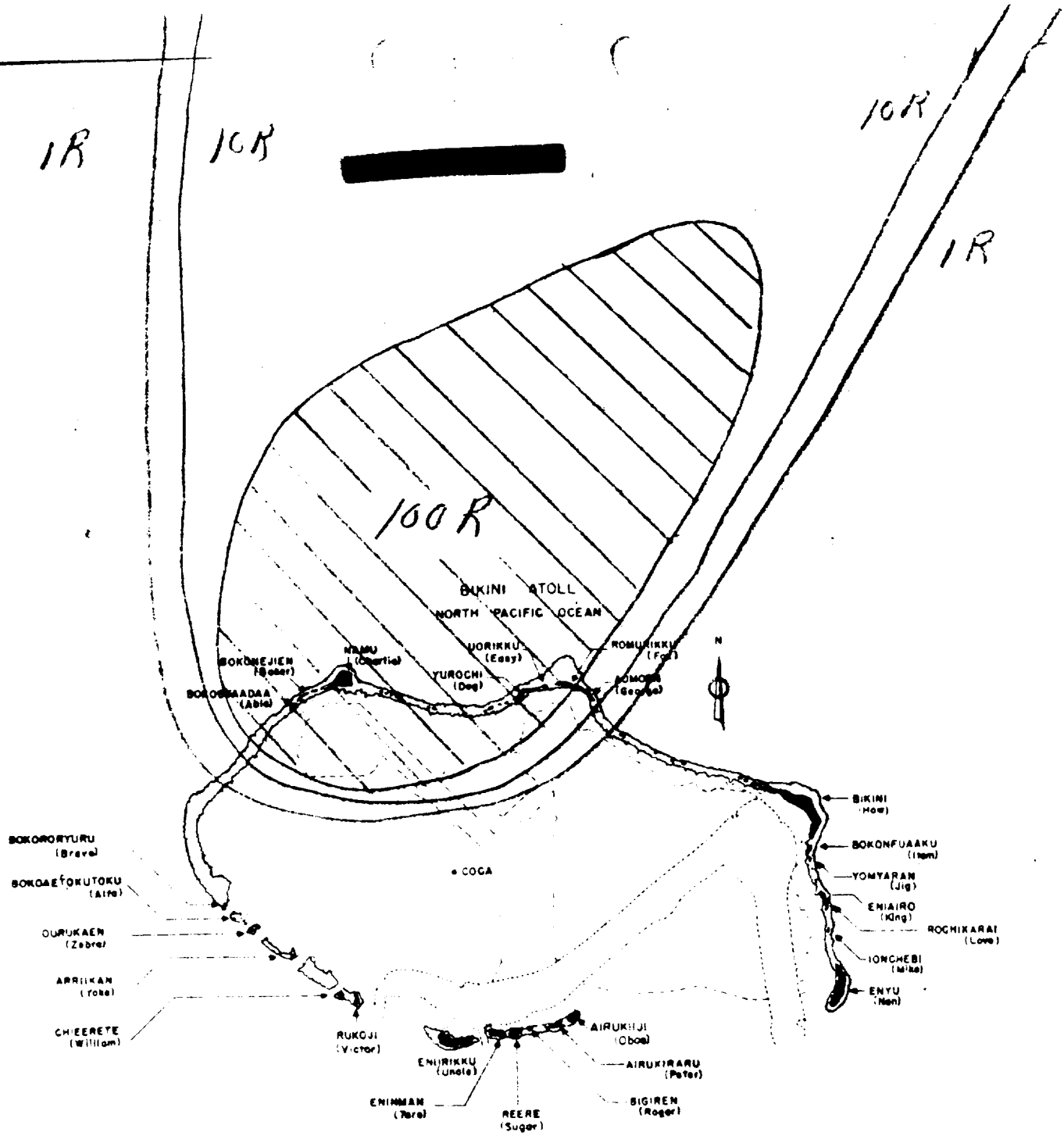
1. The CEDAR device was detonated on a barge 3,000 feet southwest of Charlie Island [redacted] Bikini Atoll, at 0530M, 3 July 1958. RadSafe operations were controlled through the USS Benner, located in Bikini Lagoon. The yield was [redacted] The cloud rose to [redacted] with the base estimated at 35,000 feet.

2. The P2V aircraft (Wildroot #13) reported over Nan at 0600M, and it was vectored cautiously over the lagoon at 1,000 feet. The highest reading taken was over Dog: 49 mr/hr at 0744M. Later, after clearing the lagoon, the P2V was vectored out on radials; for example, 270 degrees for 90 miles and return.

3. The RadSafe helicopter took off at 0700M. The highest reading was made over Charlie: 400 mr/hr.

4. Fallout was predicted along a bearing of ten degrees; however, the wind pattern had been displaced to the west in the lower altitudes, causing light fallout along a westerly bearing. The P2V aircraft verified this shift with readings from 20 mr/hr to 90 mr/hr out to fifty miles west of the ground zero through 1200M.

[redacted]



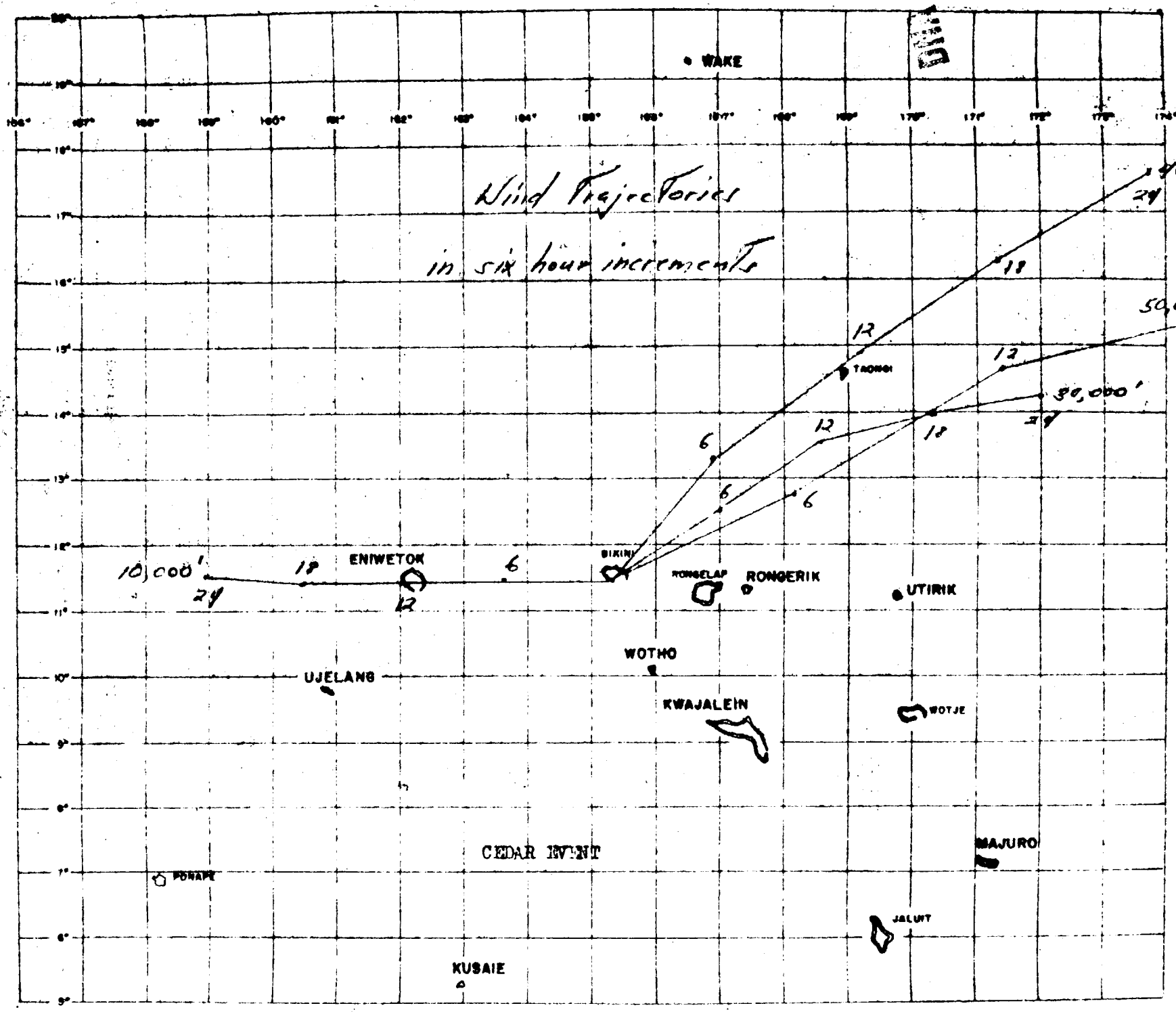
BEST COPY AVAILABLE

DNA

CHART EXTRACT

Forecast Fallout Plot

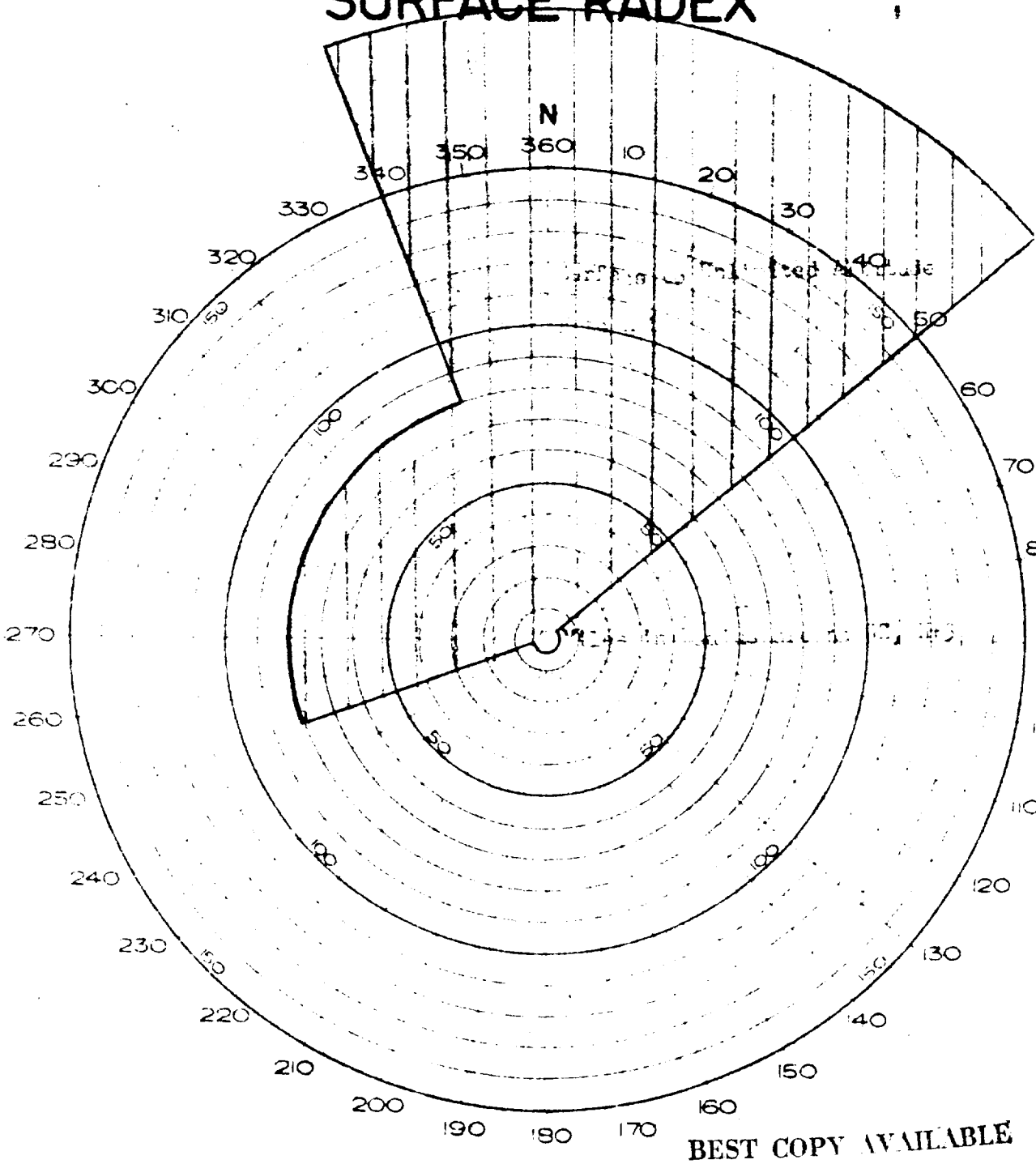
[redacted]



BEST COPY AVAILABLE

HODOGRAPH

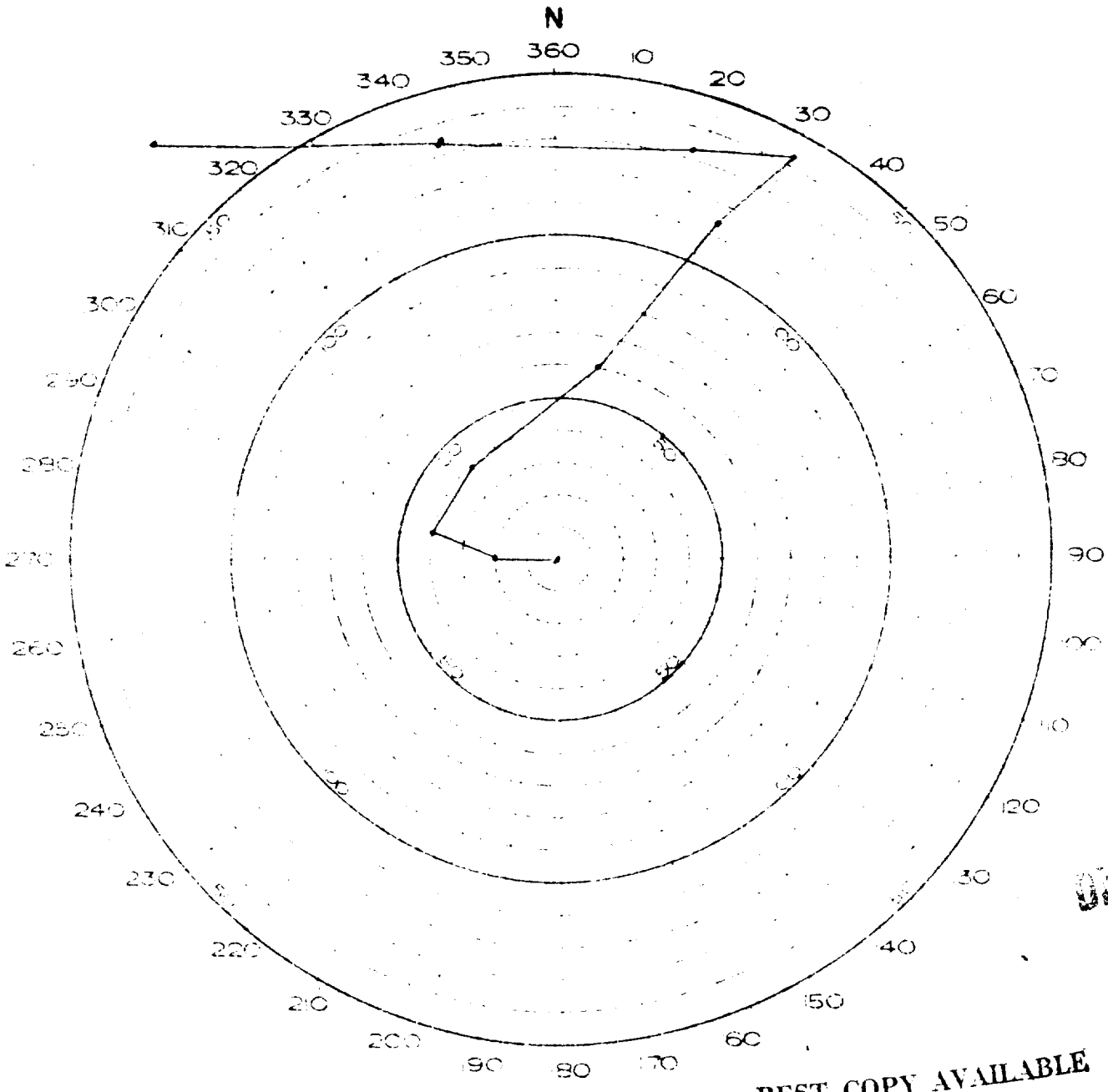
RESULTANT WINDS AND SURFACE RADEX



DNA

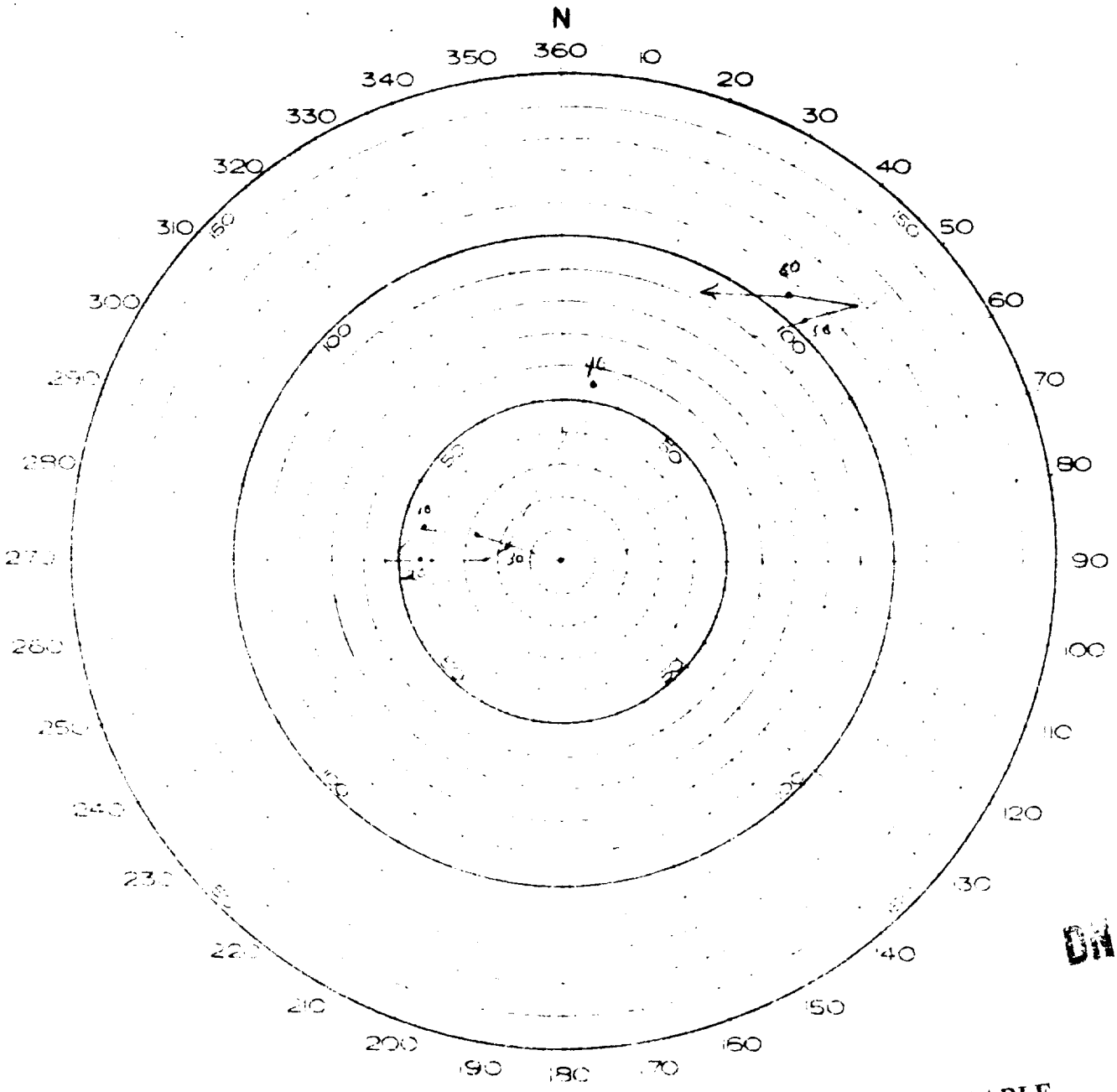
HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



DNA

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 457, San Francisco, California

5 JULY 1958

CEDAR

BIKINI OBSERVED WEATHER FOR 3 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1013.2 mbs
Free Air Surface Temperature	83.2° F
Wet Bulb Temperature	78.1° F
Dew Point Temperature	76.3° F
Relative Humidity	79%
Surface Wind	070° 16 knots
Visibility	10 miles
Weather	Widely Scattered -RW

CLOUDS:

Scattered (2/10) cumulus, bases 2,000 feet, tops unknown.
Scattered (3/10) altocumulus, bases 14,000 feet, tops unknown.
Broken (7/10) cirriform bases 22,000 feet, tops unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

None.

STATE OF THE SEA:

Open Sea: Waves 5 to 7 feet high, period 4 to 5 seconds, length 50 to 75 feet.

Lagoon Side: Waves 1 to 2 feet high, period 2 to 3 seconds.

CEDAR

BIKINI RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1008	Surface	28.2	25.8
1000	250	28.2	25.2
850	[illegible]	18.5	17.2
846	5,118	18.2	16.8
700	10,310	10.5	06.8
696	10,499	10.5	06.5
679	11,188	10.2	-07.8
600	14,480	03.2	-01.2
562	16,273	00.5	-03.2
525	18,012	-02.5	-12.5
520	18,274	-03.5	-10.5
510	18,766	-03.5	-21.5
500	19,260	-04.2	-21.8
481	20,276	-05.8	-21.8
472	20,768	-07.2	-16.2
400	24,920	-15.5	-25.8
317	30,512	-27.5	-40.5
300	31,790	-30.8	Miss
250	35,594	-31.2	Miss
200	40,790	-53.2	Miss
150	46,890	-56.0	Miss
120	51,115	-75.0	Miss
116	51,804	-75.0	Miss
111	52,592	-70.0	Miss
100	54,540	-73.0	Miss
092	56,235	-78.0	Miss
090	56,627	-75.0	Miss
082	58,432	-71.0	Miss
073	60,761	-72.0	Miss
056	65,879	-66.0	Miss
050	68,070	-57.2	Miss
031	78,051	-56.0	Miss
025	82,590	-53.0	Miss

CEDAR

BIRTH WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	10
1,000	090	23
2,000	100	25
3,000	110	26
4,000	110	25
5,000	110	24
6,000	110	21
7,000	100	21
8,000	100	22
9,000	100	18
10,000	090	17
12,000	080	14
14,000	060	11
16,000	030	12
18,000	350	03
20,000	270	10
22,000	270	16
24,000	270	12
26,000	260	11
28,000	270	15
30,000	230	18
32,000	230	24
34,000	210	33
36,000	200	28
38,000	200	31
40,000	210	35
42,500	230	20
45,000	250	41
47,500	260	32
50,000	250	24
52,500	240	23
55,000	260	17
57,500	030	12
60,000	090	19
65,000	070	22
68,000	100	41

BEST COPY AVAILABLE


DNA

INDEX

TAB

[redacted]

DOGWOOD EVENT

OPERATION HARDTACK

1. The DOGWOOD device was detonated on a barge one mile southwest of Janet Island, Eniwetok Atoll, at 0630M, 6 July 1958. The cloud rose immediately to [redacted] then stabilized at [redacted] while the base levelled off at 35,000 feet. Radar fixes from the weather radar at Fred indicated a movement of the main body of the cloud of 330 degrees at 17 knots. Aircraft reported that the cloud did not shear during the first hour.

2. The P2V started the lagoon survey at 0645M and completed it one hour later. No contamination was found except on Janet and the islands downwind of ground zero. Alice read 1,000 mr/hr; Irene, 2,900 mr/hr; and Janet, 35 mr/hr. The helicopter survey commenced at 0845M and confirmed the above readings. Re-entry hour was declared at H+3.

3. The P2V was dispatched on a track of 260 degrees from Alice and read 300 mr 35 miles out. It was then sent due north of Pearl and found unexpectedly an intensity of 700 mr at a point 25 miles north. At this time the P2V reported that his background would not fall below 130 mr/hr, in spite of repeated attempts to wash himself off in rain squalls. He was instructed to land, and a replacement was called for.

4. The standby P2V was sent to the north to discern whether or not contaminated air was moving eastward. A reading of 180 mr/hr was taken at

[redacted]

[redacted]

a point on the 350-degree radial, forty miles from Pearl, which indicated that fallout was present in the same area and that the situation would bear watching.

5. The P2V was sent north of Pearl again at 1400 hours, but no significant readings were obtained. This showed that no easterly movement was present, so the P2V was released.

6. The actual fallout pattern lay between the radials 260 degrees and 350 degrees, which was very similar to the forecast.

DNA

TAB A

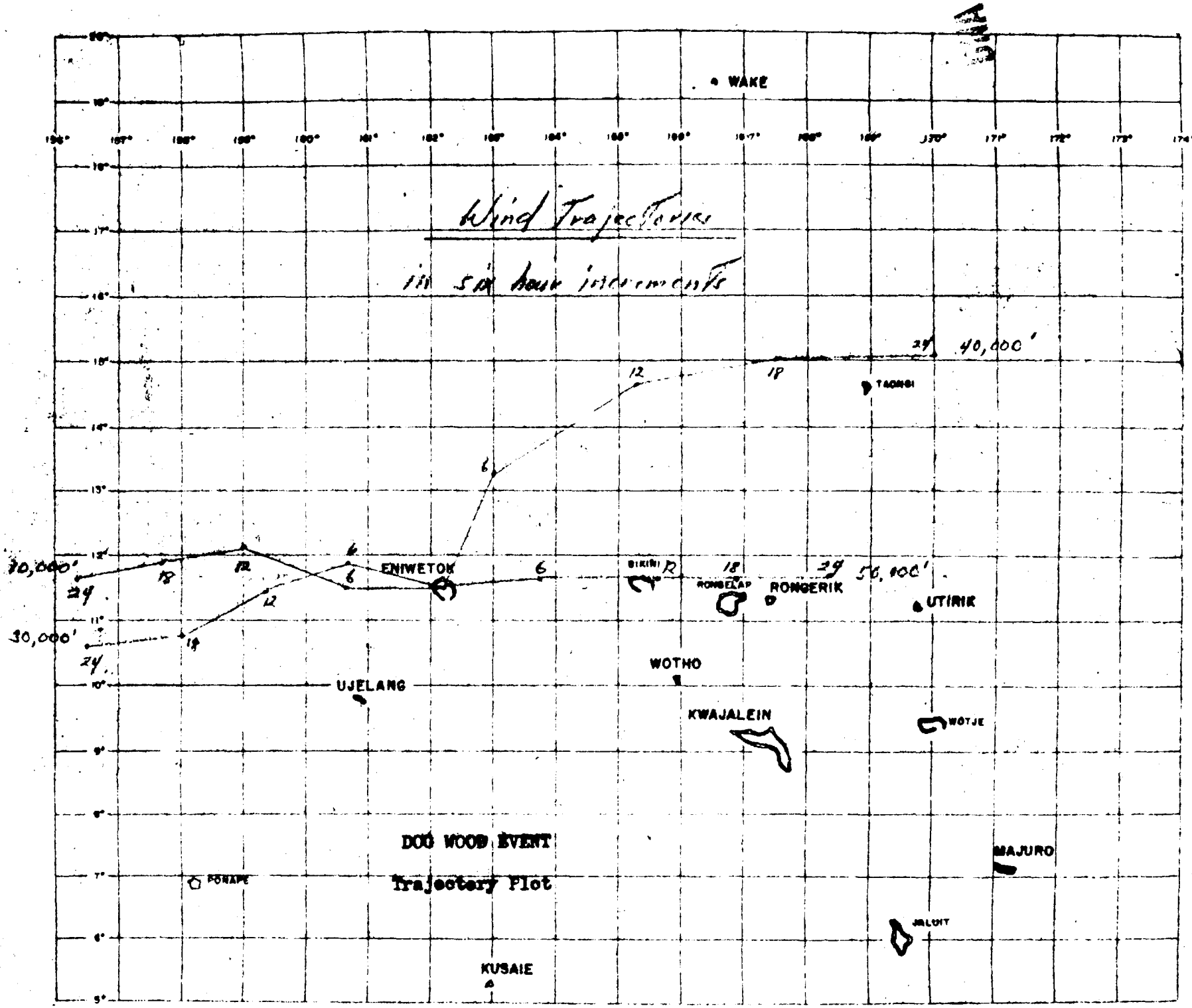
[redacted]

DNA

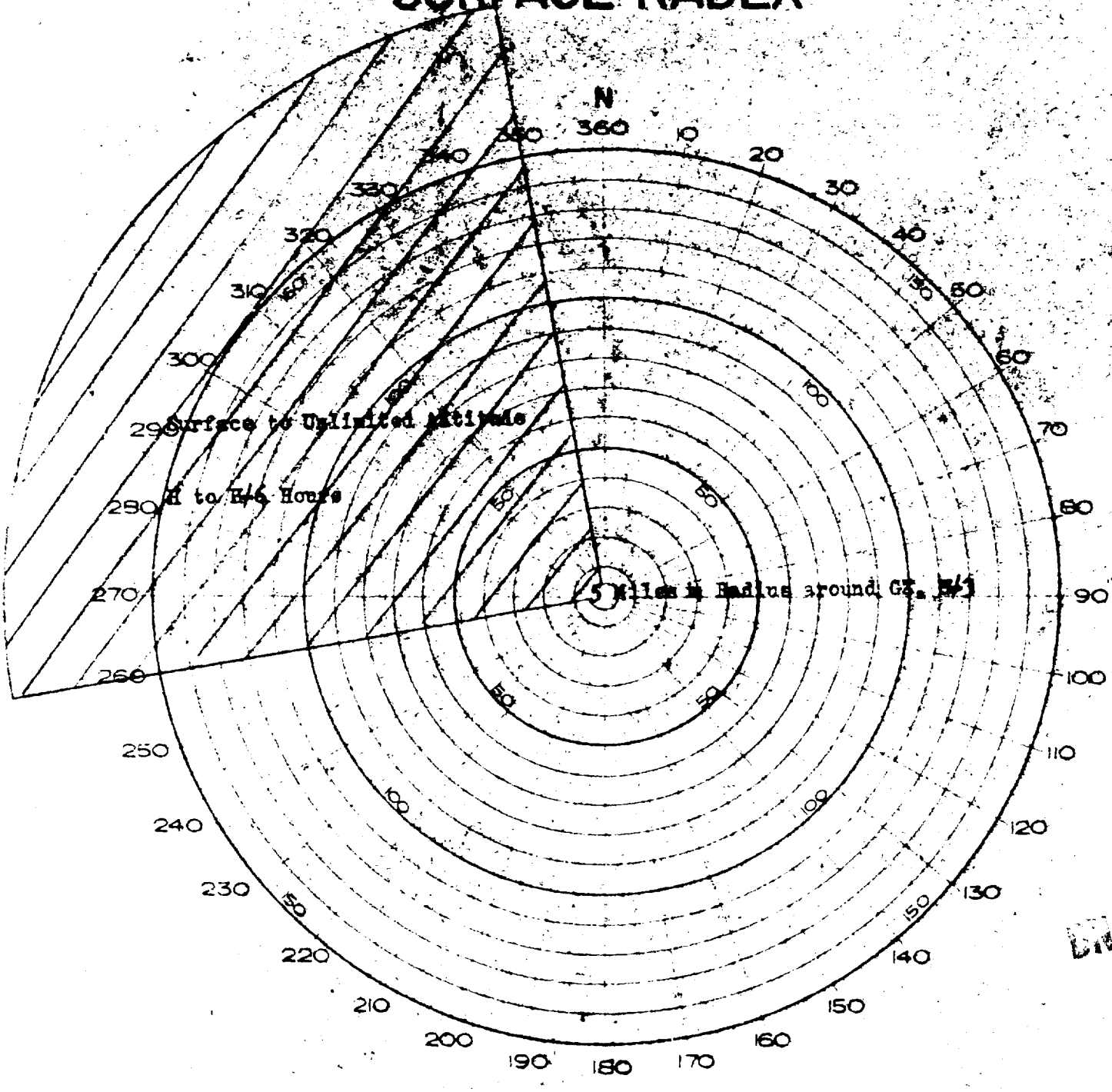
BEST COPY AVAILABLE

DOGWOOD EVENT

Forecast Fallout Plot



HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



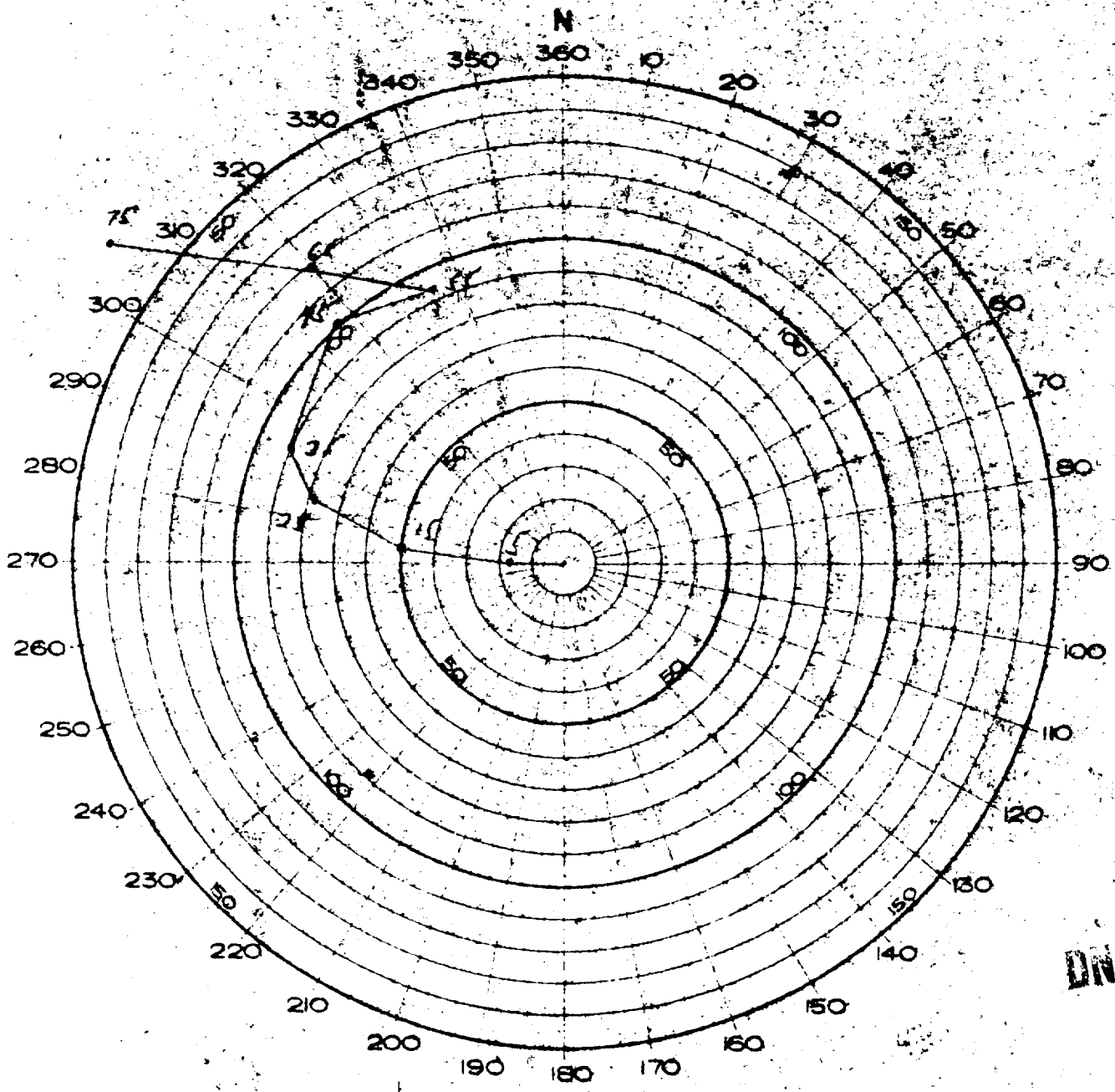
DNA

DOGWOOD EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



DNA

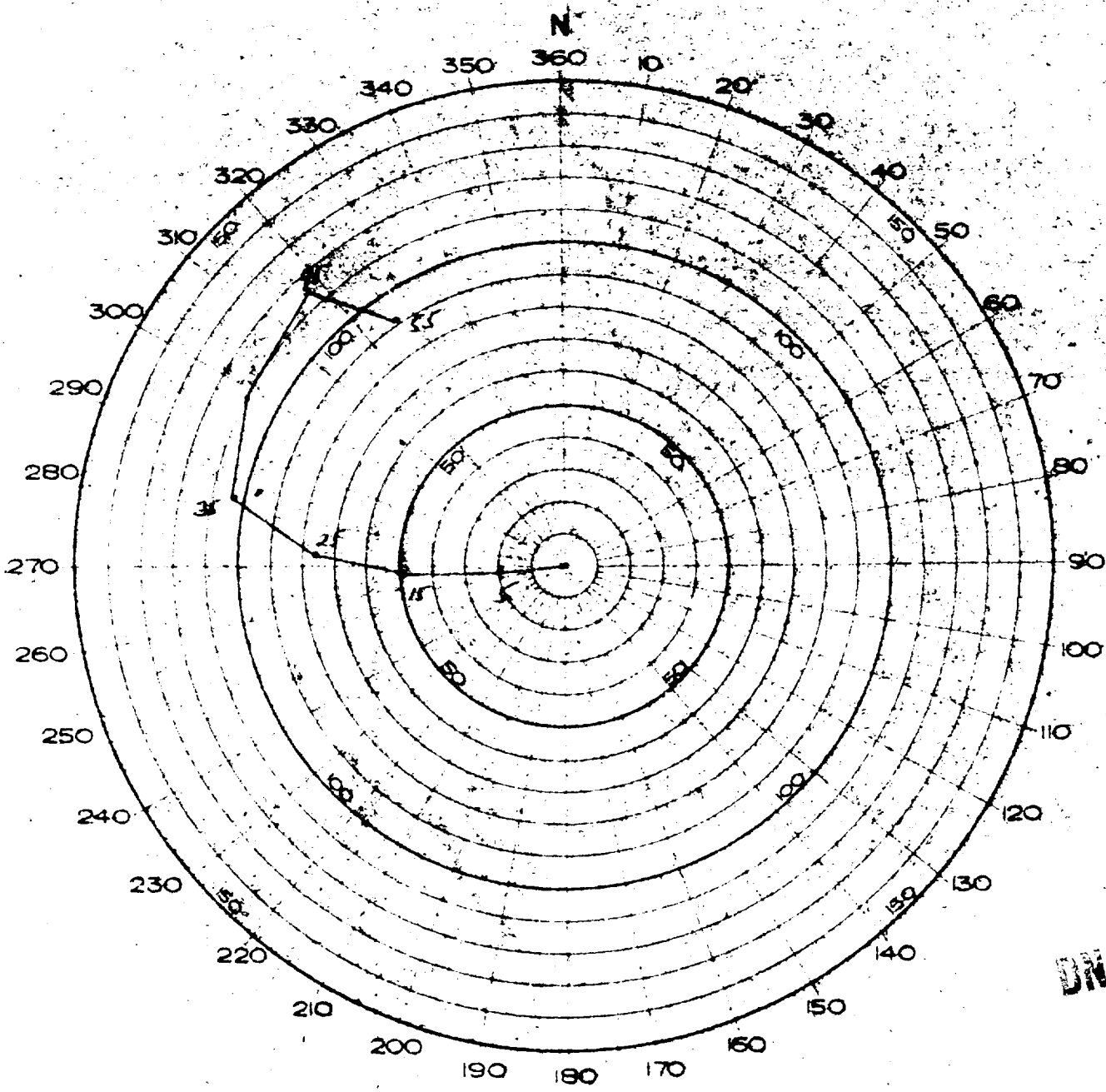
DOGWOOD EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



DNA

DOGWOOD EVENT

SHOT-TIME HODOGRAPH

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

9 July 1958

DOGWOOD

ENIWETOK OBSERVED WEATHER FOR 6 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1008.9 mbs
Free Air Surface Temperature	81.3° F
Wet Bulb Temperature	77.9° F
Dew Point Temperature	77.0° F
Relative Humidity	85%
Surface Wind	080° 17 knots
Visibility	10 miles
Weather	Very light rainshowers

CLOUDS:
Scattered (5/10) cumulus bases 1,800 feet, tops unknown. Towering cumulus southwest of Eniwetok. Scattered altostratus - altocumulus (3/10), bases 12,000 feet, tops unknown. Overcast (10/10) cirriform, bases and tops unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:
Scattered (5/10) cumulus, bases 1,800 feet, tops unknown. Broken cirrus, bases 24,000 to 26,000 feet, tops 47,000 to 49,000 feet.

STATE OF THE SEA:
Open Sea: Waves from 080°, period 5 seconds, height 5 feet.
Lagoon: Waves from 080°, period 4 seconds, height 2 feet.

DOCWOCD

ENIWETOK RADIOSONDE OBSERVATION

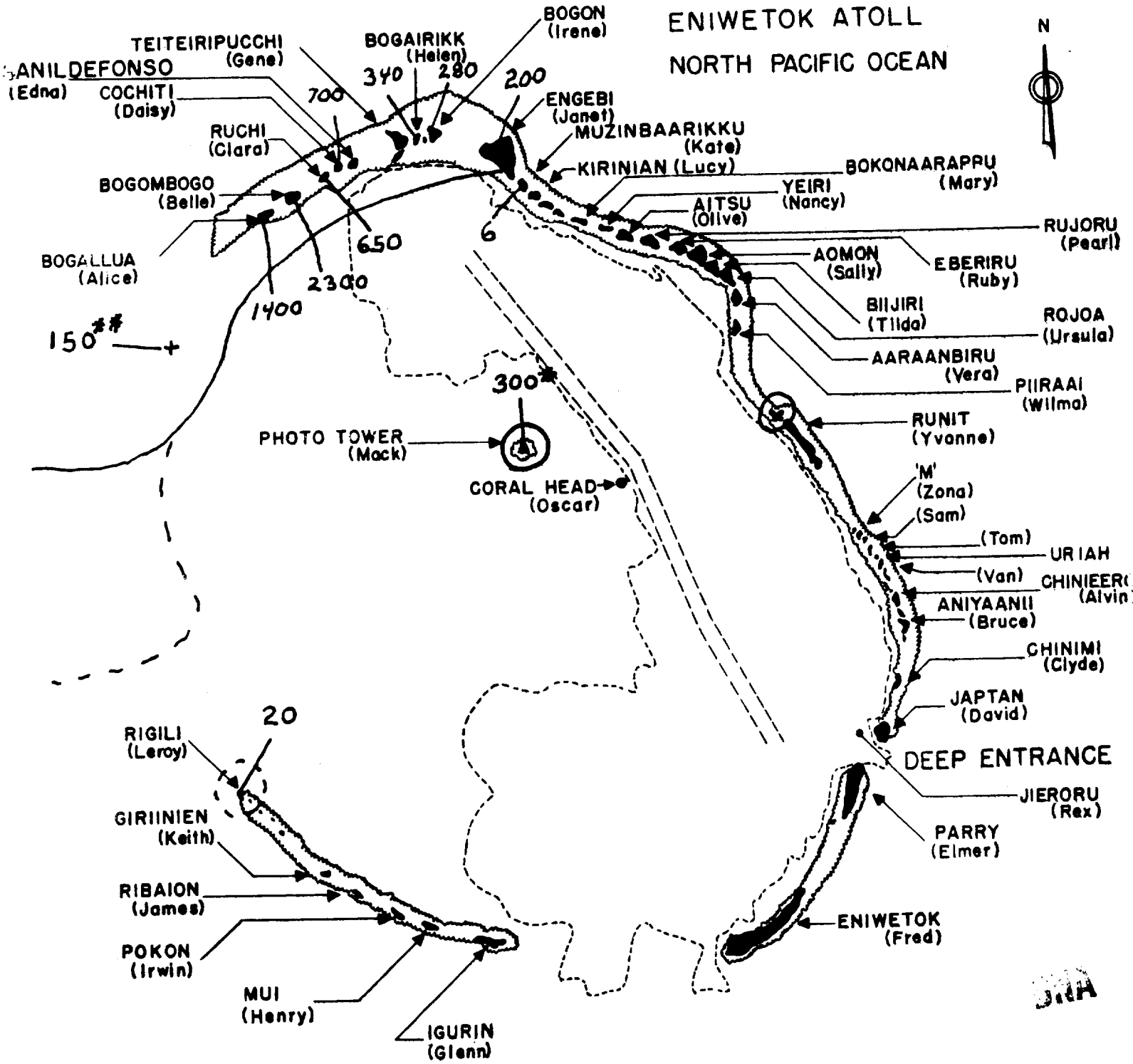
Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1008	Surface	28.5	23.5
1000	250	27.8	23.2
900	3,274	20.0	20.0
850	4,890	17.8	16.5
784	7,185	14.8	12.5
754	8,268	14.2	06.5
700	10,280	10.2	05.2
600	14,430	02.5	01.5
500	19,220	-04.2	-04.5
400	24,870	-15.2	-17.5
300	31,820	-30.2	-37.8
251	35,860	-40.2	-43.8
250	35,980	-40.2	Miss
200	40,860	-43.0	Miss
150	46,750	-67.2	Miss
119	51,181	-75.0	Miss
114	52,087	-73.0	Miss
100	54,580	-76.8	Miss
099	54,757	-77.0	Miss
086	55,249	-77.0	Miss
080	56,627	-72.0	Miss
083	58,169	-73.0	Miss
064	63,222	-64.0	Miss
050	68,230	-62.5	Miss
045	70,374	-60.0	Miss
030	78,384	~~-61.~~0-56.2	Miss

DNA

DOGWOOD

ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	~~10~~ 16
1,000	080	17
2,000	080	21
3,000	090	22
4,000	090	21
5,000	090	17
6,000	090	15
7,000	080	17
8,000	080	15
9,000	070	~~14~~ 16
10,000	080	17
12,000	100	14
14,000	100	12
16,000	100	18
18,000	100	19
20,000	100	~~12~~ 16
22,000	100	10
24,000	100	10
26,000	100	12
28,000	120	16
30,000	120	18
32,000	120	18
34,000	120	14
36,000	140	20
38,000	150	23
40,000	190	33
42,500	200	33
45,000	210	35
47,500	250	33
50,000	280	13
52,500	290	11
55,000	290	15
57,500	010	19
60,000	030	09
65,000	050	19
70,000	050	38
75,000	050	35
78,000	040	43



ALL READINGS IN MR/HR, GROUND LEVEL, AS OF 1400, 6 JULY, 1958

* 1045 HRS., 6 JULY, 1958

** AT 200' ALT.

---- LIMITED RADEX

——— FULL RADEX

DOGWOOD EVENT

Radiological Surface Survey, H+8 Hours

INDEX

TAB

[redacted]

POPLAR EVENT

OPERATION HARDTACK

1. The POPLAR device was detonated on a barge off Namu Island (Charlie), Bikini Atoll, at 1530M, 12 July 1958. RadSafe operations were conducted from the USS Benner, approximately ten miles south of Nan Island. The cloud rose immediately above the radar limits of 61,000 feet, and the cloud base was established at 42,000 feet at 1540M. The estimated yield was [redacted]

2. The P2V aircraft (Wildroot #11) reported over How at 1650M, and it was vectored between How and Oboe. Only background was recorded, and the P2V was sent out on bearings of 260 degrees from Oboe for forty miles. The high reading was obtained thirty miles out: 100 mr/hr, at 1700M. At 1745M the island chain with the exception of the ground zero area was flown at 1,000 feet. Dog read 45 mr/hr. Communications difficulties developed, and a second P2V was scrambled.

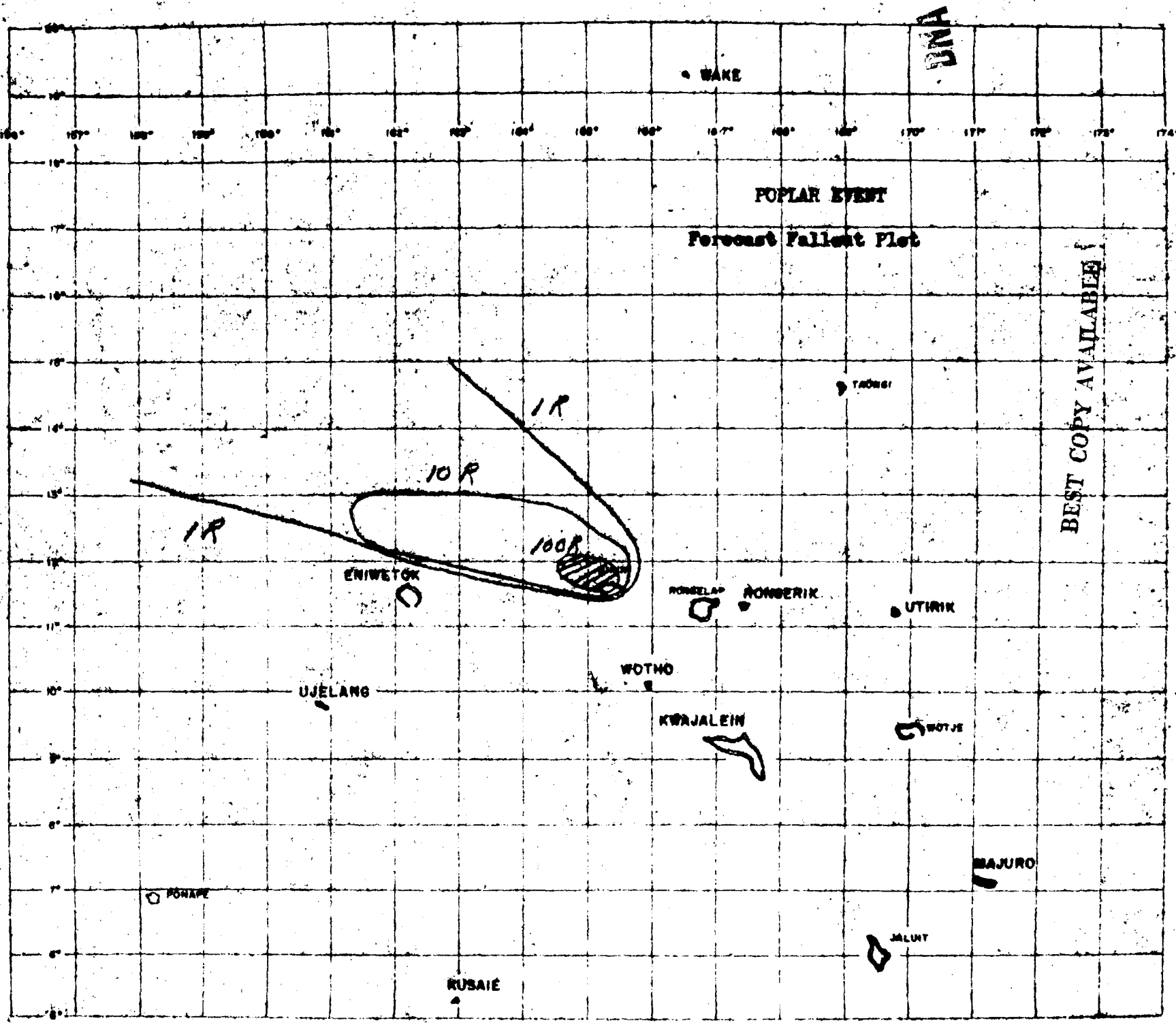
3. Re-entry hour was declared at 1945M, and the second P2V was vectored on a northerly and westerly bearing until midnight.

4. Initial helicopter surveys took off at 0700M and 0745M, 13 July. No significant readings were obtained. A detailed survey was made at 1500M the same afternoon.

5. Two problems affected the success of this operation. Communications difficulties later proved to have been with the Benner and not the P2V. The second P2V was then controlled through Eniwetok AOC. Difficulty with Benner radar made it impossible to obtain current wind data from Bikini.

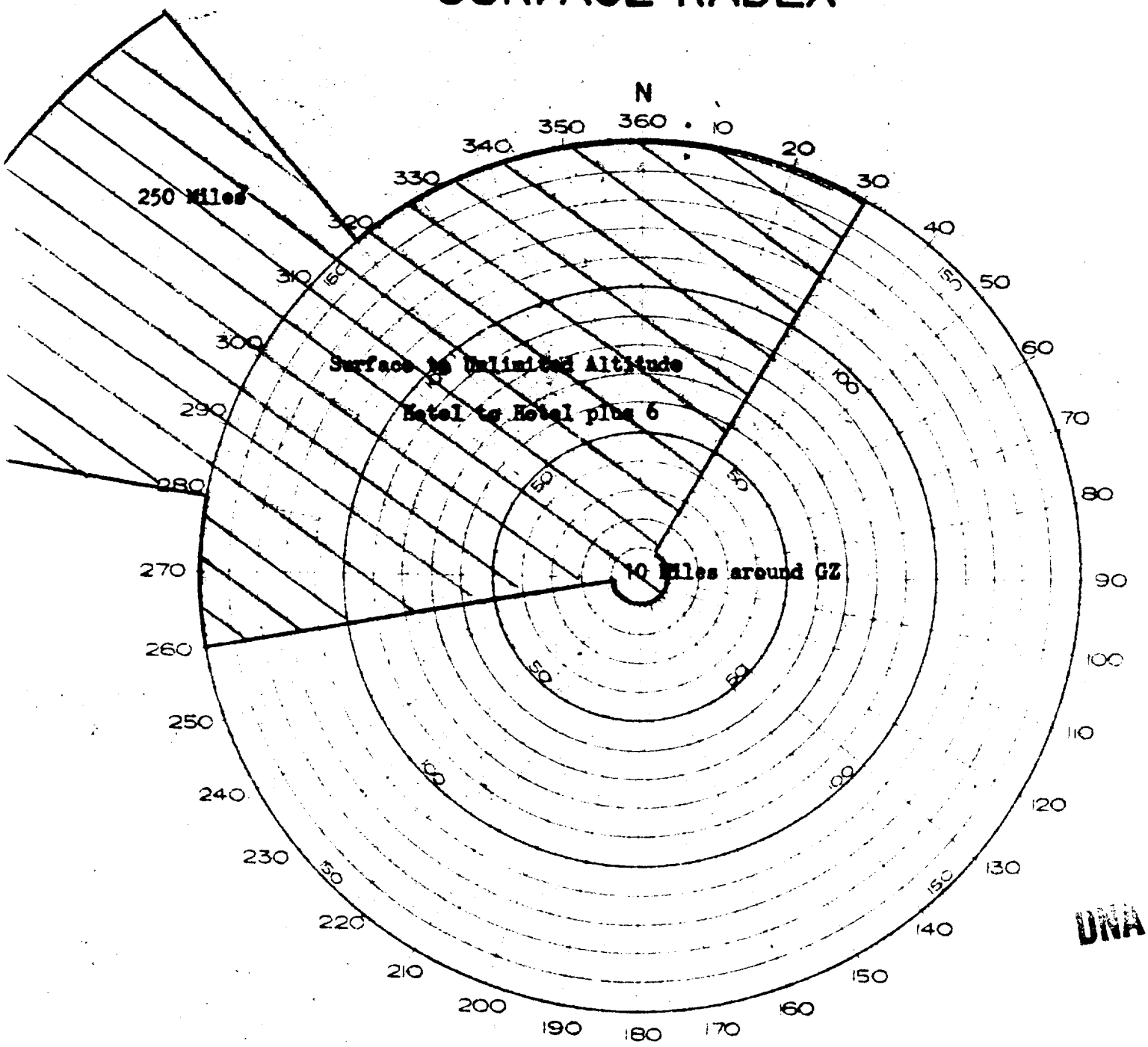
TAB A

[redacted]



HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX

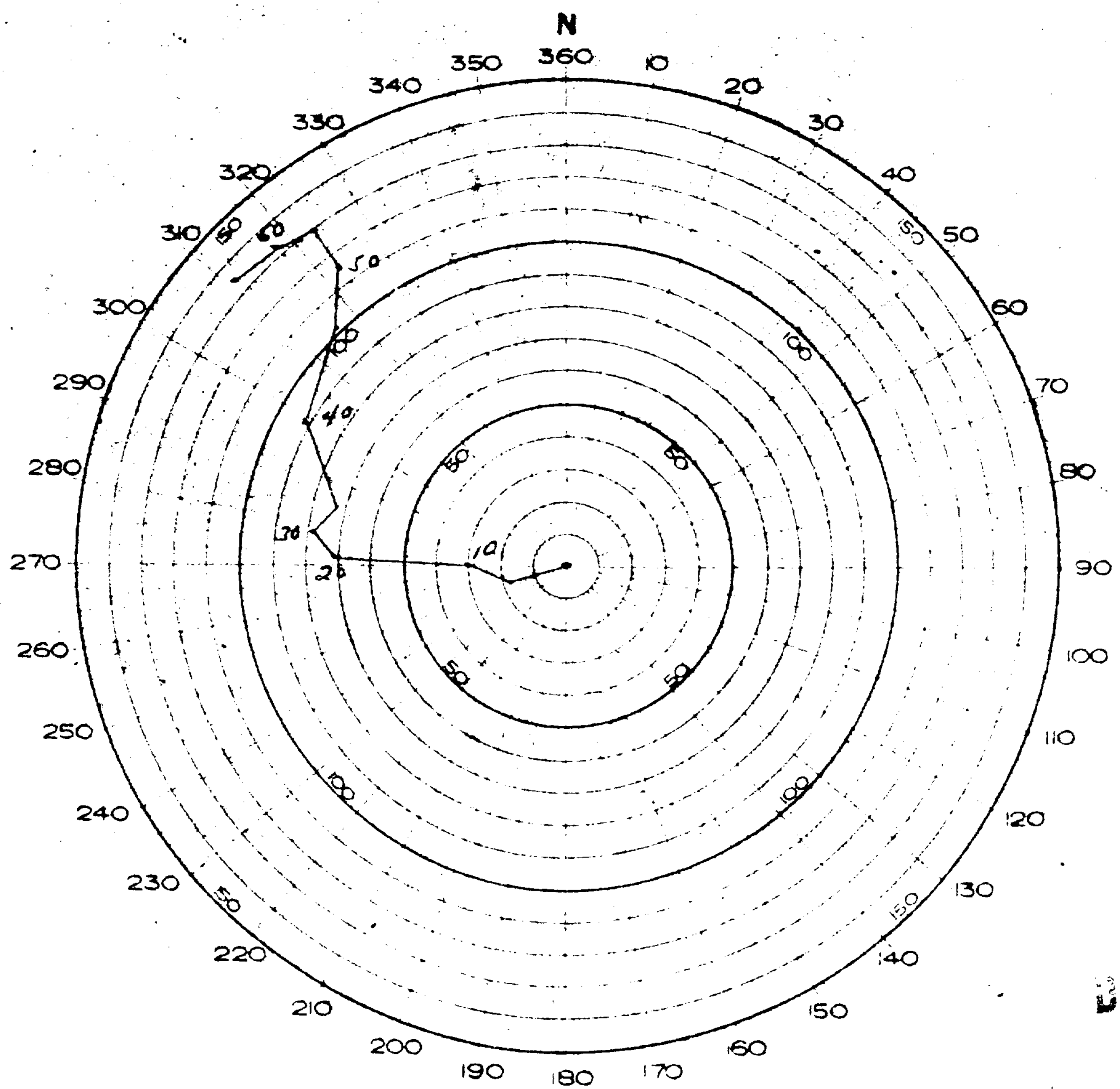


POPLAR EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX

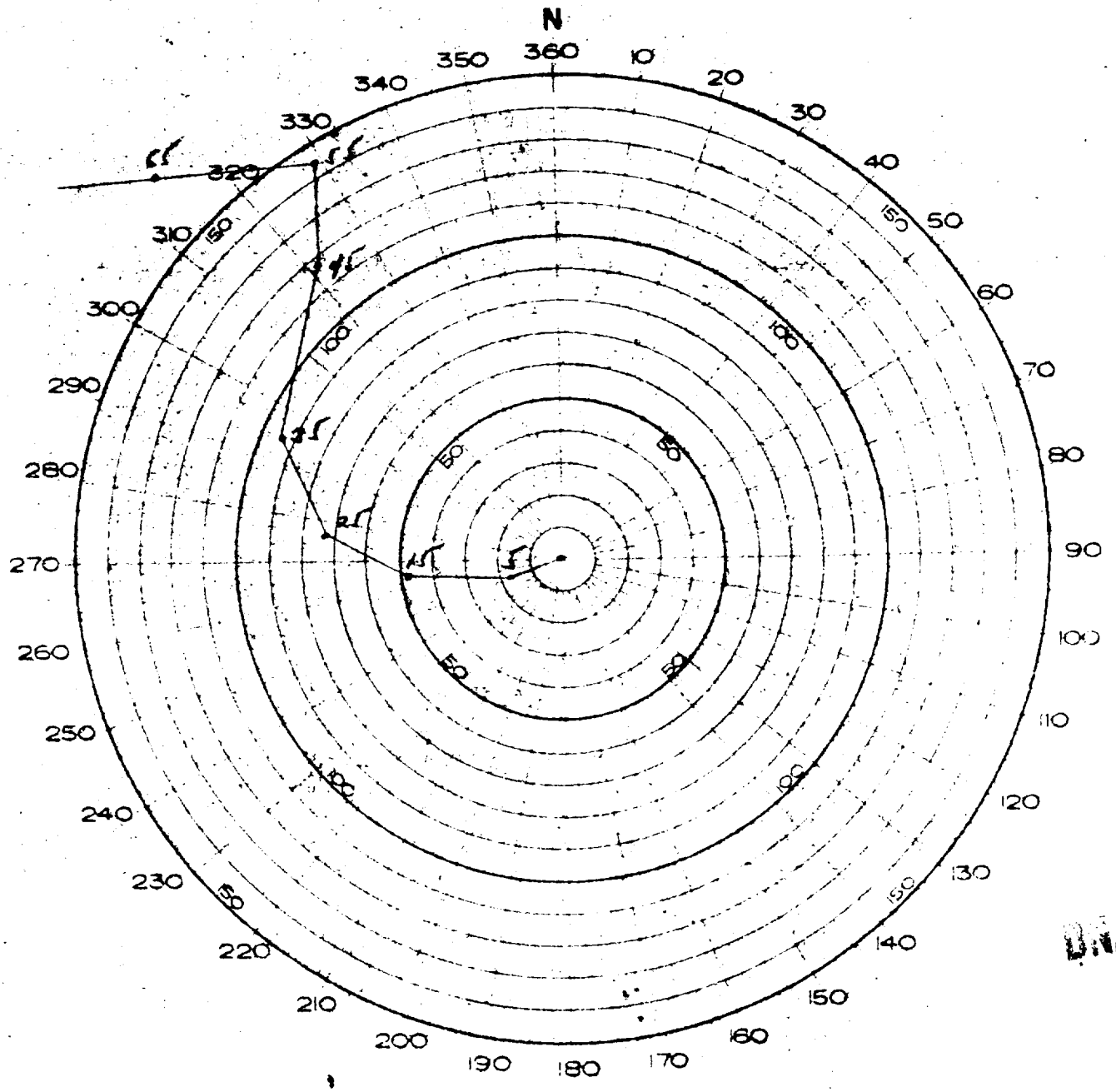


POPLAR EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX



POPLAR EVENT

Shot-time Hodograph

TAB B-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

14 July 1958

POPLAR

BIKINI OBSERVED WEATHER FOR 12 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1008.1 mbs
Free Air Surface Temperature	82.3° F
Wet Bulb Temperature	82.0° F
Dew Point Temperature	81.9° F
Relative Humidity	99%
Surface Wind	070° 11 knots
Visibility	10 miles lowering to 7 miles
Weather	Rainshowers

CLOUDS:

Overcast (10/10) cumulus and fractocumulus, bases 1,500 feet, tops unknown. Higher overcast visible, bases and tops unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

Scattered to broken (5/10 to 9/10) cumulus, bases variable 1,500 to 3,000 feet, tops generally 8,000 to 9,000 feet. Scattered tops east and south, 35,000 feet. Multiple layers of cirriform bases 30,000 to 49,000 feet, tops unknown.

Scattered rainshowers, east and south.

STATE OF THE SEA:

Open Sea: Waves from 080, period 4 - 5 seconds, height 3 - 5 feet.
Lagoon: Waves from 080, period 3 - 4 seconds, height 2 feet.

POPLAR

BIKINI RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1010	Surface	28.2	23.5
1000	300	27.2	23.2
952	1,706	23.5	21.5
850	4,950	18.2	15.2
700	10,340	09.2	04.5
612	14,042	02.5	-03.2
600	14,490	01.8	-03.2
560	16,404	-01.2	-03.2
500	19,250	-05.5	-07.5
400	24,900	-14.8	-19.2
309	31,102	-28.5	-33.5
300	31,820	-30.2	-37.2
256	34,383	-37.5	-48.2
250	35,970	-41.0	Miss
200	40,810	-53.2	Miss
175	43,583	-61.0	Miss
150	46,780	Miss	Miss

POPLAR

BIKINI WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	10
1,000	070	18
2,000	070	17
3,000	070	18
4,000	070	18
5,000	070	17
6,000	070	16
7,000	080	15
8,000	090	16
9,000	100	18
10,000	100	18
12,000	110	19
14,000	110	18
16,000	110	13
18,000	130	12
20,000	140	10
23,000	030	05
25,000	050	10
30,000	180	09
35,000	170	21
40,000	180	26
45,000	230	34
50,000	200	23
55,000	150	11
60,000	080	27
65,000	090	22
70,000	090	36
75,000	080	62
80,000	090	59
83,000	080	61

MAP OF BIKINI ATOLL

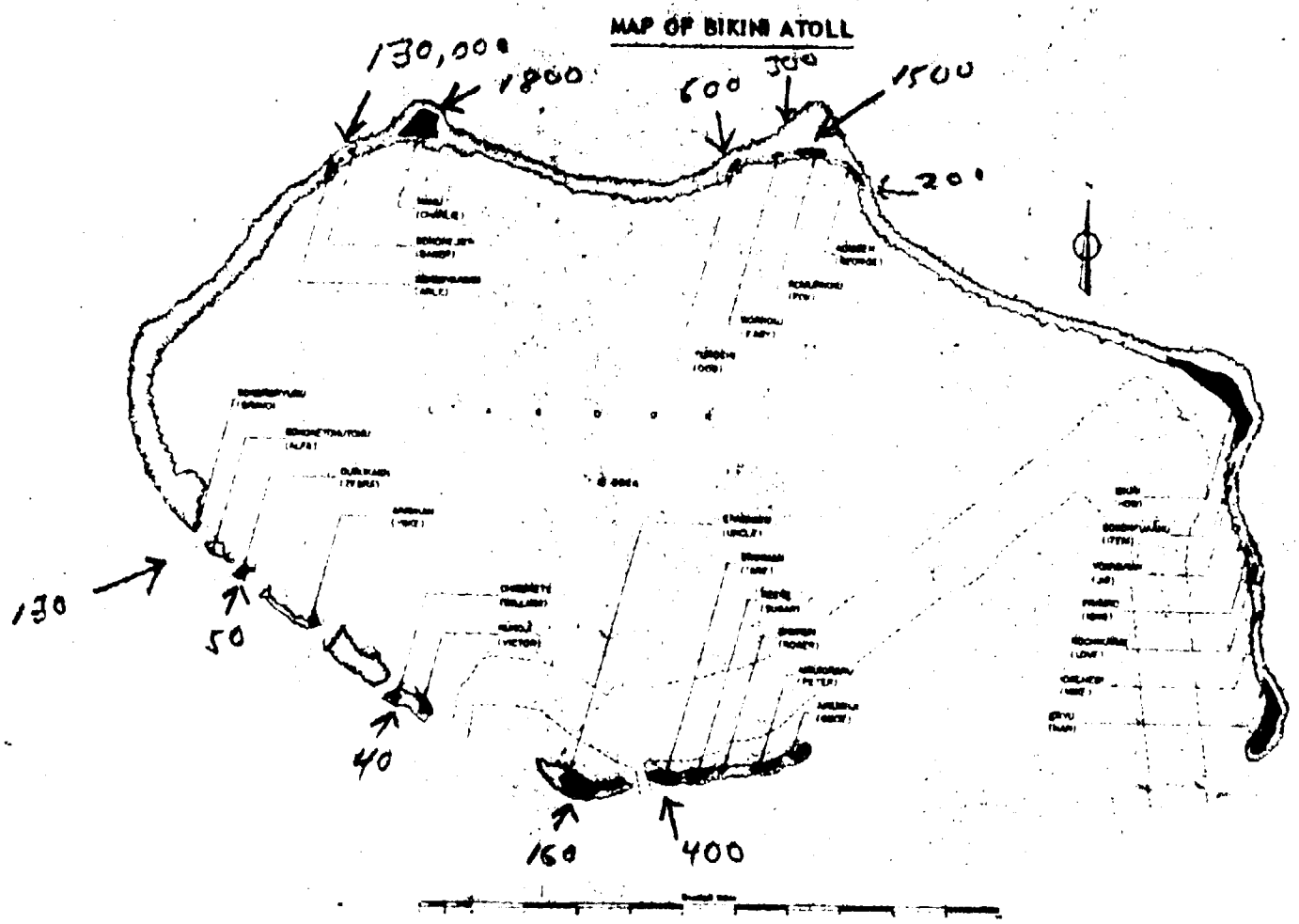
POPLAR EVENT

Initial Helicopter Survey
1307/00M July

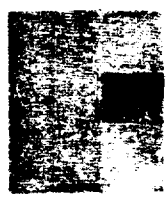
BEST COPY AVAILABLE

POPLAR EVENT

Second Helicopter Survey, H+28 Hours



DNA



INDEX

TAB

[redacted]

SCAEVOLA EVENT

OPERATION HARDTACK

1. The SCAEVOLA device was detonated 500 feet off the west side of Yvonne Island, ENIWETOK [redacted] Atoll, at 1600M on 14 July 1958. The cloud rose to 1,500 feet.

2. The P2V aircraft were not employed, but a survey helicopter took off from Bruce at 1610M. A reading of 20 to 30 mr/hr was taken over the shot barge.

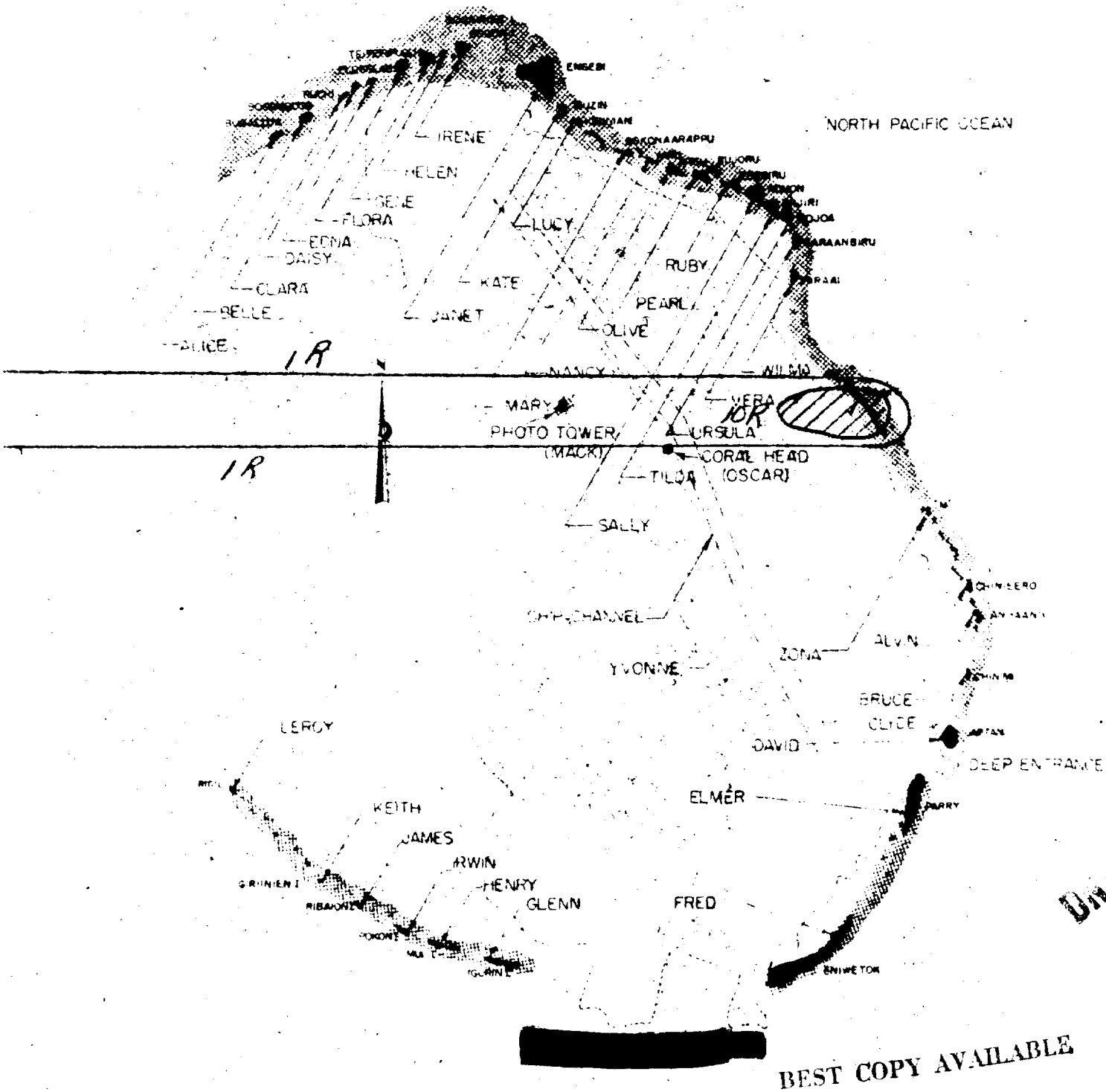
3. Re-entry hour was declared at 1700M, and the radex was cancelled.

4. It is estimated that no appreciable fallout existed outside the area immediately adjacent to ground zero.

TAB A

[redacted]

[redacted]



[redacted]

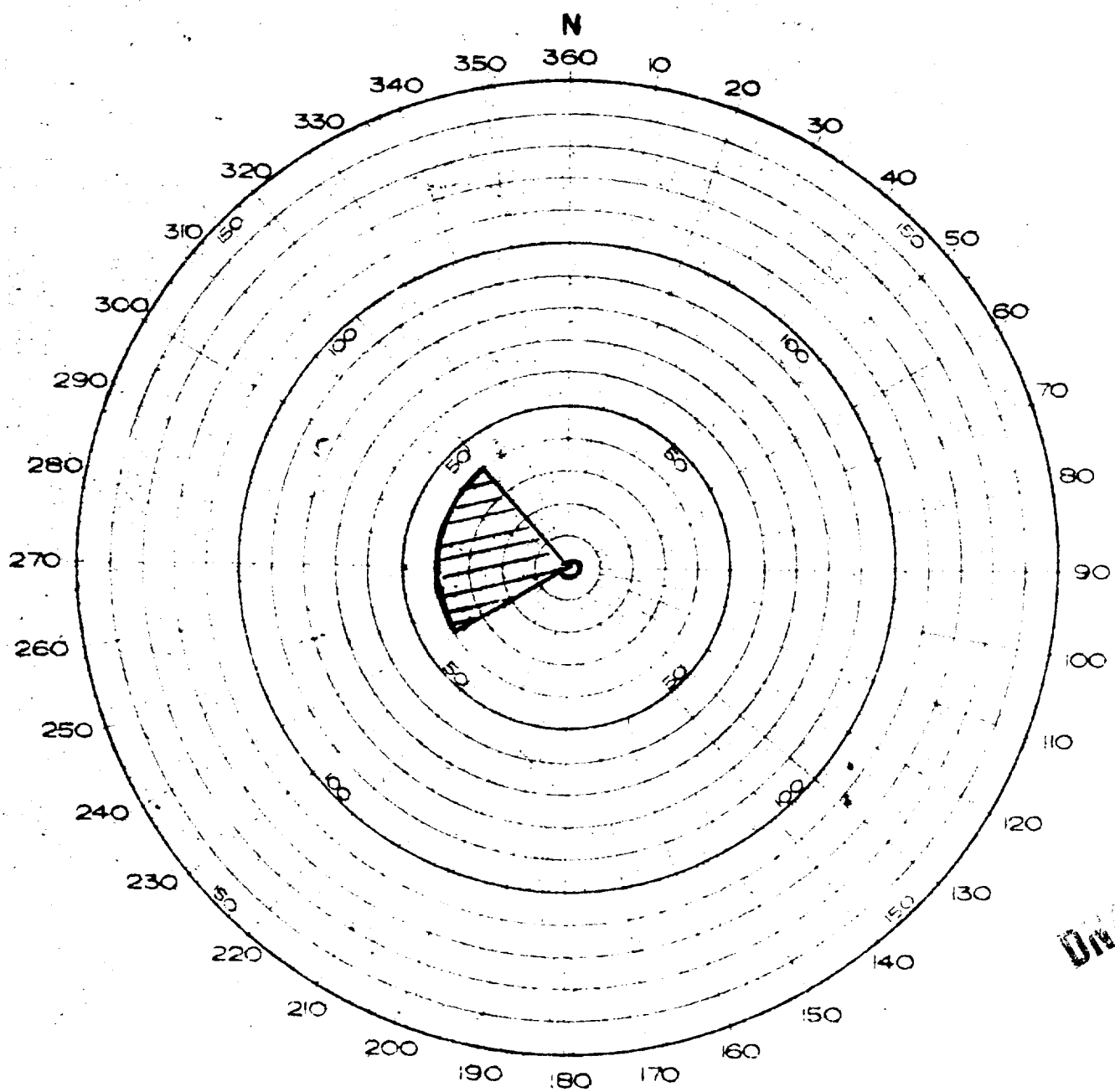
BEST COPY AVAILABLE

SCAEVOLA EVENT

Forecast Fallout Plot

TAB B

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX

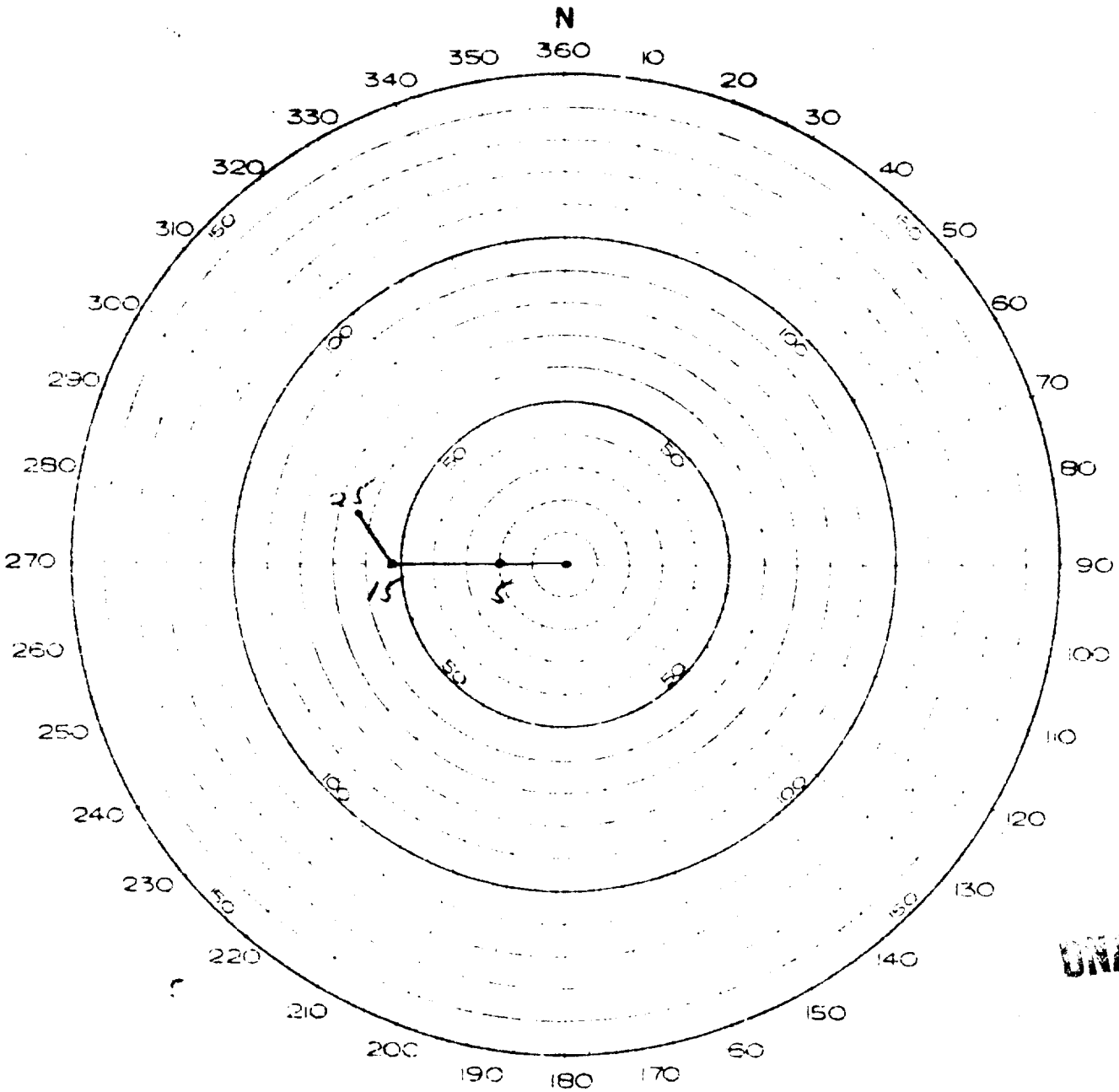


SCAEVOLA EVENT

Surface and Air Radex

TAB C

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



DNA

SCAEVOLA EVENT

Shot-time Hodograph

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

15 July 1958

ENIWETOK OBSERVED WEATHER FOR 14 JULY 1958

SCAEVOLA

SURFACE WEATHER:

Sea Level Pressure	1008.5 mbs
Free Air Surface Temperature	86.2° F
Wet Bulb Temperature	79.4° F
Dew Point Temperature	77.0° F
Relative Humidity	74%
Surface Wind	090° 14 knots
Visibility	10 miles
Weather	None

CLOUDS:

Scattered (3/10) cumulus with towering cumulus, bases 1,500 feet, tops unknown. Scattered (2/10) cumulus, bases 4,000 feet, tops unknown. Scattered altocumulus - altostratus (4/10) bases 10,000 feet, tops unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

Scattered (3/10 - 4/10) cumulus, bases 1,500 feet, tops 3,000 to 4,000 feet, scattered tops to 13,000 feet. Scattered cirriform, bases and tops unknown.

STATE OF THE SEA:

Open Sea: Waves from 090°, period 4 seconds, height 3 feet.
Lagoon: Waves from 090°, period 3 seconds, height 1 foot.

DNA

INDEX

TAB

[redacted]

PISONIA EVENT

OPERATION HARDTACK

1. The PISONIA device was detonated on a barge off Yvonne Island, Eniwetok Atoll, at 1100M, 18 July 1958. The yield was approximately [redacted] and the cloud rose to [redacted]

2. The P2V aircraft (Wildroot #10) was vectored on a line from Keith to Bruce and then gradually across the upper portion of the lagoon on radials from Alvin. Heavy rain showers caused isolated readings of 5 r/hr, 6 r/hr, and 7 r/hr throughout the area adjacent to ground zero. Readings attenuated quickly, but it was difficult to obtain a picture of the situation for several hours. The P2V was placed on a barrier patrol on radials of 240 degrees and 250 degrees for 75 miles from Eniwetok. A final clearing run was made to Ujelang, and the P2V was released at 1845M.

3. Weather prevented utilization of helicopter survey aircraft. Two M-boats were dispatched at 1415M. One turned back at Yvonne because of hot water, and the other read 1 r/hr at the Mack photo tower. Both returned at 1800M. A helicopter survey was made the following morning, from 0700M to 0900M, and readings of 1 mr/hr were made on Yvonne and Wilma.

4. It is estimated that the fallout fell along a bearing of 270 degrees for approximately 250 miles. Local radiation level on Elmer rose to a peak of 30 mr/hr suddenly, at 1448M, in heavy rain. Intensity quickly

[redacted]

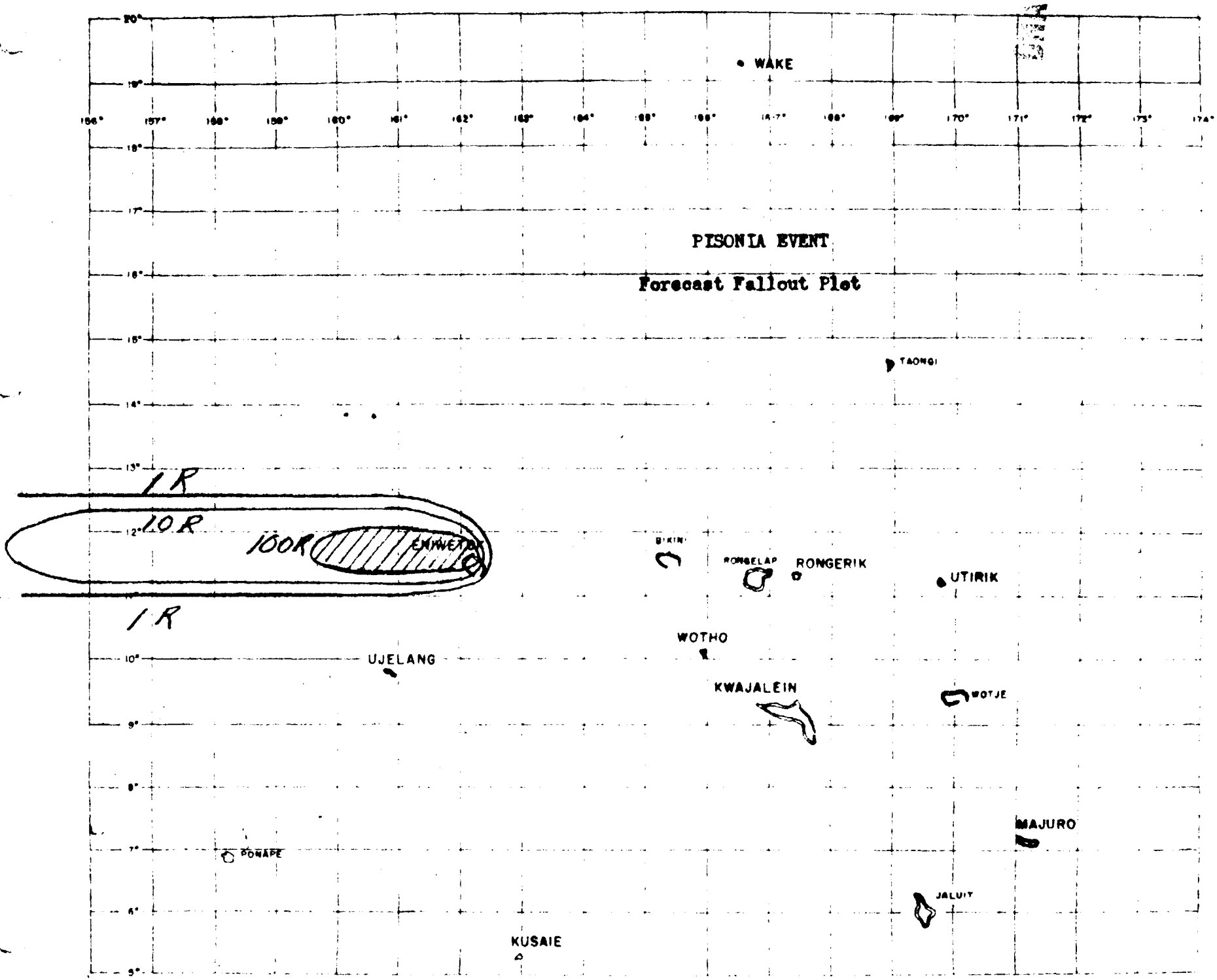
dropped and returned to background level at 1730M. No increases were reported on the off-atoll sites.

5. Weather was a contributing factor which hampered an otherwise smooth operation.

DNA

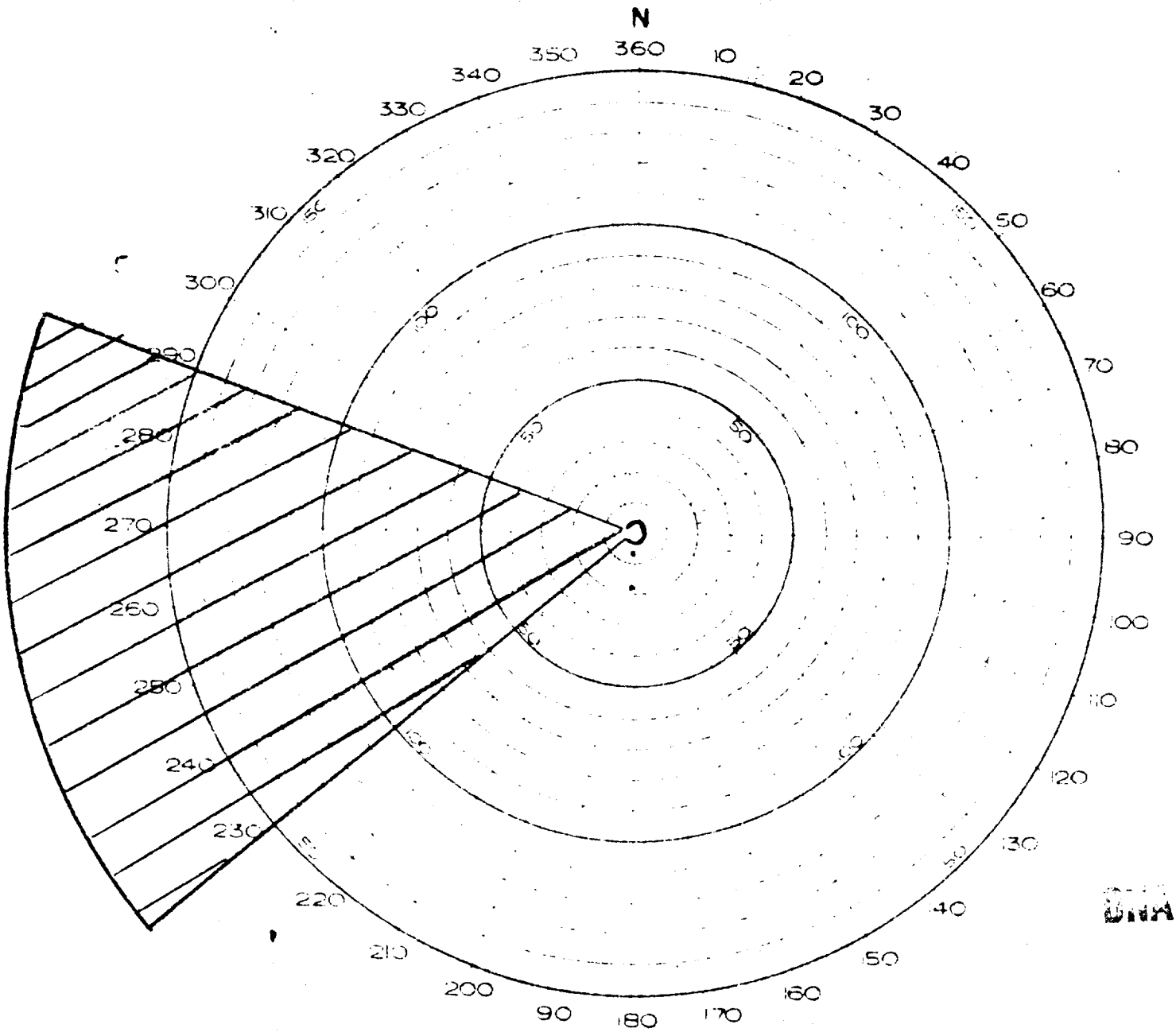
TAB A

[redacted]



BEST COPY AVAILABLE

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX

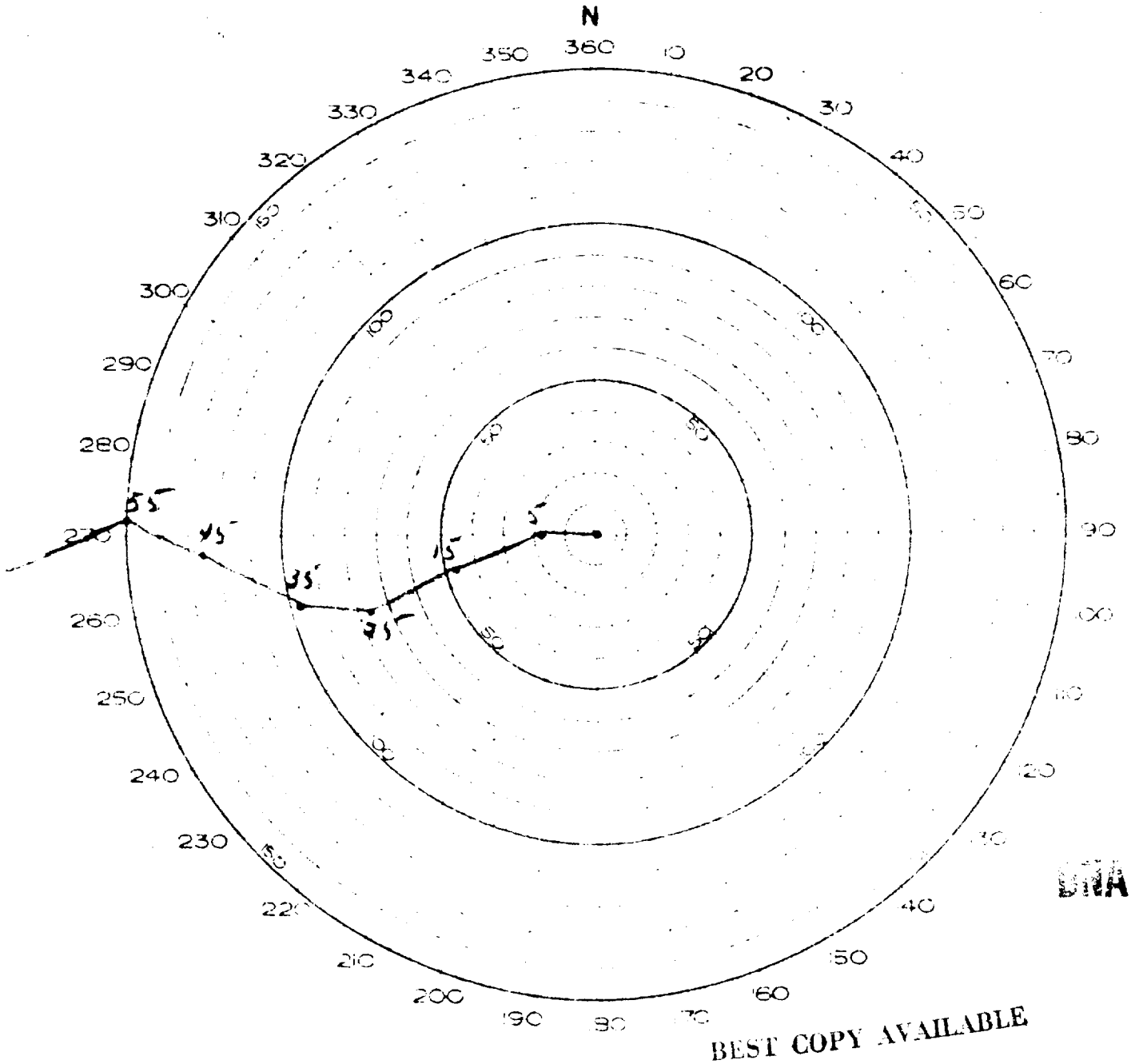


PISONIA EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



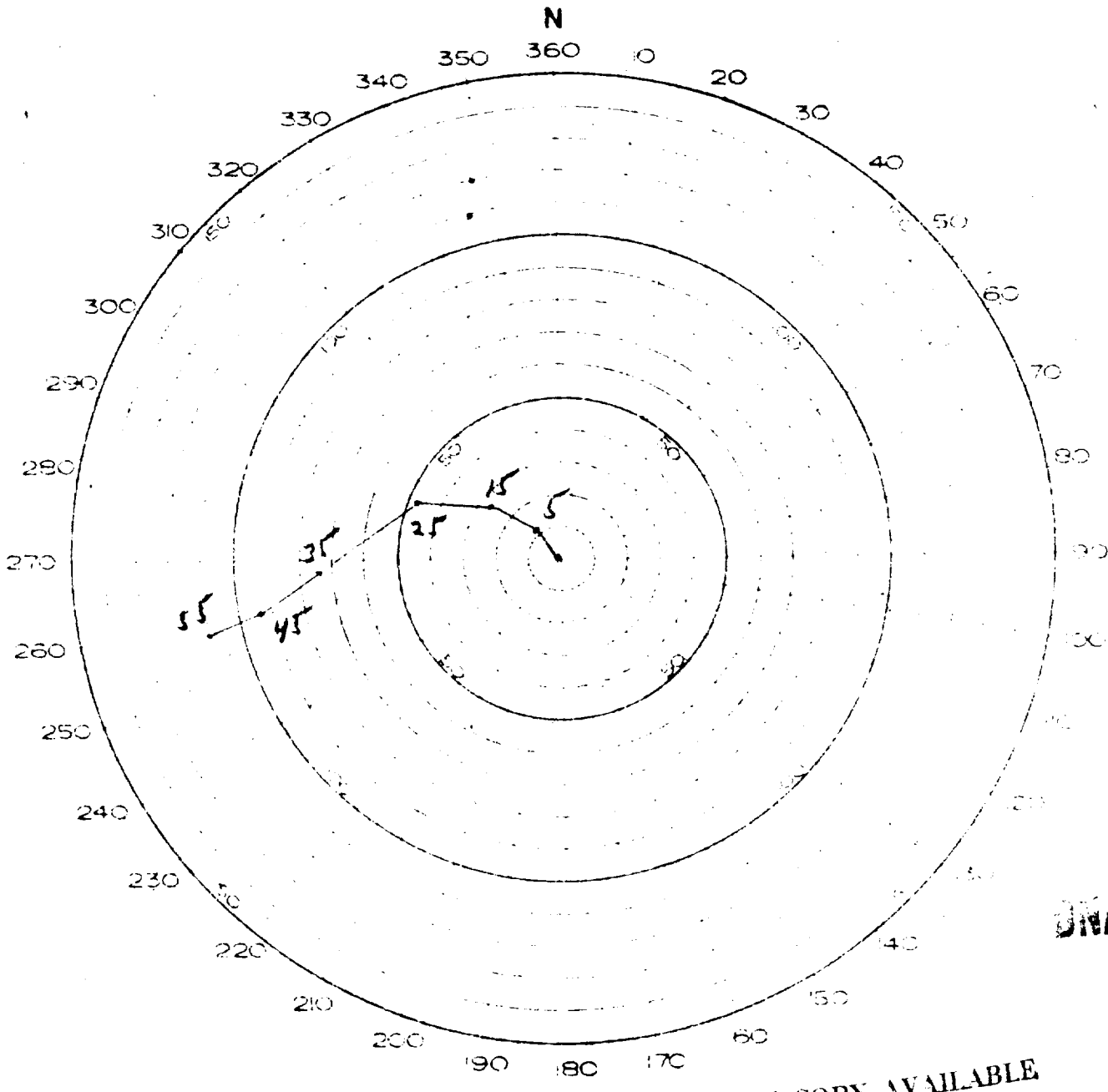
PISONIA EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



DNA

BEST COPY AVAILABLE

PISONIA EVENT

Shot-time Hodograph

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

19 July 1958

PISCNIA

ENIWETOK OBSERVED WEATHER FOR 18 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1011.5 mbs
Free Air Surface Temperature	80.3° F
Wet Bulb Temperature	76.4° F
Dew Point Temperature	74.9° F
Relative Humidity	83%
Surface Wind	C20° 4 knots shifting to 200° 7 knots
Visibility	4 miles lowering to 1 mile
Weather	Moderate rainshowers

CLOUDS:

Broken (9/10) cumulus becoming overcast (10/10) cumulus, bases 1,500 feet, tops unknown. Broken (6/10) cirriform, bases and tops unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

Broken cumulus (6/10), bases unknown, tops unknown with scattered tops above 50,000 feet. Scattered (5/10) to broken (7/10) cirriform, bases 40,000 feet, tops 47,000 feet. Some cirriform, very thin.

STATE OF THE SEA:

Open Sea: Waves 3 - 4 feet high, period 4 - 5 seconds, length 50 - 80 feet.

Lagoon: Waves 1 foot high, period 2 - 3 seconds.

PISONIA

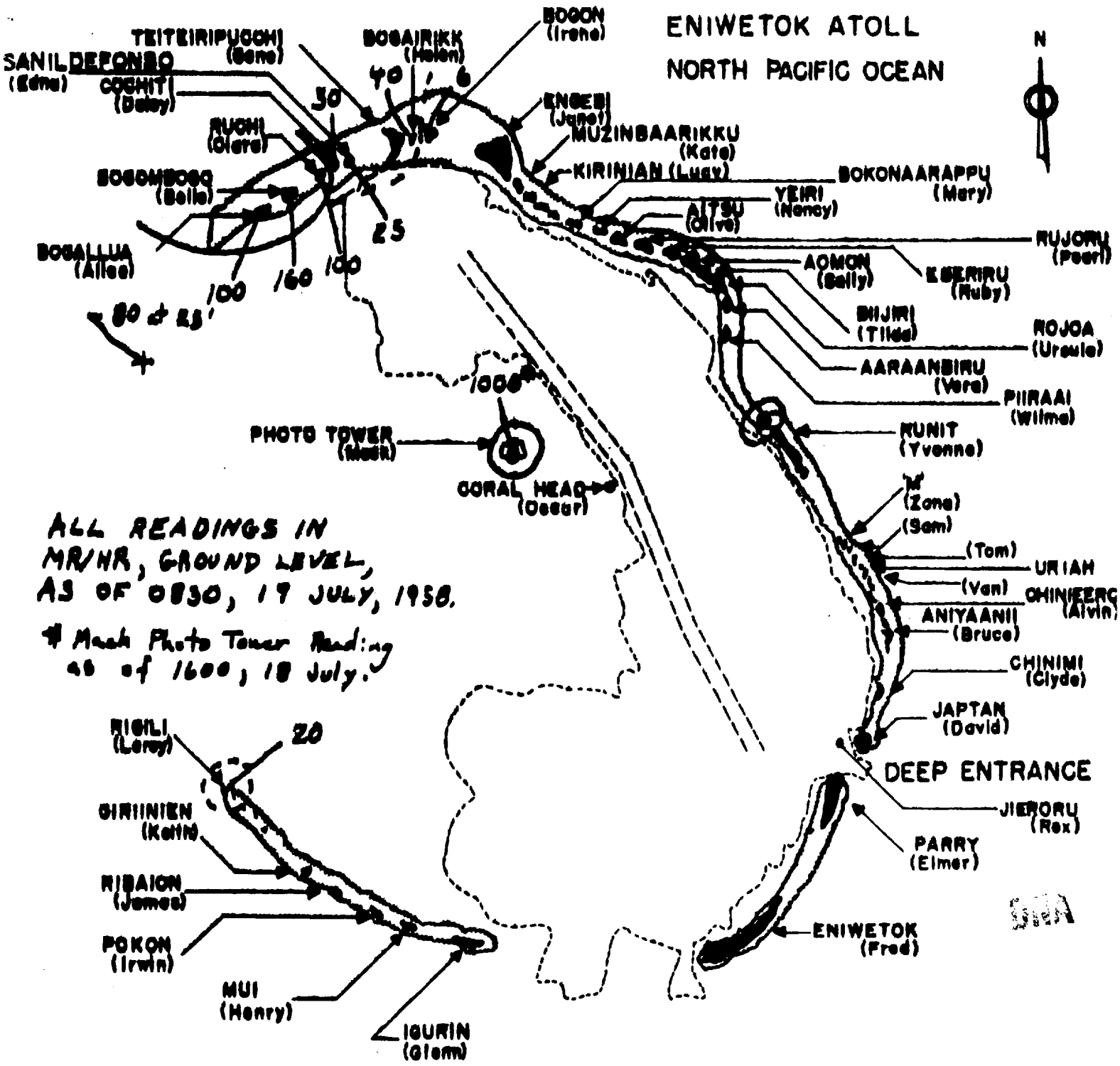
ENIWETOK RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1011	Surface	27.5	24.2
1000	340	26.8	26.8
940	2,100	24.8	24.8
883	3,871	19.4	Miss
850	4,970	18.8	Miss
784	7,218	Miss	Miss
700	10,340	09.7	Miss
696	10,466	09.5	Miss
600	14,480	03.0	Miss
587	15,059	02.0	Miss
500	19,210	-10.0	Miss
480	20,243	-12.8	-28.2
451	21,818	-11.0	Miss
400	24,800	-16.4	Miss
300	31,690	-32.4	Miss
250	35,820	-42.2	Miss
200	40,680	-53.7	Miss
150	46,550	-68.6	Miss
123	50,525	-76.0	Miss
118	51,312	-74.0	Miss
100	54,310	-76.2	Miss
097	54,954	-77.0	Miss
087	57,086	-77.0	Miss
074	60,138	-70.0	Miss
050	67,860	-62.5	Miss
044	70,538	-63.0	Miss
025	72,230	-50.8	Miss

PISONIA

ENIWETOK WINDS ALOFT OBSERVATION

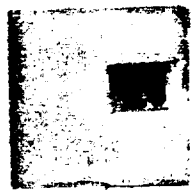
Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	Calm	Calm
1,000	180	08
2,000	170	09
3,000	160	12
4,000	140	15
5,000	130	12
6,000	130	10
7,000	130	12
8,000	120	09
9,000	120	07
10,000	120	11
12,000	110	10
14,000	100	08
16,000	090	06
18,000	120	15
20,000	120	12
23,000	080	16
24,000	070	14
25,000	070	13
26,000	080	12
28,000	070	18
30,000	060	19
32,000	050	18
34,000	050	19
35,000	050	18
36,000	050	17
38,000	070	14
40,000	070	08
42,500	050	12
45,000	040	17
47,500	040	14
50,000	050	10
52,500	080	10
55,000	100	10
57,500	110	18
60,000	100	19
65,000	090	27
70,000	090	45
75,000	090	48
80,000	090	58
85,000	100	59
90,000	090	71
95,000	090	65
100,000	090	86
105,000	090	88
109,000	100	89



PISONIA EVENT

Radiological Surface Survey, H+20 Hours

TAB F



DNA

INDEX

TAB

[redacted]

JUNIPER EVENT

OPERATION HARDTACK

1. The JUNIPER device was detonated on a barge to the west of Tare Island, Bikini Atoll, at 1620M, 22 July 1958. The cloud rose immediately to [redacted] with a base estimated at 24,000 feet. The yield was [redacted]

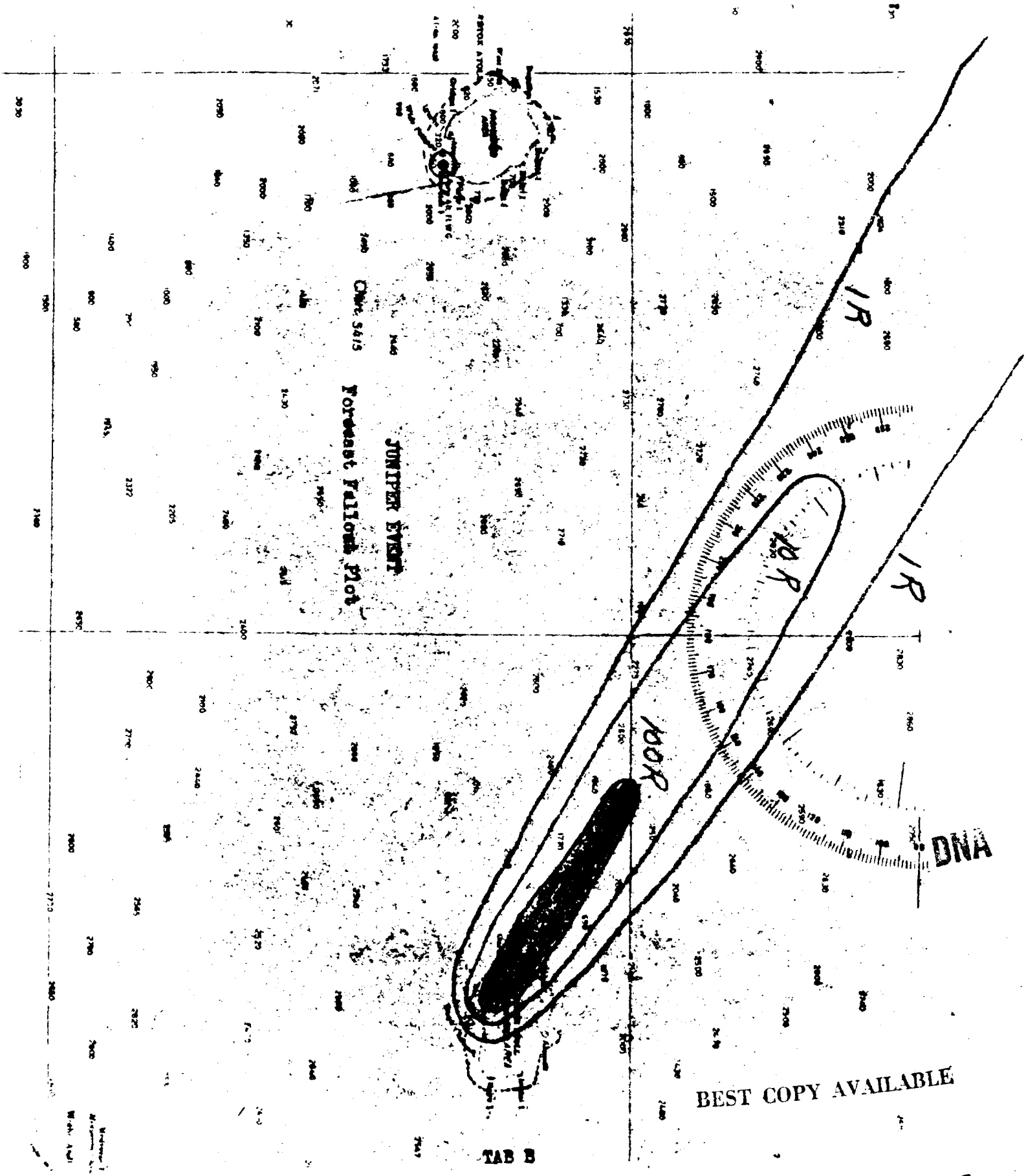
2. The P2V aircraft (Wildrcot #4) reported over Nan at 1650M, and it was vectored to How, to Dog, to Peter with only background readings reported. Some hot spots were encountered in the vicinity of ground zero, the highest being 32 mr/hr at 1720M. The P2V was vectored on a westerly bearing as a barrier patrol.

3. The helicopters took off at 1800M to survey the southern island chain. The highest reading was made over William at 200 feet: 150 r/hr.

4. Fallout was forecast along a bearing of 290 degrees; however, the wind pattern continued to shift to the south throughout the evening. The P2V encountered a reading of 1.3 r/hr at 1755M, 30 miles due west of Peter. To verify this shift and protect Eniwetok, P2V aircraft were worked on various tracks between Eniwetok and Bikini until 0210M 23 July.

TAB A

[redacted]

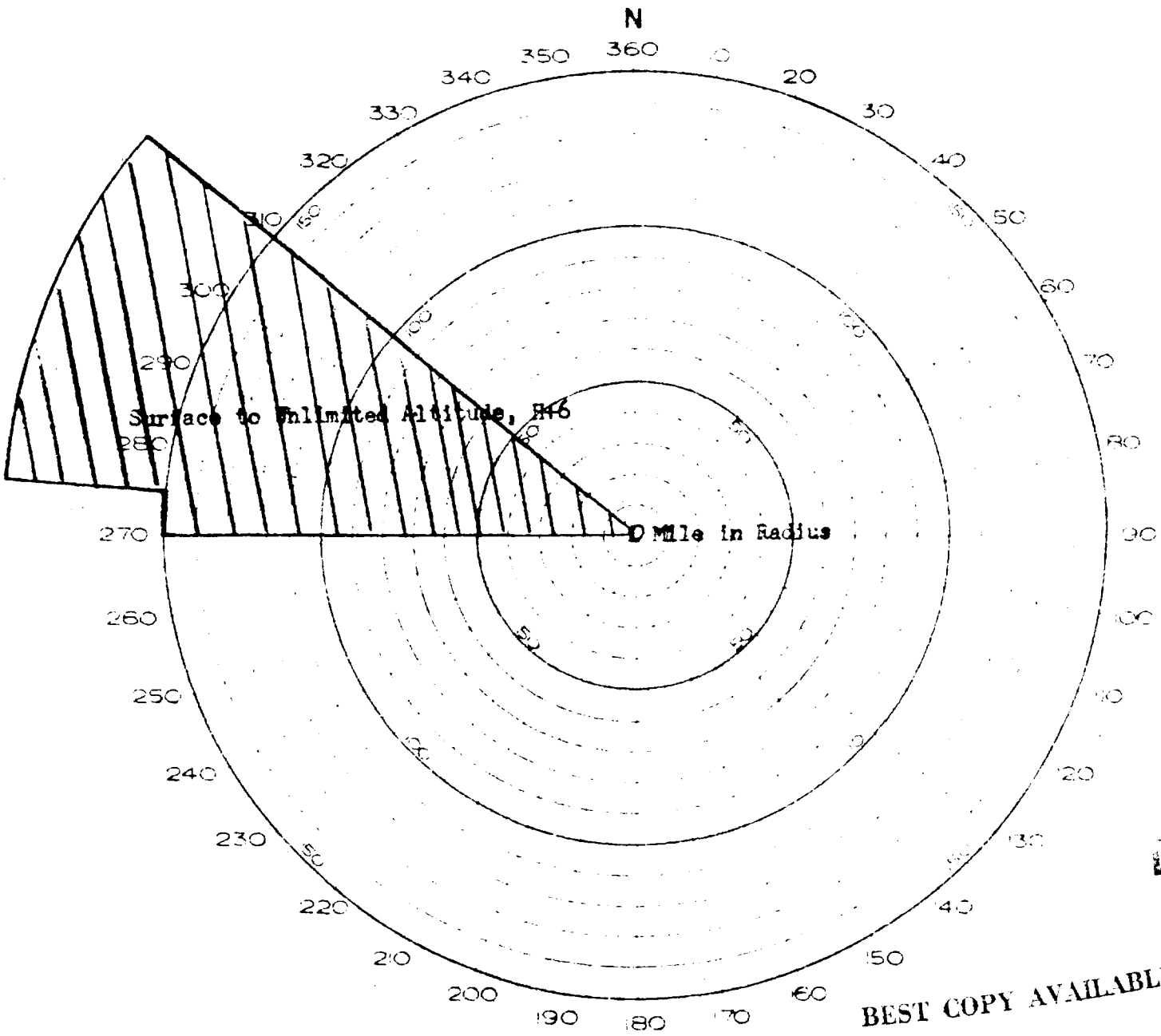


BEST COPY AVAILABLE

TAB B

BEST COPY AVAILABLE

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



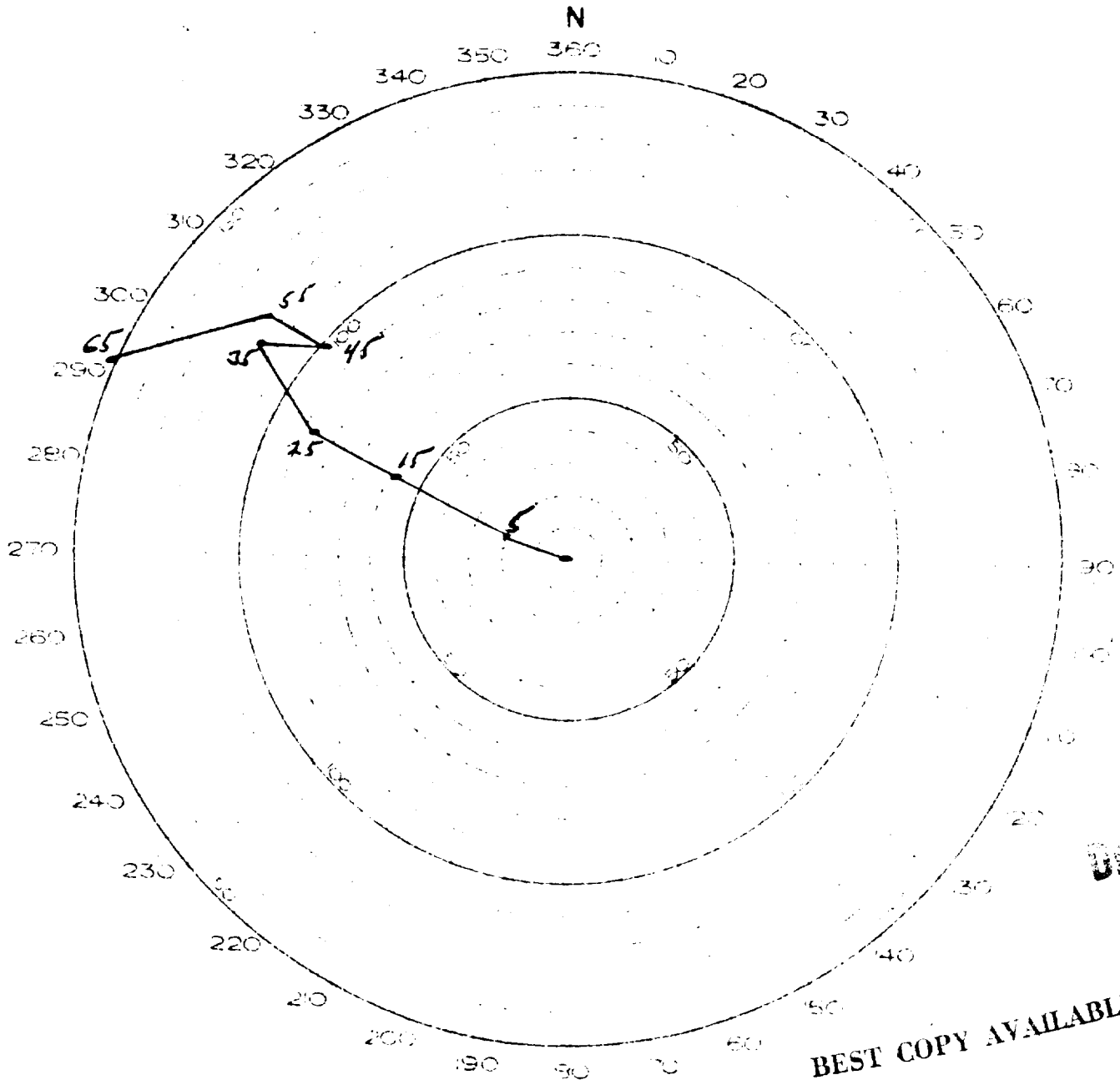
BEST COPY AVAILABLE

JUNIPER EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX

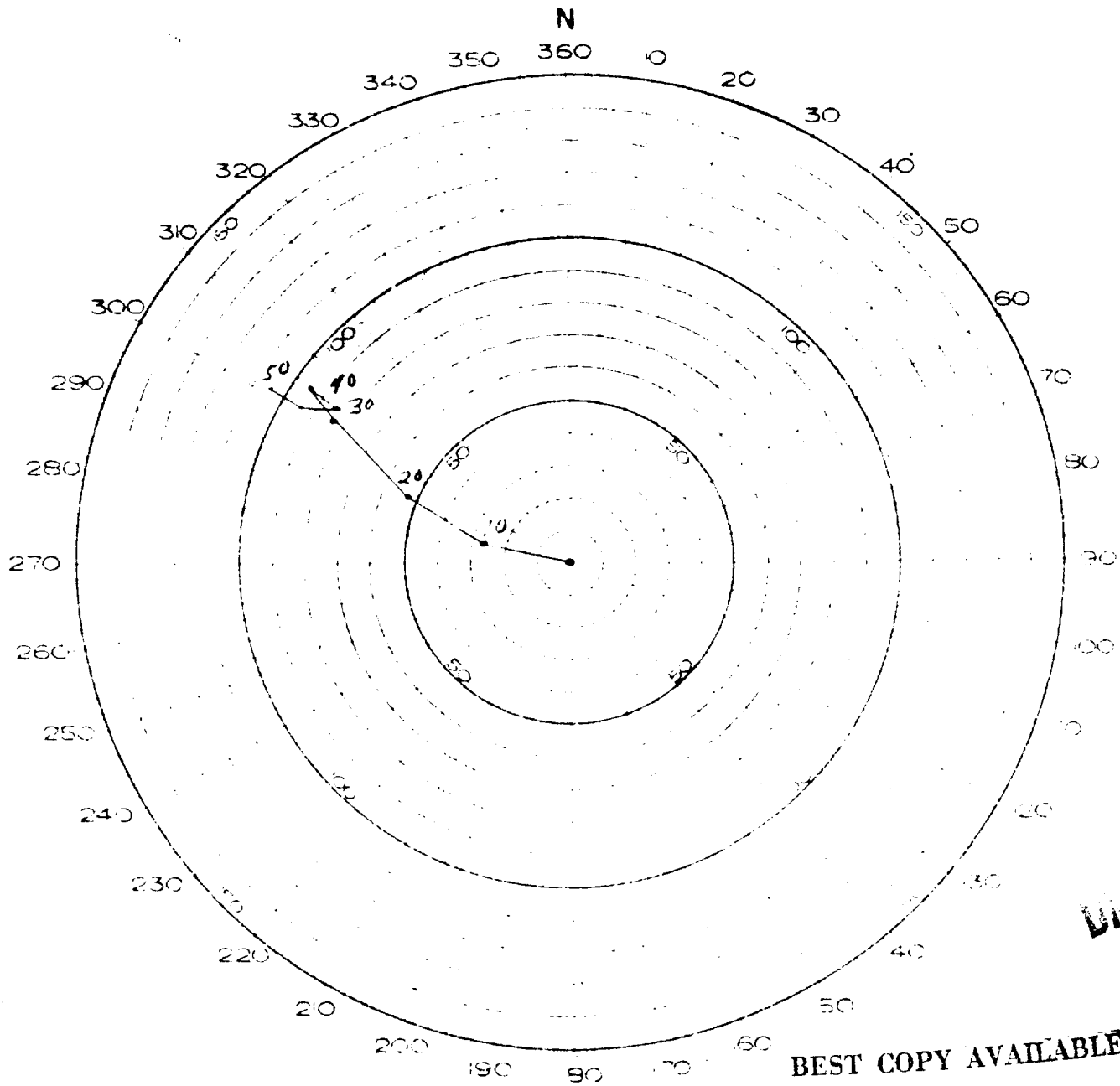


JUNIPER EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



JUNIPER EVENT

Shot-time Hodograph

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

24 July 1958

JUNIPER

BIKINI OBSERVED WEATHER FOR 22 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1009.5 mbs
Free Air Surface Temperature	87.5° F
Wet Bulb Temperature	81.0° F
Dew Point Temperature	78.9° F
Relative Humidity	76%
Surface Wind	090° 17 knots
Weather	None

CLOUDS:

Scattered (2/10) cumulus, bases 2,000 feet. Scattered (4/10) altocumulus, bases 16,000 feet. Scattered (4/10) cirrostratus, bases unknown.

STATE OF THE SEA:

Open Sea: Waves 6 to 8 feet high, period 5 - 6 seconds, length 80 to 110 feet.

Lagoon: Waves 1 to 2 feet high, period 3 - 4 seconds.

JUNIPER

BIKINI RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1010	Surface	27.5	22.8
1000	300	26.8	22.5
850	4,950	17.2	15.2
700	10,320	08.2	04.8
634	13,058	03.2	-00.5
624	13,451	02.2	-11.5
602	14,370	01.2	-15.2
600	14,450	01.2	-12.5
590	14,895	00.5	-03.5
570	15,814	-01.2	-03.2
500	19,200	-06.2	-10.5
442	22,342	-12.2	-18.8
412	24,081	-15.2	-19.2
400	24,820	-16.5	-21.5
300	31,700	-31.8	-38.5
258	35,171	-40.2	-48.8
250	35,840	-41.5	Miss
200	40,670	-53.5	Miss
150	46,530	-67.5	Miss
122	50,525	-76.0	Miss
100	54,280	-76.5	Miss
099	54,462	-76.0	Miss
092	55,774	-73.0	Miss
077	59,252	-74.0	Miss
075	59,810	-70.0	Miss
070	61,286	-70.0	Miss
067	62,008	-67.0	Miss
050	67,810	-63.8	Miss
048	68,569	-63.0	Miss
046	69,521	-59.0	Miss
032	79,068	-57.0	Miss
020	82,180	-53.2	Miss

JUNIPER

BIKINI WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots
Surface	080	14
1,000	080	16
2,000	090	17
3,000	100	18
4,000	100	18
5,000	100	17
6,000	110	16
7,000	110	14
8,000	110	11
9,000	110	08
10,000	110	09
12,000	120	11
14,000	120	14
16,000	130	12
18,000	130	13
20,000	130	16
22,000	130	17
24,000	140	19
26,000	140	18
28,000	140	15
30,000	140	13
32,000	140	14
34,000	140	16
36,000	230	10
38,000	300	09
40,000	310	10
42,500	350	11
45,000	080	09
47,500	120	08
50,000	120	11
52,500	130	12
55,000	230	16
57,500	010	11
60,000	080	27
65,000	090	31
70,000	100	42
75,000	090	44
80,000	080	55
85,000	090	58
90,000	080	58
95,000	080	66
100,000	090	68
105,000	090	70
108,000	090	72

MAP OF BIKINI ATOLL

JUNIPER EVENT

Radiological Surface Survey, H+3 Hours

DNA

BEST COPY AVAILABLE

INDEX

TAB

[redacted]

OLIVE EVENT

OPERATION HARDTACK

1. The OLIVE device was detonated on a barge off Janet Island, Eniwetok Atoll, at 0820M, 23 July 1958. The cloud rose to [redacted] and the base was estimated at 15,000 feet. The yield was [redacted]

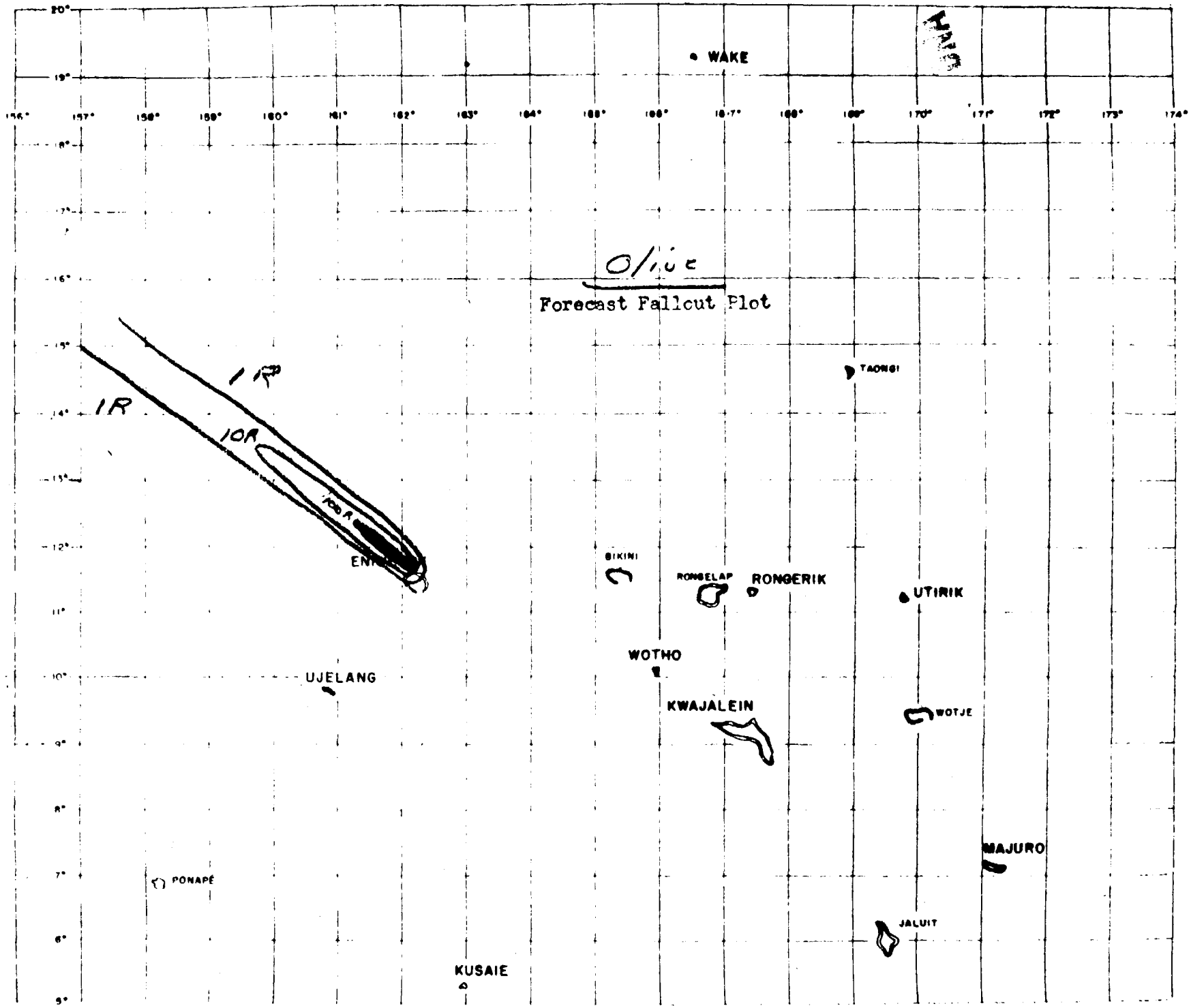
2. The P2V aircraft reported over Alvin at 0900M, at 1,000 feet, and it was vectored to Keith, to Yvonne, to Leroy, to Wilma, to Leroy. Only background was recorded. The northern part of the atoll was cleared slowly, and the highest reading, 3.5 mr/hr, was recorded abeam the ground zero point at 0955M. Re-entry hour was declared at 1000M, and the P2V was vectored out of the lagoon on westerly and northeasterly radials.

3. The helicopter survey took off at 1038M. The highest reading was made over Janet at 25 feet: 600 mr/hr.

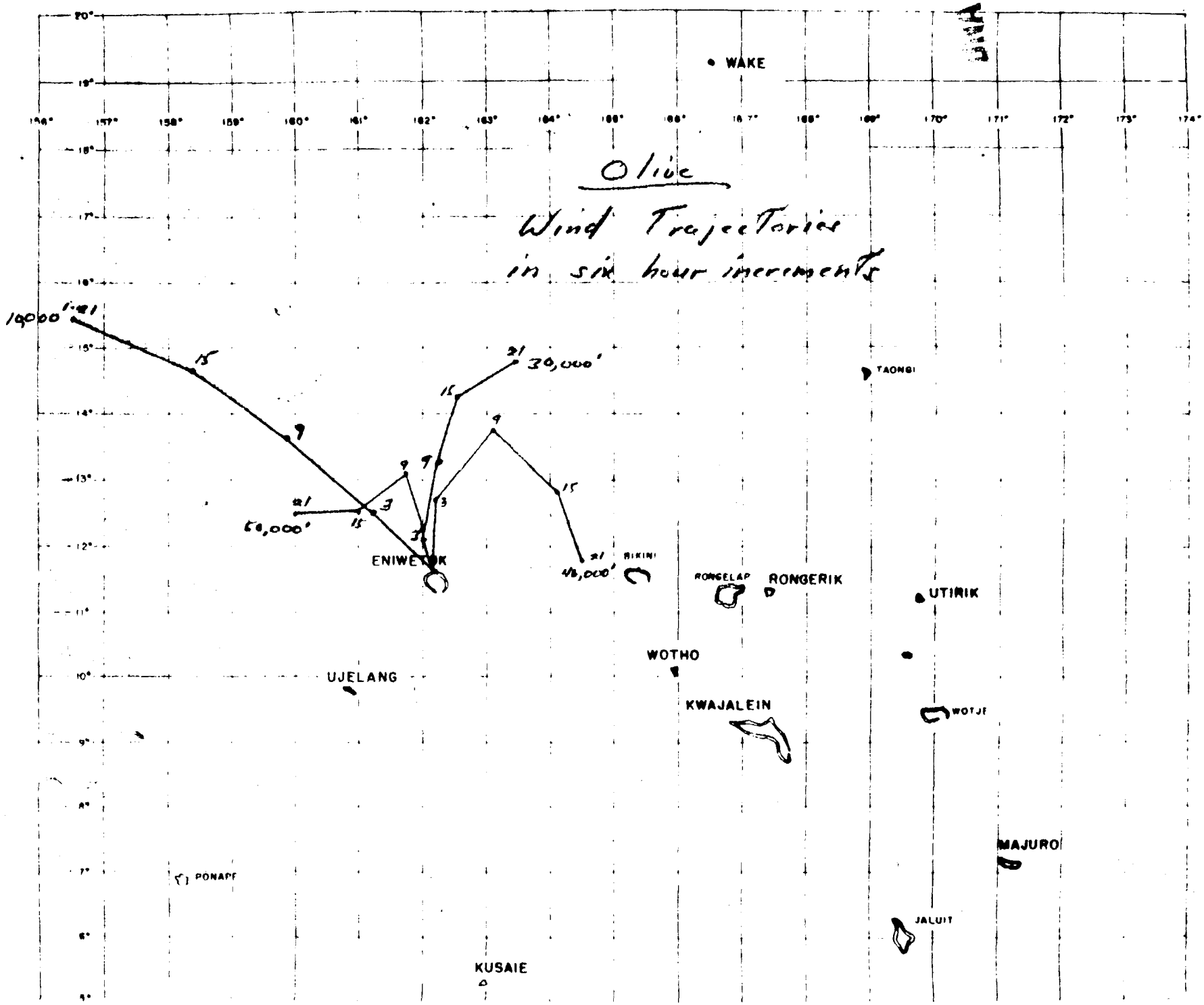
4. Fallout was forecast along a bearing of 300 degrees, but the wind pattern shift more to the scuth in the lower altitudes.

TAB A

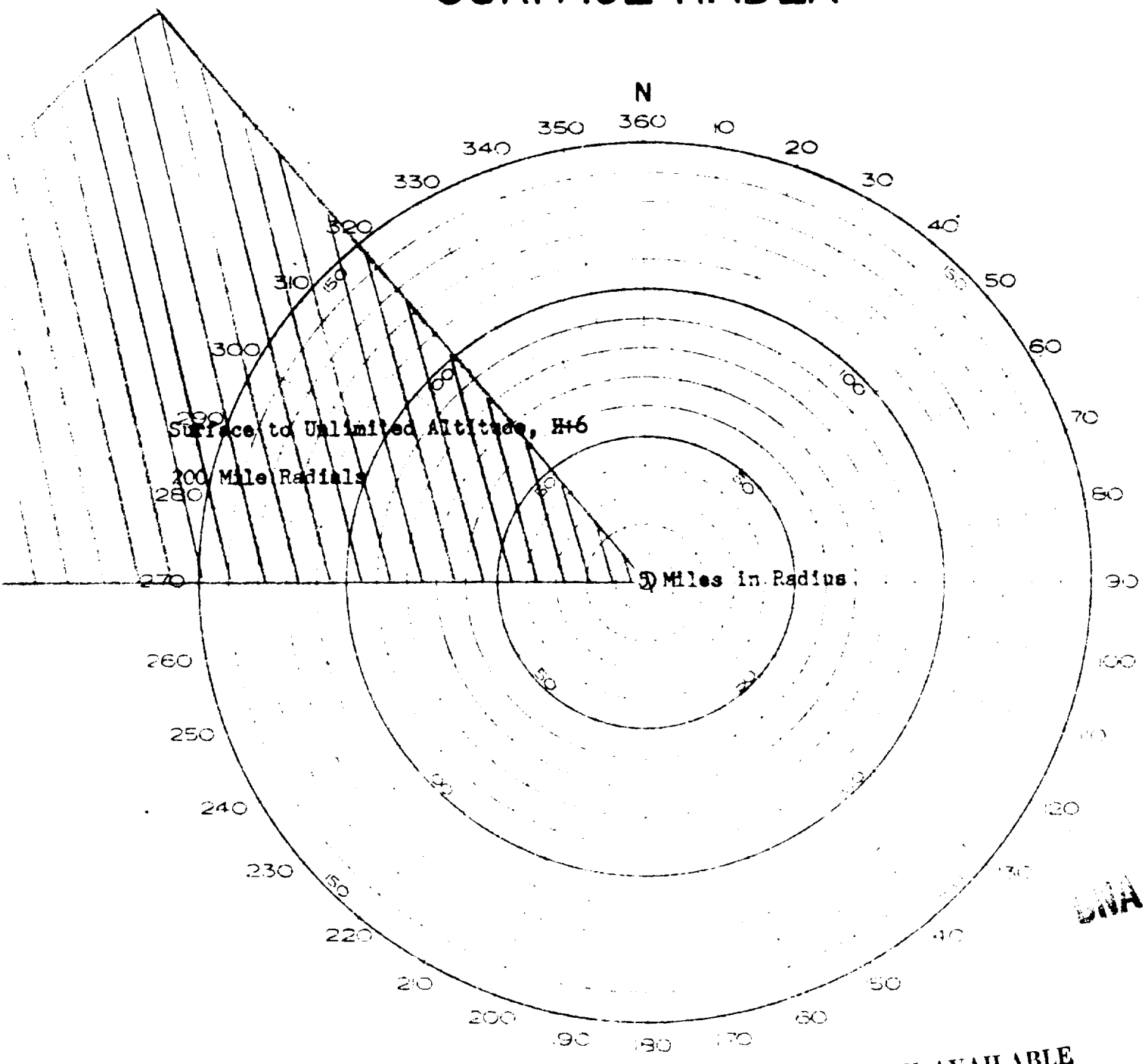
[redacted]



TAB C



HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



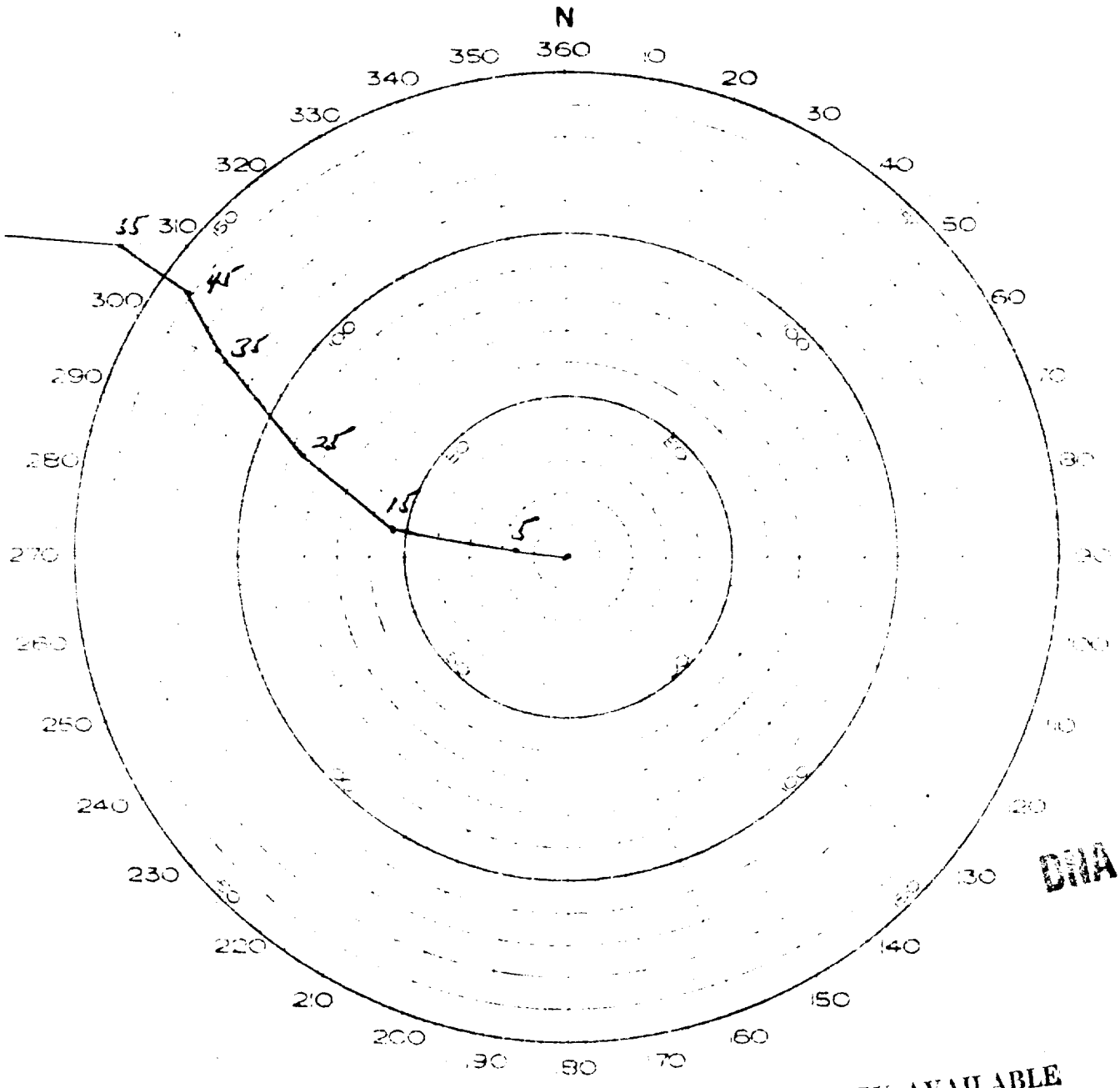
BEST COPY AVAILABLE

OLIVE EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



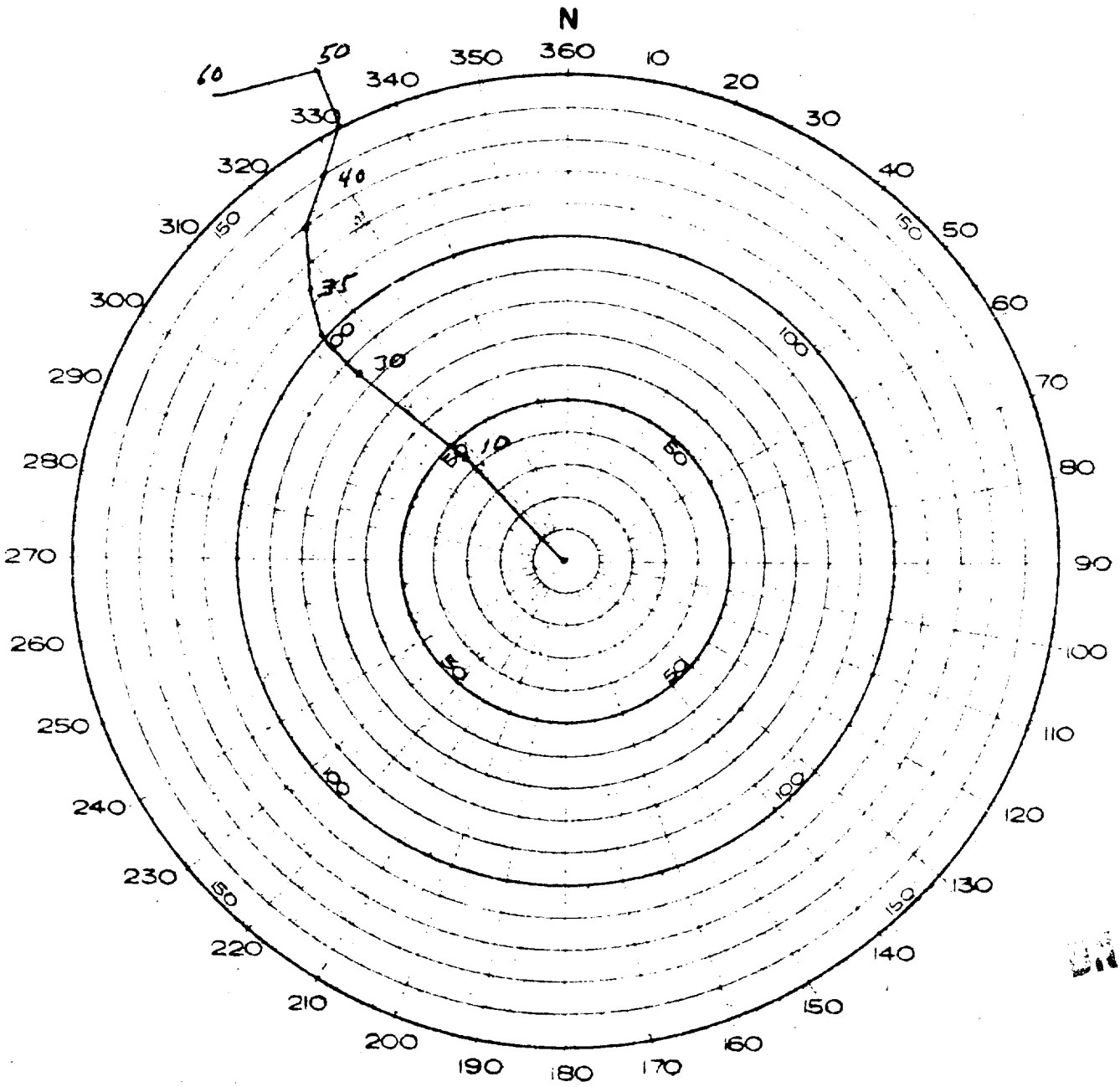
OLIVE EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



OLIVE EVENT

Shot-time Hodograph

TAB E-2

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

24 July 1958

OLIVE

ENIWETOK OBSERVED WEATHER FOR 23 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1009.7 mbs
Free Air Surface Temperature	79.5° F
Wet Bulb Temperature	78.9° F
Dew Point Temperature	76.0° F
Relative Humidity	89%
Surface Wind	130° 13 knots
Visibility	8 miles
Weather	Very light rainshowers

CLOUDS:

Scattered (2/10) cumulus, bases 1,000 feet. Broken (6/10) altostratus - altocumulus, bases 11,000 feet. Broken (6/10) cirrostratus, bases unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

Scattered (2/10) cumulus, bases unknown. Broken (6/10) altostratus - altocumulus, bases 20,000 to 22,000. Scattered (5/10) cirrus becoming broken (8/10) cirrus west, bases 30,000, some bases 34,000.

STATE OF THE SEA:

Open Sea: Waves 6 feet high, period 5 seconds, length 80 feet.
Lagoon: Waves 1 foot high, period 3 - 4 seconds.

OLIVE

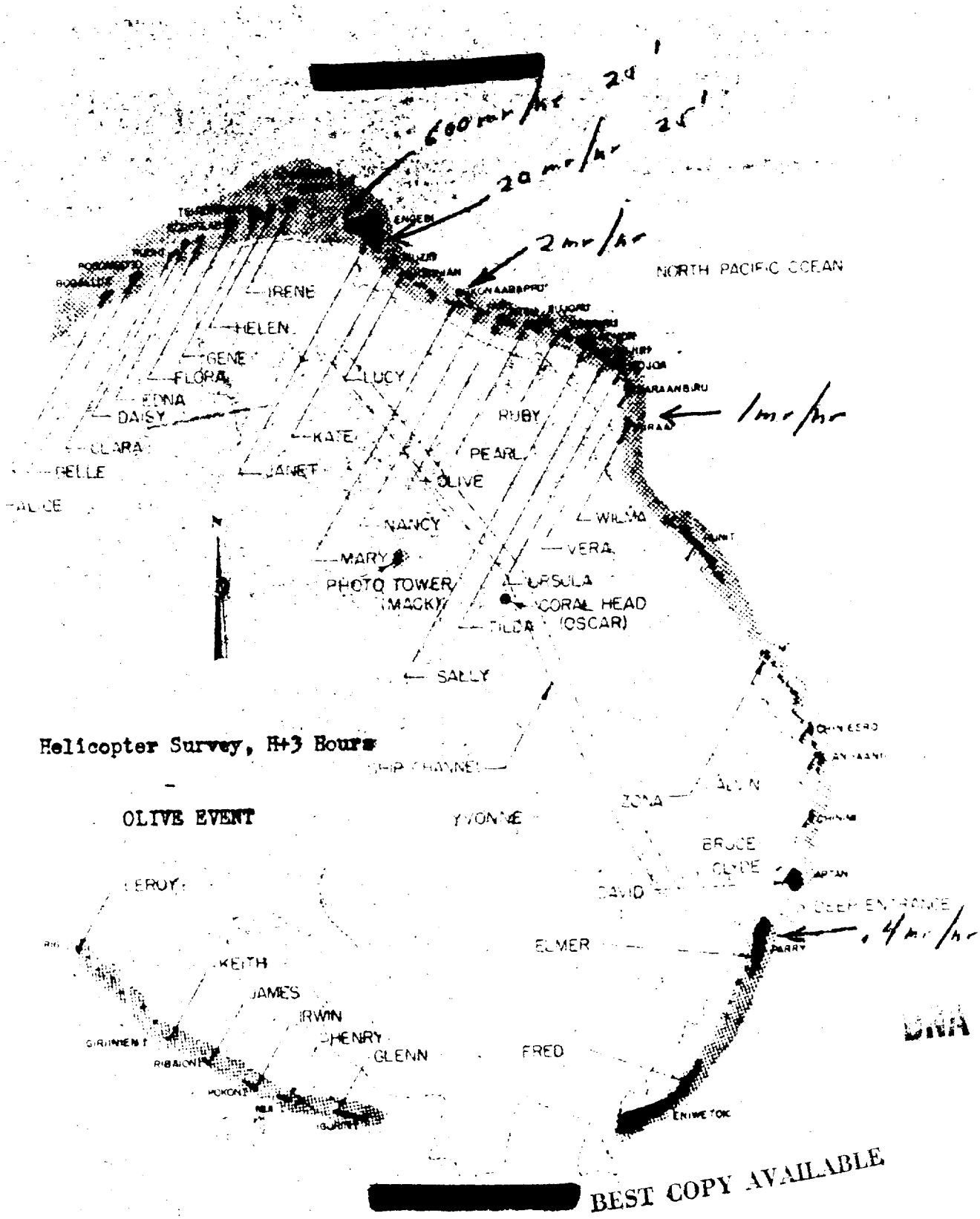
ENIWETOK RADIOSONDE OBSERVATION

Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1009	Surface	25.5	23.5
1000	280	25.2	22.8
850	4,920	19.2	13.8
700	10,310	09.2	04.2
673	11,417	07.5	-04.5
647	12,402	05.5	01.8
600	14,450	02.2	-01.5
500	19,210	-06.2	-18.8
400	24,850	-13.8	-17.2
300	31,790	-31.2	-37.8
270	34,121	-37.0	-44.5
250	35,940	-42.0	Miss
200	40,780	-55.2	Miss
150	46,590	-69.9	Miss
139	47,999	-73.0	Miss
100	54,350	-76.1	Miss
096	55,118	-76.0	Miss
055	66,109	-62.0	Miss
050	67,940	-62.6	Miss
047	69,193	-60.0	Miss
034	75,951	-60.0	Miss
025	82,250	-53.2	Miss
022	85,138	-60.0	Miss
010	102,184	-36.0	Miss

CLIVE

ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	120	10
1,000	140	19
2,000	140	21
3,000	140	23
4,000	140	25
5,000	140	25
6,000	140	26
7,000	140	24
8,000	130	21
9,000	130	18
10,000	130	20
12,000	130	21
14,000	130	21
16,000	130	23
18,000	120	23
20,000	130	19
22,000	130	18
24,000	140	15
26,000	150	14
28,000	160	15
30,000	170	15
32,000	170	15
34,000	170	17
36,000	180	18
38,000	200	15
40,000	200	17
42,500	200	18
45,000	200	14
47,500	180	13
50,000	150	18
52,500	070	18
55,000	070	19
57,500	070	16
60,000	080	11
65,000	090	31
70,000	090	42
75,000	090	61
80,000	090	64
85,000	090	72
90,000	090	76
95,000	090	83
100,000	090	74



Helicopter Survey, H+3 Hours

OLIVE EVENT

BEST COPY AVAILABLE

INDEX

TAB

[redacted]

PINE EVENT

OPERATION HARDTACK

1. The PINE device was detonated on a barge off Janet Island, Eniwetok Atoll, at 0830M, 27 July 1958. The cloud rose immediately to [redacted] with a radar-established base of 38,000 feet. The yield was [redacted]

2. A P2V aircraft commenced the RadSafe survey of the southern part of the atoll at 0930M but went out of commission over Leroy at 0950M. Only background was recorded, and a second P2V arrived on station at 1115M. A pass south of ground zero at 1125M recorded the maximum reading on the atoll: 37 mr/hr. The P2V, plus a third P2V, was sent out on northwest and northeast radials until 1607M in an effort to define clearly the major fallout area.

3. Re-entry hour was declared at 1145M, and the helicopter survey took off at 1140M. The following three readings were made, at 50 feet: Yvonne, 3 mr/hr; Wilma, Zero; and Janet, 230 mr/hr. A detailed survey was made at 1600M.

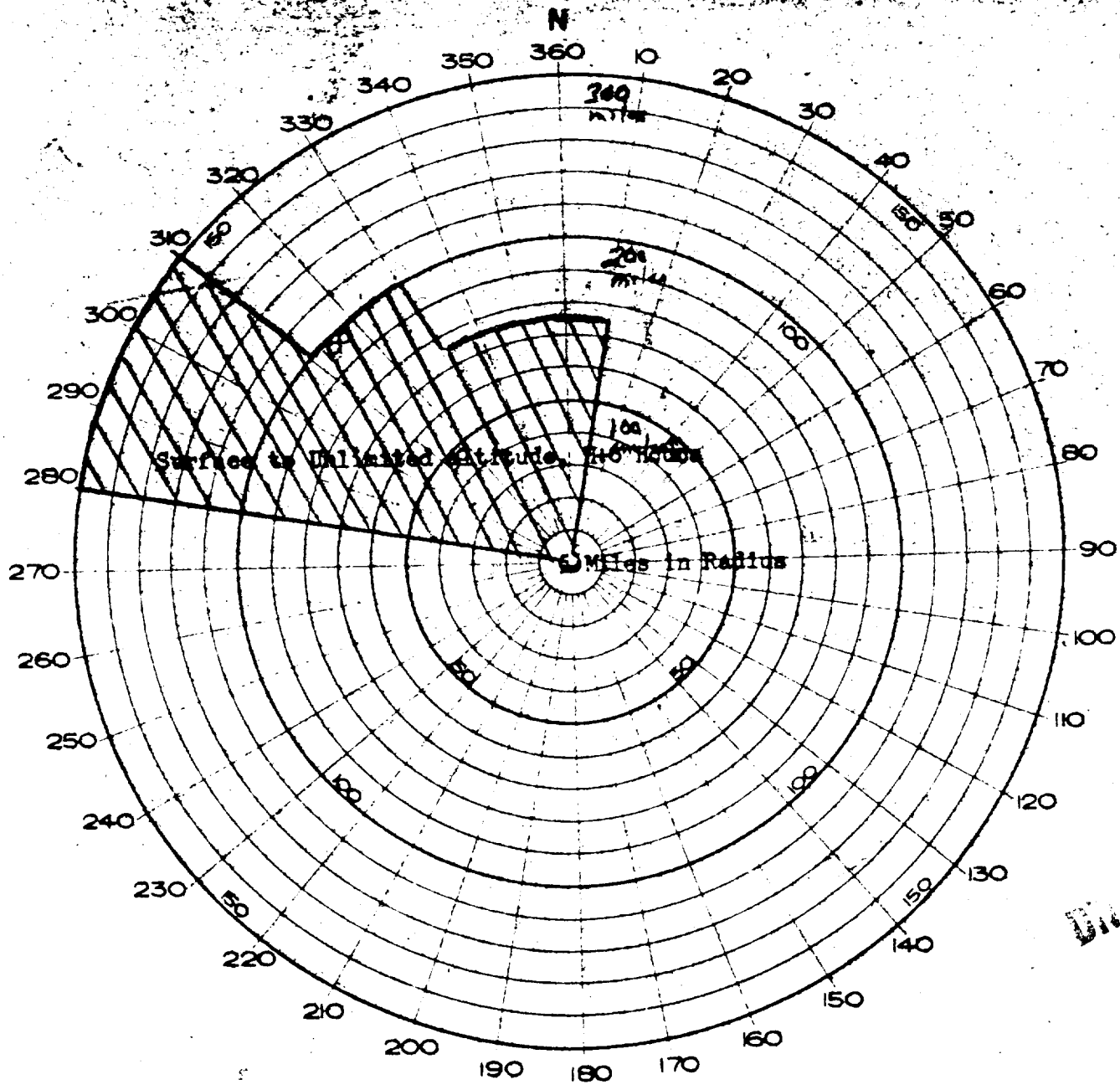
4. It is estimated that fallout fell within the forecast area, or between the 320-degree radial and that of 010 degrees.

BEST COPY AVAILABLE

TAB C

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX

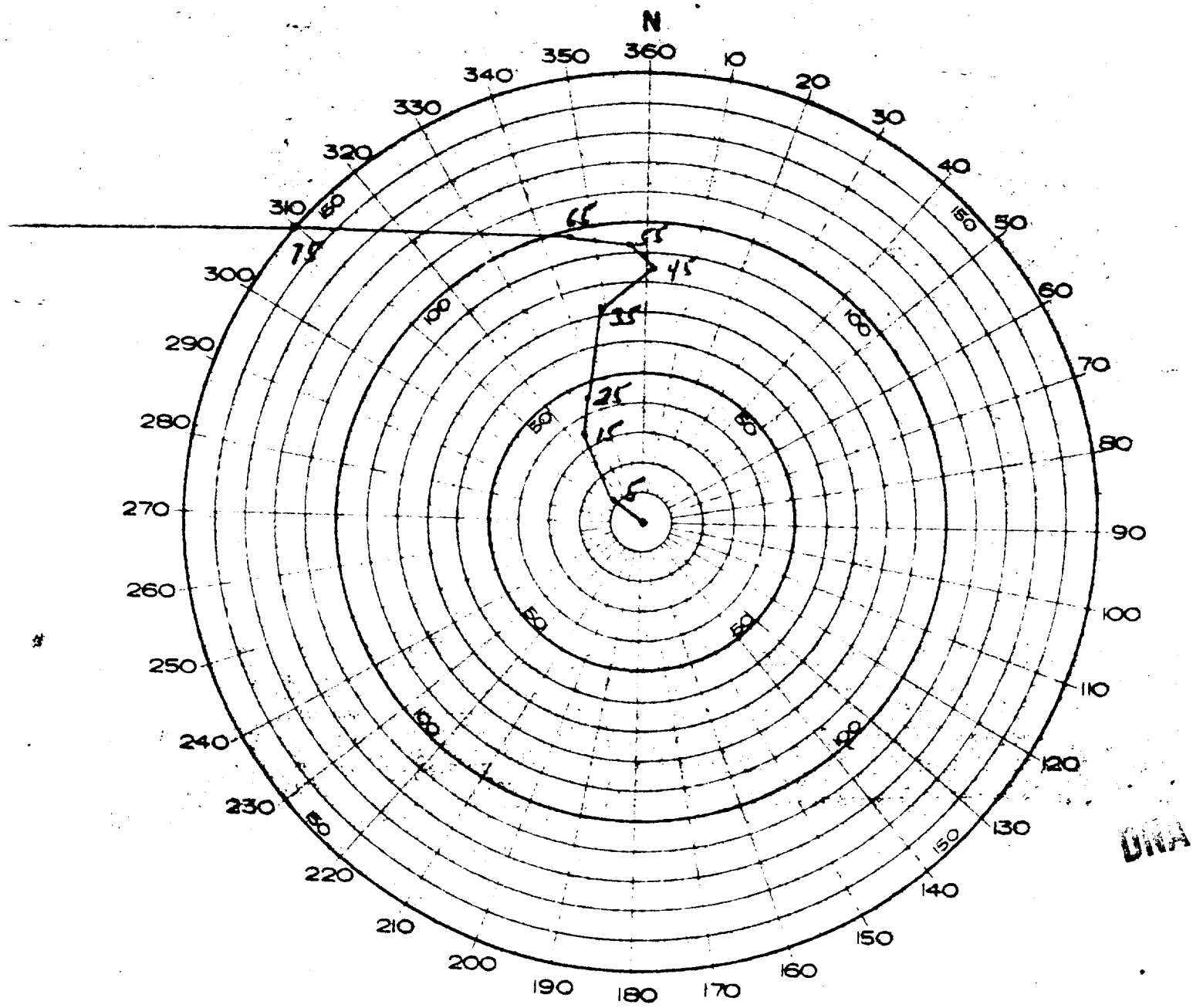


PINE EVENT

Surface and Air Radex

TAB D

HODOGRAPH
RESULTANT WINDS AND SURFACE RADEX

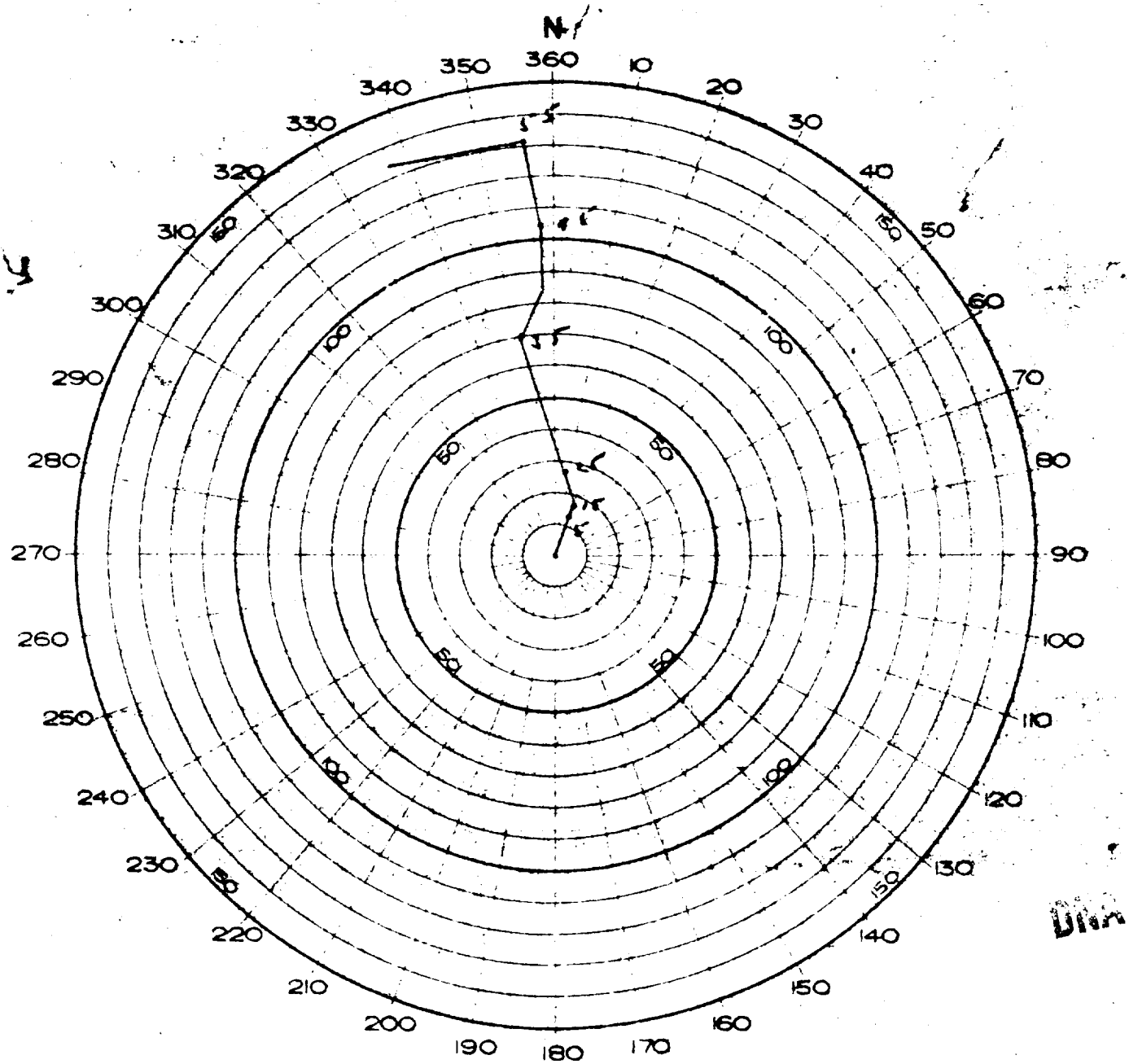


PINE EVENT

Forecast Hodograph

TAB E-1

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



PINE EVENT

Shot-time Hodograph

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

29 July 1958

PINE

ENIWETOK OBSERVED WEATHER FOR 27 JULY 1958

SURFACE WEATHER:

Sea Level Pressure	1009.3 mbs
Free Air Surface Temperature	80.1° F
Wet Bulb Temperature	78.7° F
Dew Point Temperature	75.5° F
Relative Humidity	85%
Surface Wind	220° 13 knots
Visibility	10 miles
Weather	None

CLOUDS:

Scattered (5/10) cumulus, bases 1,400 feet. Scattered altocumulus - altostratus (5/10), bases 8,000 feet. Overcast (10/10) cirriform, bases unknown.

AREA WEATHER SUMMARY FROM AIRCRAFT:

Scattered (3/10) cumulus, bases and tops unknown. Scattered (5/10) altocumulus - altostratus in multiple layers, bases 20,000 to 34,000 feet, tops unknown. Broken (8/10 - 9/10) cirriform, bases 54,000 feet, tops unknown.

STATE OF THE SEA:

Open Sea: Waves 3 to 4 feet high, length 30 - 50 feet, period 3 - 4 seconds.

Lagoon: Waves 2 feet high, period 2 - 3 seconds.

PINE

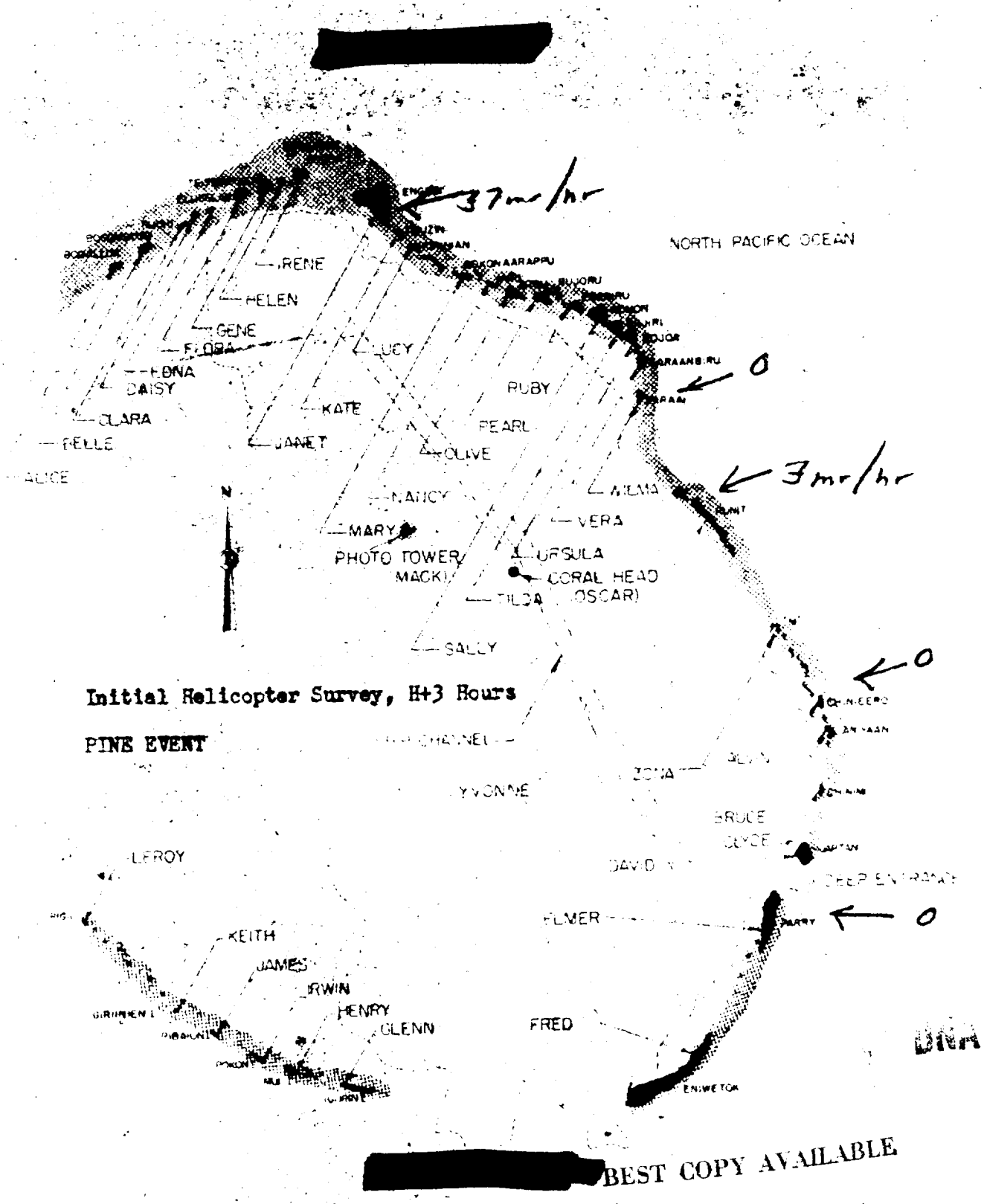
ENIWETOK RADIOSONDE OBSERVATION

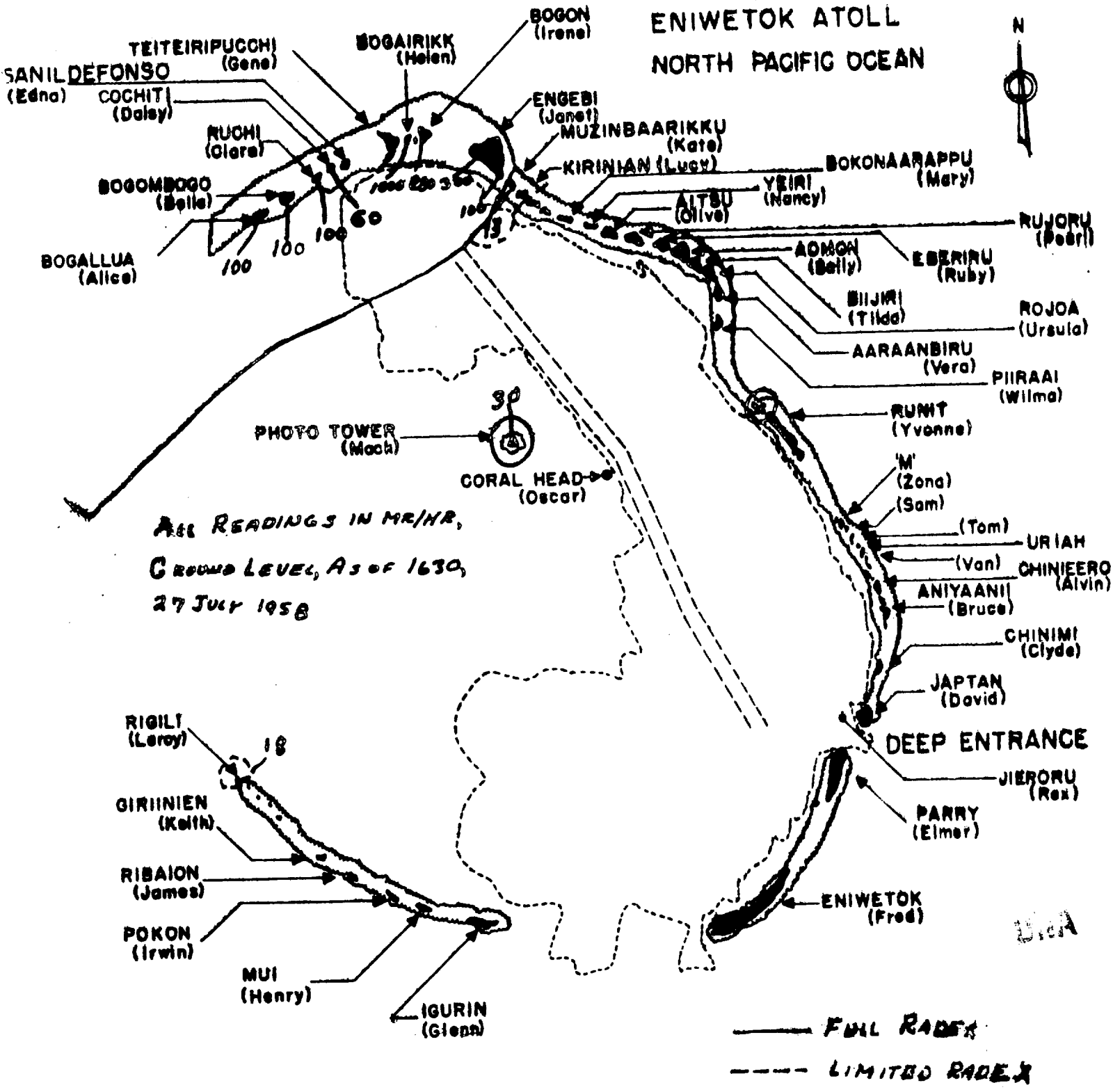
Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1008	Surface	25.8	22.8
1000	250	28.5	22.2
850	4,890	19.2	14.5
772	7,612	15.2	09.2
700	10,290	09.2	05.5
640	12,730	04.2	02.2
600	14,430	01.2	-01.5
500	19,190	-05.8	-12.2
412	24,081	-14.8	-18.2
400	24,820	-16.2	-23.2
370	26,804	-20.8	-24.8
355	27,756	-22.2	-31.5
300	31,720	-30.8	-39.5
257	35,203	-39.2	-47.2
250	35,080	-40.8	Miss
200	40,720	-53.8	Miss
150	46,570	-68.8	Miss
111	52,296	-81.0	Miss
109	52,857	-78.0	Miss
100	54,280	-75.5	Miss
090	56,266	-70.0	Miss
075	59,908	-73.0	Miss
065	62,964	-63.0	Miss
055	65,978	-67.0	Miss
051	67,487	-59.0	Miss
050	67,940	-58.8	Miss
038	73,355	-64.0	Miss
037	74,147	-56.0	Miss
036	74,803	-55.0	Miss
034	75,853	-57.0	Miss
020	82,330	-51.8	Miss

PITE

ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	180	10
1,000	210	15
2,000	200	15
3,000	200	15
4,000	200	15
5,000	200	12
6,000	190	10
7,000	170	04
8,000	220	04
9,000	200	04
10,000	200	04
12,000	170	04
14,000	150	05
16,000	130	04
18,000	080	04
20,000	100	07
22,000	140	11
24,000	150	13
26,000	130	17
28,000	160	21
30,000	130	23
32,000	150	23
34,000	150	22
36,000	160	19
38,000	180	14
40,000	190	14
42,500	200	14
45,000	200	14
47,500	190	12
50,000	190	12
52,500	160	12
55,000	120	12
57,500	090	15
60,000	080	20
65,000	090	36
70,000	100	42
75,000	100	51
80,000	100	60
85,000	100	70
90,000	100	79
95,000	100	78
100,000	100	36
105,000	100	80
110,000	100	110
115,000	100	102

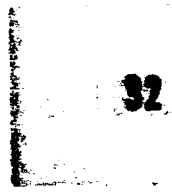




PIKE EVENT

Radiological Surface Survey, H+8 Hours

TAB F-2



[redacted]

TEAK AND ORANGE EVENT

OPERATION HARDTACK

In view of the fact that the burst point was above the tropopause, no RadSafe operations were required.

[redacted]

INDEX

TAB

[redacted]

QUINCE EVENT

OPERATION HARDTACK

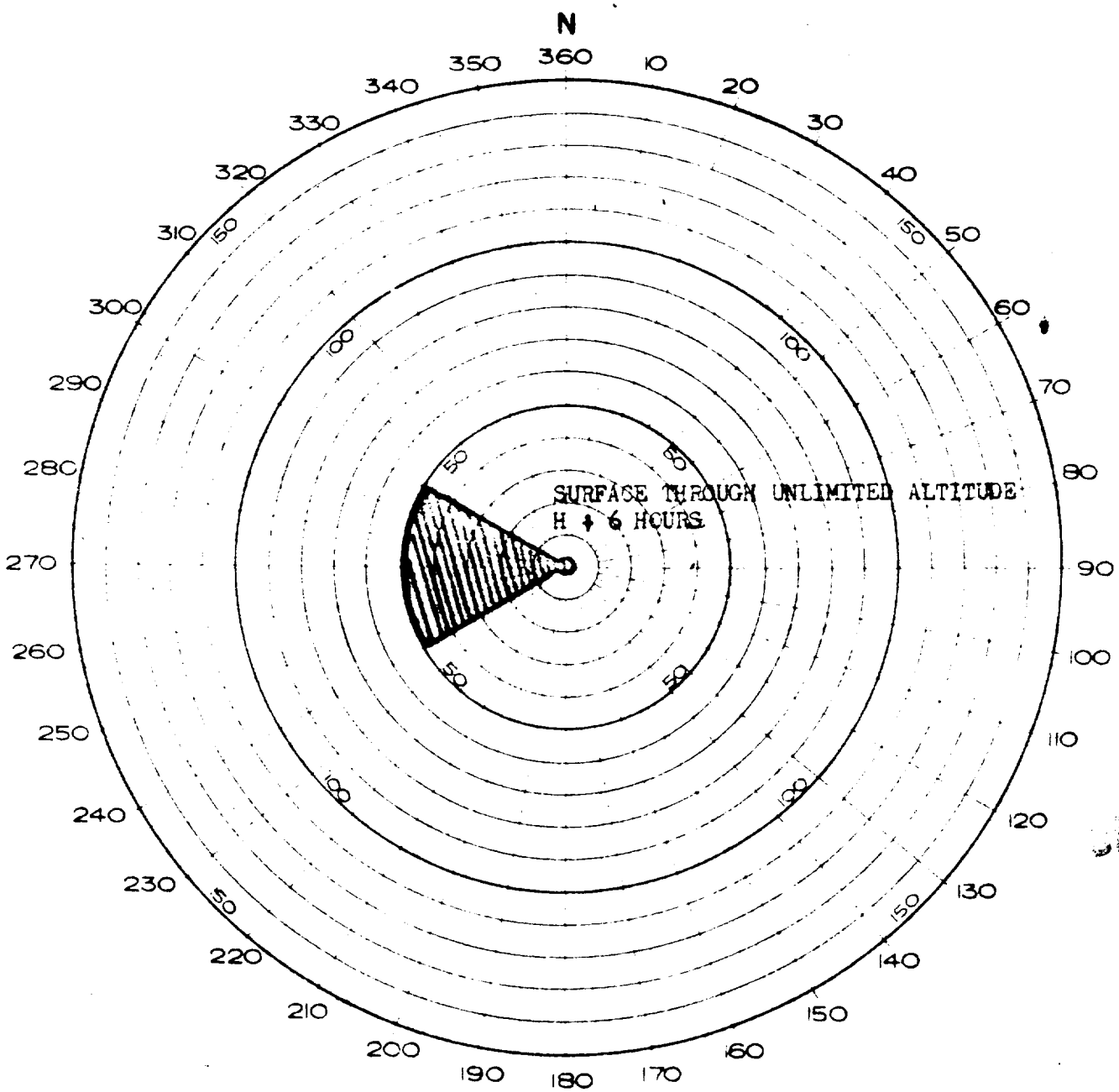
1. The QUINCE device was detonated on Yvonne Island, Eniwetok Atoll [redacted] at 1415M, 6 August 1958. The cloud rose to an estimated 1500 feet. [redacted]

2. Re-entry hour was declared at 1615M.

[redacted]

TAB A

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX

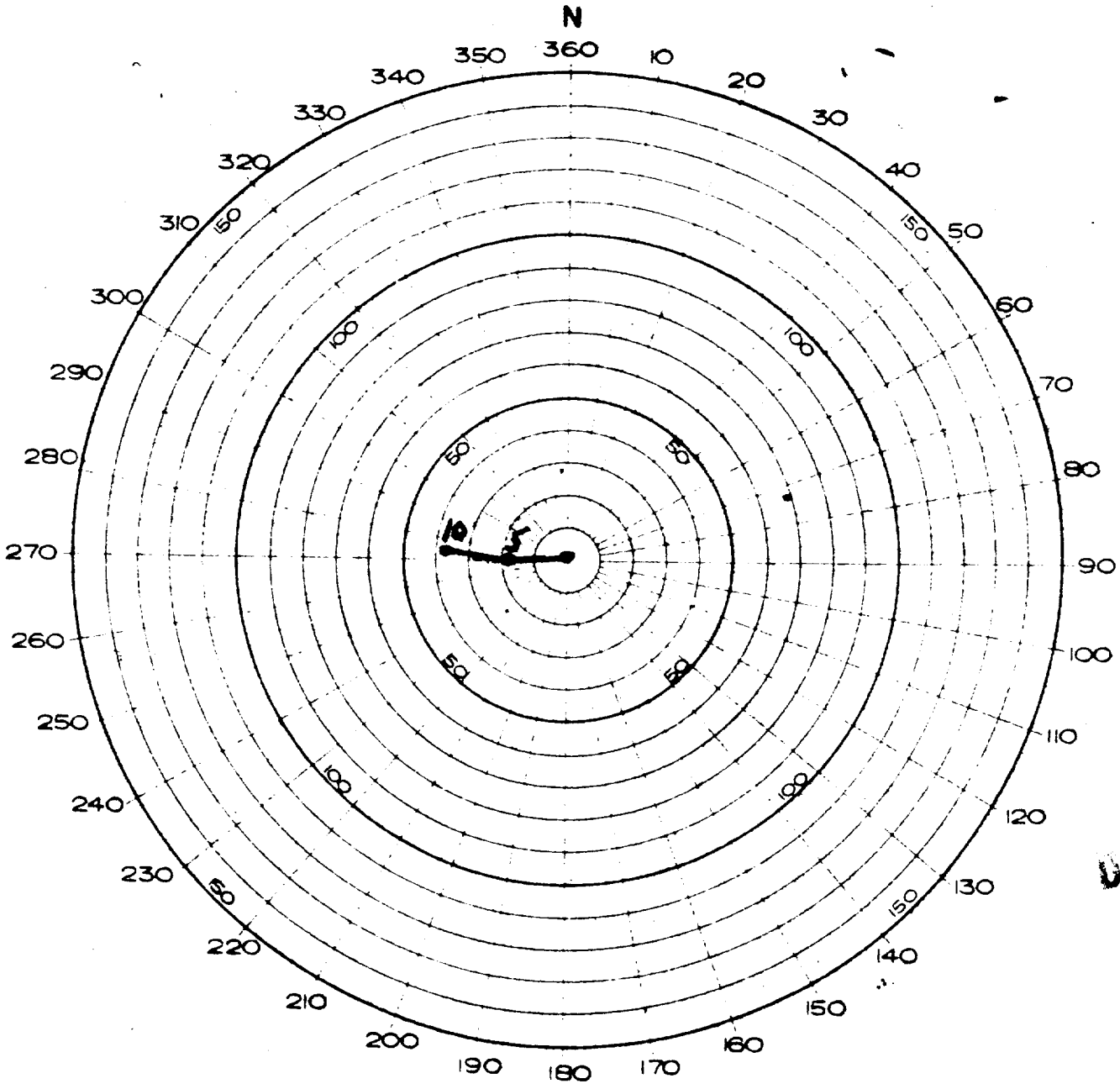


AIR & SURFACE RADEX

FIG & QUINCE EVENT

TAB B

HODOGRAPH
RESULTANT WINDS AND
SURFACE RADEX



SHOT-TIME HODOGRAPH

QUINCE EVENT

061415M AUGUST

TAB C

HEADQUARTERS
JOINT TASK FORCE SEVEN
APO 437, San Francisco, California

7 August 1958

QUINCE

ENIWETOK OBSERVED WEATHER FOR 6 AUGUST 1958

SURFACE WEATHER:

Sea Level Pressure	1009.9 mbs
Free Air Surface Temperature	89.7° F
Wet Bulb Temperature	80.3° F
Dew Point Temperature	77.5° F
Relative Humidity	67%
Surface Wind	090° 12 knots
Visibility	10 miles
Weather	None

CLOUDS:
Scattered (4/10) cumulus, bases 2,000 feet.

QUINCE

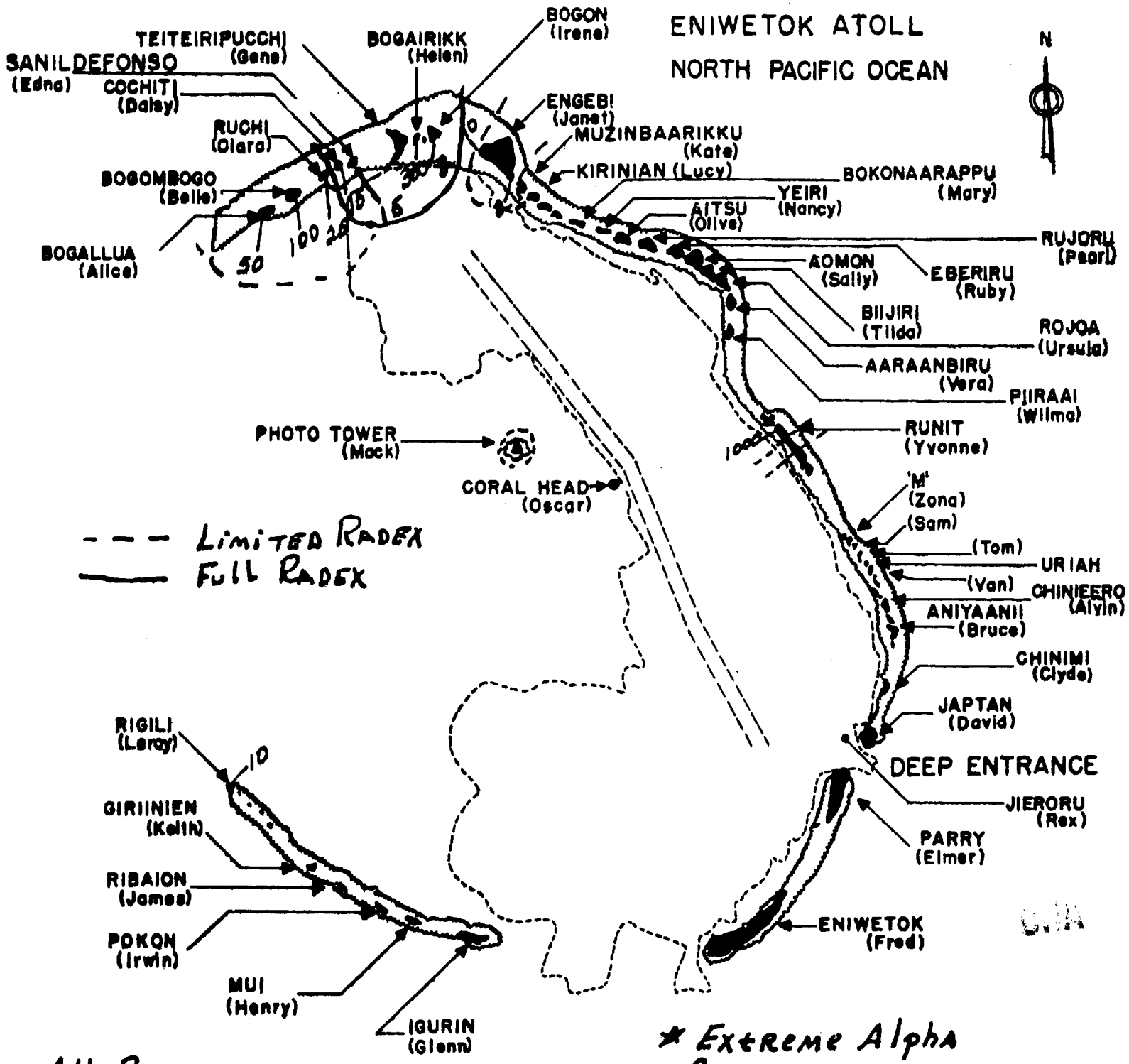
ENIWETOK RADIOSONDE OBSERVATION

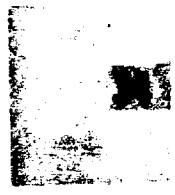
Pressure (Millibars)	Height (Feet)	Temperature (°C)	Dew Point (°C)
1010	Surface	29.5	21.8
1000	310	28.8	22.7
990	500	28.0	22.0
980	1,000	27.2	21.2
962	1,500	25.2	21.5
944	2,000	23.8	18.5
924	2,500	22.8	17.2
912	3,000	22.2	15.5
894	3,500	21.5	10.8
885	4,000	21.2	08.5
863	4,500	17.5	13.2
850	4,970	19.5	11.2
848	5,000	19.4	12.0
834	5,500	18.5	14.2
820	6,000	17.5	13.2
804	6,500	16.5	12.2
790	7,000	16.5	12.5
776	7,500	14.2	10.5
765	8,000	13.8	10.5
750	8,500	13.2	07.8
734	9,000	12.8	02.5
720	9,500	11.8	-05.2
710	10,000	11.2	-05.5
700	10,360	10.5	-05.2

QUINCE

ENIWETOK WINDS ALOFT OBSERVATION

Height (Feet)	Direction (Degrees)	Velocity (Knots)
Surface	090	14
1,000	080	15
2,000	090	16
3,000	100	16
4,000	100	17
5,000	100	19
6,000	100	20
7,000	100	21
8,000	100	20
9,000	100	18
10,000	090	18


ENIWETOK ATOLL
NORTH PACIFIC OCEAN
N
SANIL DEFONSO (Edna)
TEITEIRIPUCCHI (Gene)
BOGAIRIKK (Helen)
BOGON (Irene)
COCHITI (Daisy)
ENGEBI (Janet)
RUCHI (Clara)
MUZINBAARIKKU (Kate)
BOGOMBOGO (Belle)
KIRINIAN (Lucy)
BOKONAARAPPU (Mary)
YEIRI (Nancy)
AITSU (Olive)
BOGALLUA (Alice)
RUJORU (Pearl)
AOMON (Sally)
EBERIRU (Ruby)
BIIJIRI (Tilda)
ROJOA (Ursula)
AARAANBIRU (Vera)
PIIRAAI (Wilma)
PHOTO TOWER (Mack)
RUNIT (Yvonne)
CORAL HEAD (Oscar)
'M' (Zona)
(Sam)
(Tom)
URIAH
(Van)
CHINIEERO (Alvin)
ANIYAANII (Bruce)
CHINIMI (Clyde)
JAPTAN (David)
RIGILI (Leroy)
DEEP ENTRANCE
GIRIINIEN (Kelin)
JIERORU (Rex)
PARRY (Elmer)
RIBAION (James)
POKON (Irwin)
ENIWETOK (Fred)
MUI (Henry)
IGURIN (Glenn)
--- LIMITED RADEX
—— FULL RADEX
* EXTREME ALPHA CONTAMINATION
ALL READINGS AT GROUND LEVEL,
TIME: 1000 hrs., 7 Aug. 1958



[redacted]

PEAK AND [illegible] EVENT

OPERATION HARDTACK

In view of the fact that the burst point was above the tropopause, no RadSafe operations were required.

BEST COPY AVAILABLE

[redacted]

INDEX

TAB

[redacted]

FIG EVENT

OPERATION HARDTACK

1. The FIG device was detonated on Yvonne Island, Eniwetok Atoll at 1600M, 18 August 1958. The cloud rose to an estimated 5-6000 feet. The yield was [redacted]

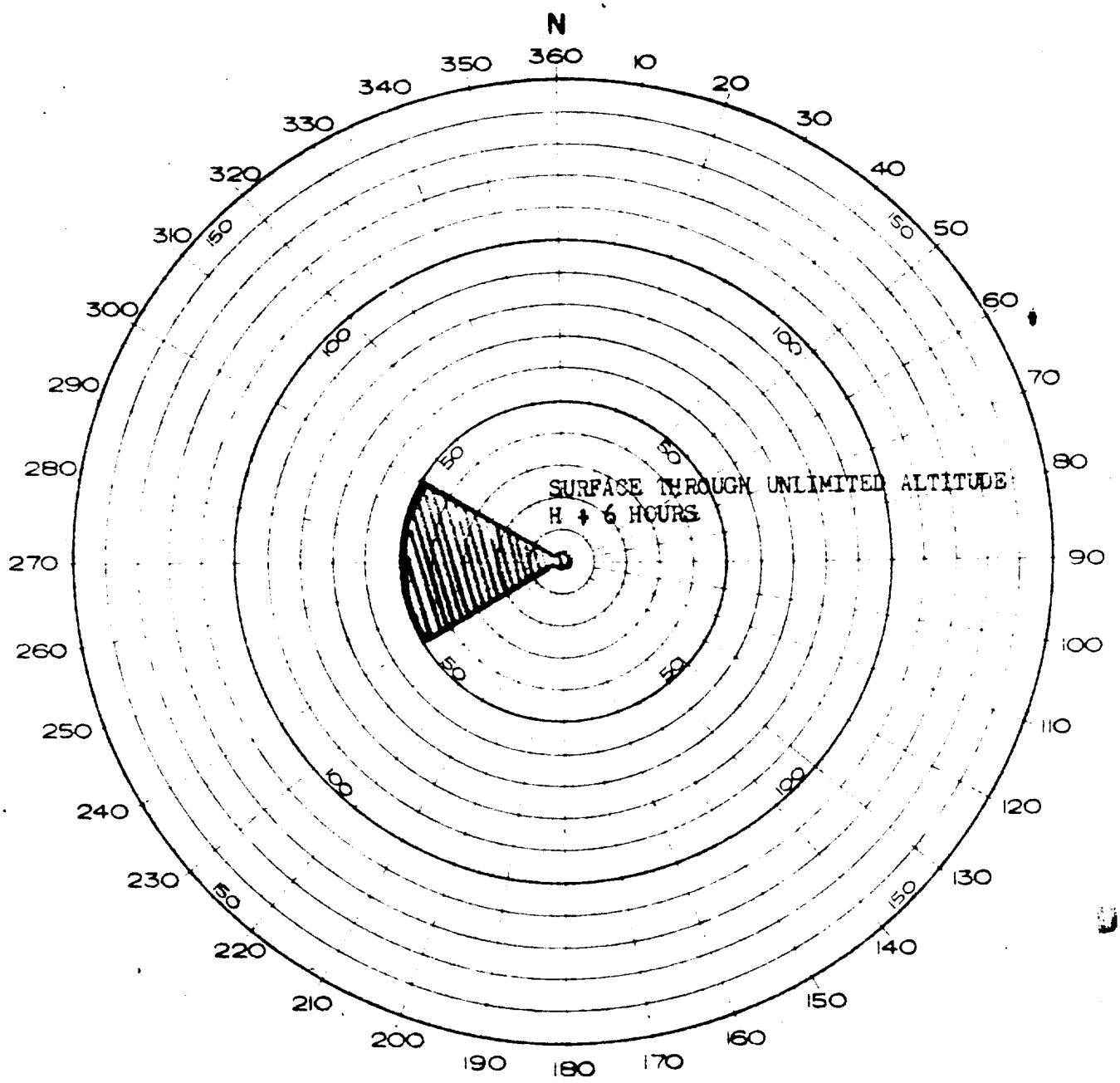
2. Re-entry hour was declared at 1800M, and the redex was cancelled at 1900M.

TAB A

[redacted]

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



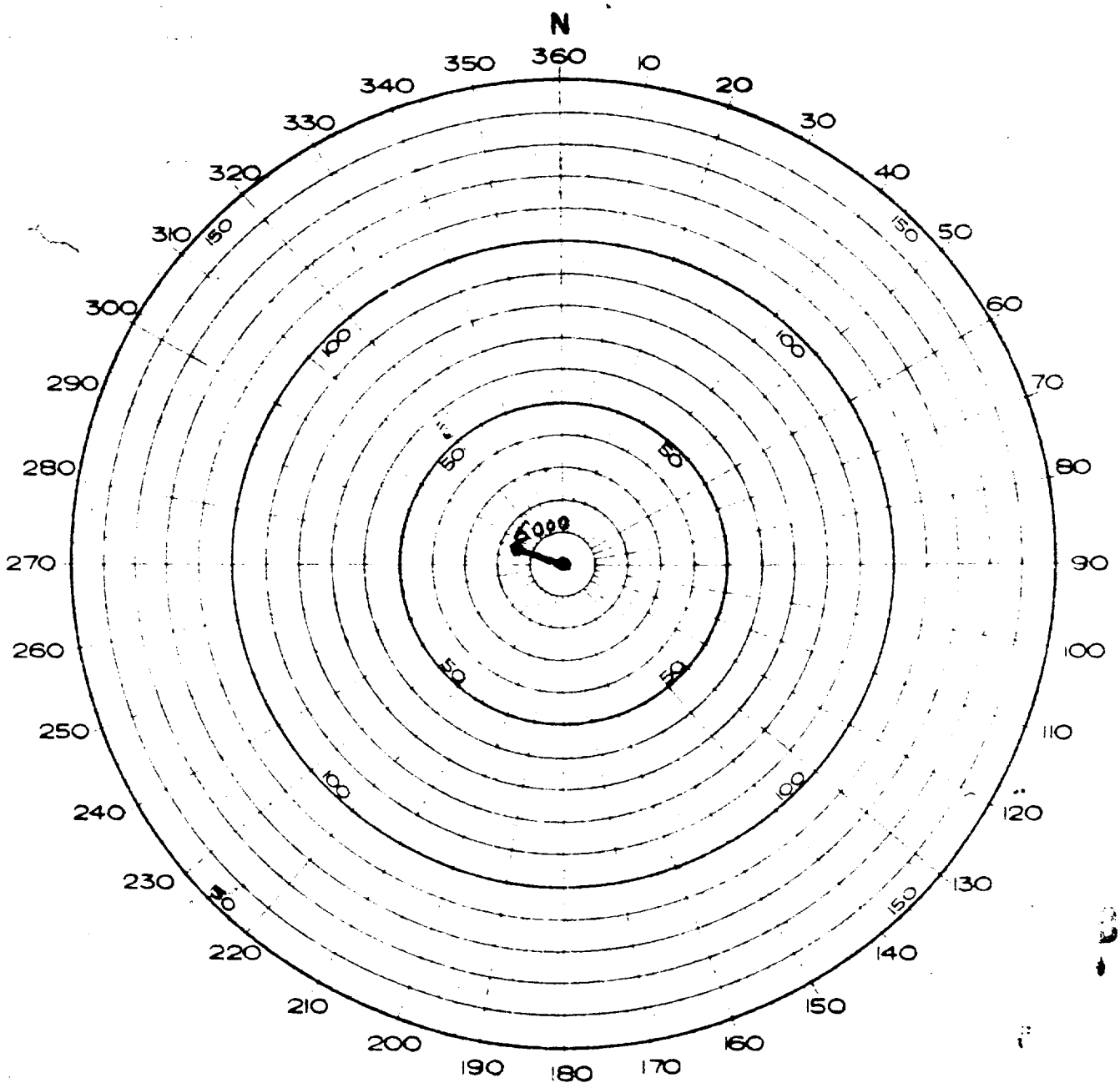
AIR & SURFACE RADEX

FIG & QUINCE EVENT

TAB B

HODOGRAPH

RESULTANT WINDS AND SURFACE RADEX



SHOT-TIME HODOGRAPH

FIG EVENT

181600M AUGUST

DNA