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DNA1.950210.021

CO ATU
3.4.4

ATU 3.4.4 319.1

SUBJECT: Radiological Safety Activities - EASY Shot

TO: Commander
Air Task Group 3.4
APO 187, c/o/ Postmaster
San Francisco, California

1. Forwarded herewith, for your information, is a report of radiological safety activities conducted by this unit during the period associated with EASY shot.

2. This report should be considered informal and supplements the summary furnished your headquarters in letter, this headquarters, subject, "Informal Report of Dog Shot Radiological Safety Activities", dated 20 April 1951. The enclosed report is designed to exclude material remaining unchanged in Test Shot EASY activities which were covered in the previous report.

3. Your comments are requested as pertain to action required to alleviate cited discrepancies in future tests.

1 Incl:
Informal Rpt
of Rad Activities,
ATU 3.4.4

ARTHUR A. McCARTAN
Colonel, USAF
Commanding

WITH INCLOSURE
Declassified by DNA, Chief, ISTS
and AF (11 MSS/MSISL) memo
dated 30 Jan 1995

Date: 2/2/95

HRE-
1023

Co ATU
3.4.4

INFORMAL REPORT

OF

RADIOLOGICAL SAFETY ACTIVITIES

AIR TASK UNIT 3.4.4 (PROV)

APO 824

EASY AND DOG SHOTS

WITH

DETAIL SUMMARY RELATIVE

TO EASY SHOT

TABLE OF CONTENTS

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PART I

STATISTICAL ACCOUNT

OF

AIRCRAFT PERSONNEL MONITORING FINDINGS

EASY SHOT

SECRET

STATISTICAL ACCOUNT OF PERSONNEL MONITORING FINDINGS

1. The following record includes only those missions where personnel contamination was detected. On all other missions, excepting those noted below, survey of crewmembers rendered background intensities only.

| Mission Desig. | Type Acft | Number of Crew Members | Highest G-M Counter Readings Noted | Number of Personnel |
|---|---|---|---|---|
| Rose | WB-29 | 12 | Background | 7 |
| | | | 0.1 mr/hr | 1 |
| | | | 0.5 mr/hr | 2 |
| | | | 2.0 mr/hr | 1 |
| | | | 4.6 mr/hr | 1 |
| Pearl | WB-29 | 11 | Background | 8 |
| | | | 0.4 mr/hr | 1 |
| | | | 0.5 mr/hr | 1 |
| | | | 0.7 mr/hr | 1 |
| Jane | WB-29 | 11 | Background | 7 |
| | | | 0.6 mr/hr | 1 |
| | | | 2.0 mr/hr | 1 |
| | | | 2.5 mr/hr | 1 |
| | | | 8.0 mr/hr | 1 |
| H + 24 | WB-29 | 10 | Background | 8 |
| | | | 0.2 mr/hr | 2 |
| H + 12 | WB-29 | 9 | Background | 7 |
| | | | 0.8 mr/hr | 2 |

2. All personnel with 5.0 mr/hr readings were decontaminated to background in the decontamination center and clothing held. All personnel with readings of three (3) times background were decontaminated to background prior to release. Personnel with lower readings were decontaminated and advised to air their clothing for forty-eight (48) hours prior to re-use.

# PART II

## INDIVIDUAL REPORTS

## OF

## AIR MONITORS (ATU 3.4.4)

## EASY SHOT

# AIR MONITOR'S MISSION REPORT

1. MISSION DESIGNATION: Jane

2. PURPOSE: To establish contact with the atomic cloud fall-out area underneath the eastward moving atomic cloud and to obtain filter samples of fall-out materials.

3. TAKE-OFF AND LANDING, TRACK AND ALTITUDES.

a. Take-off: 1452Z, 20 April 1951

b. Landing: 0635Z, 21 April 1951

c. Track:

(1) Kwajalein to 5000' immediately after take-off.

(2) Northwest from Kwajalein to an orbit thirty (30) miles long on a N-S heading and five (5) miles wide, E-W. Center point of orbit located seventeen and one-half (17-1/2) miles east of zero point.

(3) See atached plot for portion of track flown from 1827Z 20 April, to 0459Z, 21 April.

(4) Entire track flown at 5000'.

(5) Departed 11 45'N, 164 13'E, at 0459Z, 21 April, on a direct heading for Kwajalein, letting down over Kwajalein range station.

4. SPECIAL EQUIPMENT.

a. Special equipment on the aircraft consisted of type C-1 airfoil filter box.

b. Radiological equipment carried by air monitor and crew consisted of the following:

(1) One film badge per aircrew member.

(2) Rubber gloves and respirator worn by filter operator. Filter operator was also equipped with one (1) 0-10R dosimeter.

(3) Air monitor was equipped with two (2) AN/PDR-T1B Ion chambers, one (1) Victoreen Model 263B G-M counter, two (2) 0-200MR dosimeters and one PP-354C/PD dosimeter charger.

(4) Air radex and cloud trajectory charts for H + 1, H +2, and H + 3 Hours.

5. SIGNIFICANT READINGS OBTAINED.

a. Background reading increased from 0.02 mr/hr before shot time to 12 mr/hr at 0459Z, 21 April. The increase in background was steady throughout the day.

b. Highest reading encountered was 40 mr/hr on both Ion Chambers at 2307Z, 20 April at position 11°39'N, 162°34'E.

c. Other readings ranged from 8 to 20 mr/hr for the first eight hours after shot time with the first contact being made at 1920Z, 20 April at 11°38'N, 162°25'E. The period from 0230Z to 0459Z, 21 April found readings decreasing to an average of 4 to 10 mr/hr.

6. EVALUATION.

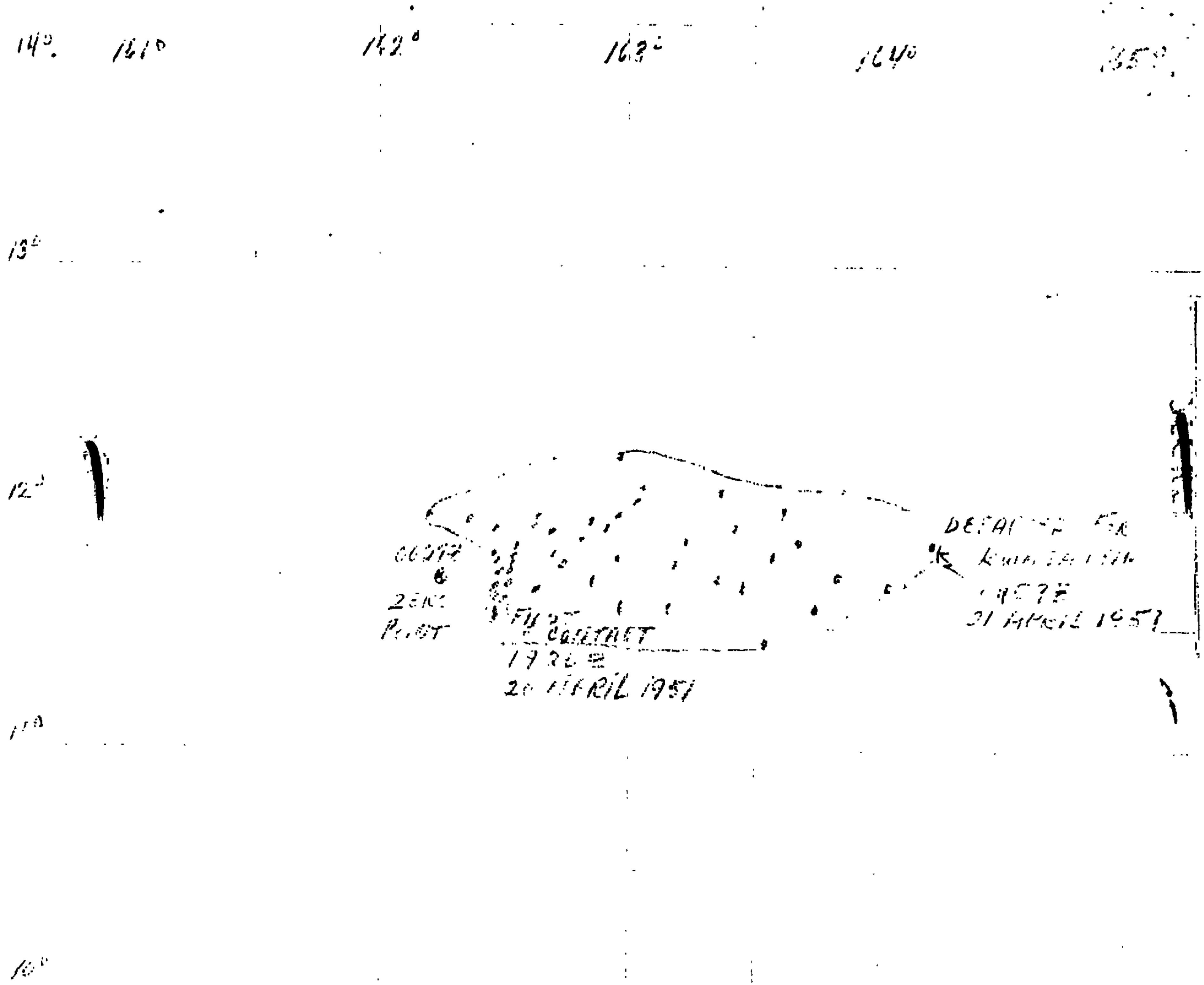
a. It is believed the mission was accomplished in a satisfactory manner. The exact extent and area of the fall-out pattern to east of zero point was determined for the 5000' level. Fall-out was encountered at 1920Z and contact was maintained with little difficulty for the remainder of the flight. The visible cloud overhead was used as an excellent guide in establishing contact.

b. The detection of the fall-out area was easily made using the AN/PDR-T1-B Ion chambers. The Victoreen Model 263B counter was of no use as all readings obtained with this instrument were erratic and unreliable.

c. The dosimeters were not reliable. The 0-200 MR dosimeters varied in their readings by approximately 20 mr. The 0-10R dosimeter repeatedly went to a reading of 0.5R and then returned to zero.

7. AIR MONITOR.

Captain Paul J. Morehead, AO 866050



14°
161°
162°
163°
164°
13°
12°
20 APRIL 1951
31 APRIL 1951

AIR MONITOR'S MISSION REPORT

1. MISSION: H + 12 - LOW

2. PURPOSE: Air filtering and detection of the atomic cloud or cloud fall-out areas along a predetermined track and at predetermined altitudes.

3. TAKE-OFF AND LANDING, TRACK AND ALTITUDES.

a. Take-off: 0720Z, 21 April 1951

b. Landing: 2005Z, 21 April 1951

c. Track:

(1) Kwajalein to 5000', on course, heading of 360°.

(2) Spiral climb from 5000' to 20,000' at 13.5°N, 167°38'E.

(3) Heading of 180°, altitude 20,000', to 5°N, 167°36'E.

(4) Descent at (3), above, to 5000', proceeded on heading of 360° to position noted in (2), above, and repeated spiral climb to 20,000'.

(5) From point of spiral climb, at altitude 20,000', to 6°N, 167°38'E, letting down at that point to 5000' via spiral descent.

(6) From let-down point direct to Kwajalein, altitude 5000', heading 180°, making final let-down over Kwajalein range station.

4. SPECIAL EQUIPMENT.

a. Special equipment on the aircraft consisted of type C-1 airfoil filter box.

b. Radiological equipment carried by air monitor and crew consisted of the following:

(1) One film badge per crew member.

(2) Rubber gloves and respirator worn by filter operator who was also provided with one 0-200MR dosimeter.

(3) Air monitor was equipped with one (1) AN/PDR-T-1B Ion chamber, one (1) AN/PDR-8B G-M counter, one (1) 0-200 MR dosimeter, one (1) 0-10R dosimeter and one (1)

[redacted]

PP-354C/PD dosimeter charger.

(4) Radex and cloud trajectory plot for H + 6 to H + 24 hours, was provided the air monitor.

5. SIGNIFICANT READINGS:

a. Normal background readings of 0.03 to 0.05 mr/hr were obtained at 5000' at all times.

b. Background readings at 20,000' of 0.05 to 0.08 mr/hr were obtained at all times except for the periods noted below during which light fall-out from the atomic cloud computed to be at 40,000', was encountered. All readings were obtained from the AN/PDR-8B G-M counter. Levels of intensity were too low to permit use of the ion chamber instrument.

| Altitude | Time | Reading | Position |
|---|---|---|---|
| 20,000' | 1036Z | .12 to .15 mr/hr | 11.1N - 167.7E |
| | 1037Z | .12 to .15 mr/hr | |
| | 1038Z | .15 to .20 mr/hr | 11.0N - 167.6E |
| | 1046Z | .11 to .12 mr/hr | |
| | 1047Z | .05 to .08 mr/hr | 10.5N - 167.6E |
| 20,000' | 1803Z | .10 to .15 mr/hr | 10.1N - 167.7E |
| | 1816Z | .15 to .20 mr/hr | |
| | 1818Z | .30 to .35 mr/hr | |
| | 1819Z | .35 to .40 mr/hr | |
| | 1820Z | .45 to .58 mr/hr | 09.7N - 167.6E |
| | 1821Z | .30 to .35 mr/hr | |
| | 1822Z | .25 to .30 mr/hr | |
| | 1824Z | .20 to .25 mr/hr | |
| | 1825Z | .15 to .18 mr/hr | |
| | 1827Z | .10 to .15 mr/hr | |
| | 1828Z | .08 to .13 mr/hr | 09.2N - 167.6E |

6. EVALUATION.

a. Inso far as the flight was concerned, it is believed that the mission was accomplished successfully. The first encounter with the light fall-out at 1036Z was very closely correlated with the fall-out at plot prepared by Captain Bradbury. The second encounter with the fall-out area at 1803Z was south of the fall-out plot chart and just north of Kwajalein, indicating a slight southerly component to the westerly winds prevailing at that altitude.

b. The detection of the fall-out area using hand portable instruments is not considered desireable due to the low sensitivity of the instrument. The Ion chamber was of no use in detection on this flight. The PDR-8B G-M counter did detect the two areas noted above, but several

[redacted]

times during the flight, short but significant deflections on the high sensitivity scale were noted, but it was impractical to determine whether the deflection was due to instrument variation or fall-out encounter. A change in background was noted between the low level legs (5000') and the high level legs (20,000'). Here again it is impractical to determine whether this change was due to change in the instrument (PDR-8B) or due to actual atmospheric conditions.

e. The 0-200MR dosimeter given to the filter operator leaked during the entire flight and by the time the second fall-out was encountered, the instrument had run off scale. The air monitor recharged the dosimeter and found it leaking almost as rapidly as the charge was applied This leakage was not due to any apparent radiation field in the aircraft since a survey of the rear pressurized compartment revealed a maximum of one (1) mr/hr gamma radiation from the filter papers. No other radiation was detected with the hand portable instrument. It was also noted that the 0-10R dosimeter discharged to one-half (1/2)R at 20,000' and returned to 0R when the aircraft descended to 5000'. At no time was any appreciable radiation field observed by use of the hand portable counters.

7. <u>GENERAL COMMENT.</u>

a. This flight was successful primarily because of the exactness of the fall-out trajectory plot. As can be noted above the aircraft merely encountered the fall-out during the course of its pre-established track. Had the trajectory and fall-out plot been in error, it is questionable that the hand portable survey meters would have permitted location of the fall-out area on a search basis.

b. It is strongly recommended that consideration be given to the design of aircraft instrumentation which can be used for cloud and fall-out detection with an expanded range in the low sensitivity levels.

c. It is further recommended that consideration be given to the development of suitable radiological safety detecting and measuring devices designed specifically for airborne operations.

8. <u>AIR MONITOR.</u>

CWO David Magilavy, 950075[illegible]

[redacted]

AIR MONITOR'S MISSION REPORT

1. MISSION DESIGNATION: H + 12 - High

2. PURPOSE: To obtain filter samples of the atomic cloud or cloud fall-out; to obtain atmospheric samples of the atomic cloud through filling of B/31 equipment type J-5 oxygen bottles with air samples collected while in the fall-out or cloud area.

3. TAKE-OFF AND LANDING, TRACK AND ALTITUDE.

a. Take-off: This mission was standby for the original H + 12 aircraft which aborted due to electrical fire and the loss of two (2) engines. Take-off was accomplished subsequent to abortion of first aircraft. Take-off time, 0155Z, 22 April 1951.

b. Landing: 0755Z, 22 April 1951.

c. Track: On course climb to 10,000' immediately after take-off; heading of 00 degrees to 17°N, 157°30'E; spiral climb to 30,000', thence southward on heading of 180°. See below for termination of mission.

4. SPECIAL EQUIPMENT.

a. Special equipment installed in aircraft consisted of type C-1 airfoil filter box; B/21 air conductivity equipment and B/31 air sampling equipment.

b. Filter operator was equipped with one (1) respirator, rubber gloves, one (1) 0-200MR dosimeter, and one (1) 0-10R dosimeter.

c. Air monitor was equipped with one (1) Victoreen type 263B G-M counter; one (1) AN/PDR-8B G-M counter; and two (2) AN/PDR-T1-B ion chambers.

d. One film badge was issued to each crew member

e. Air radex and cloud trajectory plot was carried by monitor.

5. SIGNIFICANT READINGS OBTAINED.

a. Background readings at 10,000' were 0.25 mr/hr increasing gradually in the climb to 30,000' to 0.40 mr/hr at 30,000'. The 0.40 mr/hr background maintained from 17°N to 14°N at 30,000', then dropped to 0.30 mr/hr. The increased background from the hand portable instruments was not substaniated by the B/21 readings.

b. B/21 readings increased significantly from approximately 12°N to 10°N, but no significant readings were obtained from the hand portable survey meters. The area of increased activity as indicated by

[redacted]

the B/21 equipment coincided with the forecast cloud position as briefed and as indicated on the cloud trajectory and fall-out plot chart for 30,000'.

c. The B/31 air sampling equipment was turned on, per preflight briefing, just prior to entering the area of forecast cloud position. The equipment operated satisfactorily for approximately thirty (30) minutes. After thirty (30) minutes of operation the control panel light located in the air monitor's position indicated that the equipment had ceased operating. An attempt was made to restart the compressor according to normal SOP, with negative results. At the same time, an electrical fire started in the C-1 auto-pilot and all electrical equipment was turned off since the cause of the fire was unknown. At the same time, engine power difficulty was encountered and the mission was aborted.

d. None of the dosimeters indicated any significant readings.

6. EVALUATION.

a. The mission was considered unsuccessful due to early abortion because of the equipment failure and engine trouble.

b. B/31 equipment failed after thirty (30) minutes of operation and permitted gathering of only sixty-five (65) psi in the J-5 oxygen bottles, whereas a sample of 265 psi was desired.

c. The hand portable equipment provided for this type operation is obviously unsatisfactory, since the levels of intensities encountered were too low to permit detection by this means. The B/21 equipment operates in a much higher sensitivity level range, but on the other hand is not suited for high intensity operation. It is therefore recommended that equipment be provided which will meet the total requirement for cloud detection and radiological safety.

7. AIR MONITOR.

Lt. Donald C. Schortz, AO 327295

[redacted]

[redacted]

AIR MONITOR'S MISSION REPORT

1. MISSION. H + 24 - LOW

2. PURPOSE. Air filtering and detection of the atomic cloud or cloud fall-out areas along a predetermined track and at predetermined altitudes.

3. TAKE-OFF AND LANDING, TRACK AND ALTITUDES.

a. Take-off. Crew alerted at 2245Z, 21 April 1951, to replace regular H + 24 - Low flight which was aborting because of engine failure. Take-off was accomplished at 2345Z, 21 April 1951.

b. Kwajalein to 5000', on course, heading 180°, proceeding to 7°N, 167°43'E at 0030Z, 22 April 1951.

c. Spiral climb to 20,000', proceeded on heading of 360° from spiral point to 17°N, 167°43'E, spiraling descent at that point to 5000' beginning descent at 0341Z, 22 April.

d. At 5000', on course of 180°, 0356Z, 22 April proceeding from descent point to Kwajalein.

e. Over Kwajalein at 5000' at 0634Z, normal IFR let-down accomplished and landing made at 0650Z, 22 April.

4. SPECIAL EQUIPMENT.

a. Type C-1 airfoil filter box only special equipment installed on aircraft. Air monitor carried and issued following items to crew:

(1) One pair rubber gloves, one respirator, one 0-10R dosimeter and one 0-200MR dosimeter to filter operator.

(2) One 0-200 MR dosimeter, one AN/PDR-8B G-M counter, and one AN/PDR-T-1B Ion chamber carried by monitor

5. SIGNIFICANT READINGS.

a. During both 5000' legs the background reading was 0.03 to 0.06 mr/hr, as obtained from the PDR-8B, and 0.00 on the ion chamber. General background was slightly higher at 20000' with the G-M reading 0.04 to 0.07 mr/hr and 0.00 on the ion chamber. The ion chamber occasionally deflected momentarily to 0.1 mr/hr and returned instantaneously to 0.

b. Significant readings were observed between 0137Z and 0144Z while at 20,000' Maximum reading was observed at 0140Z, at 8°53'N, 167°45'E. The PDR-8B was steady with readings of 0.15 to 0.20 mr/hr while the ion chamber indicated fairly steadily at 0.2 mr/hr with an occasional deflect-

[redacted]

ion to 0.3 mr/hr. The increase and decrease of instrument readings was noted to be fairly even and the maximum readings lasted for a period of about one (1) minute.

6. EVALUATION.

a. It is believed that data desired will be found on the filter papers. The readings that were noted on the hand instruments, the only conclusion that can be drawn is that light fall-out was encountered.

b. The hand instruments used on this flight were designed to be used in much greater intensities than were encountered. There is a great need for more sensitive instruments to be used in this type of work.

c. The pocket dosimeters used held their charge very well, and it is assumed that they would have recorded properly if higher intensities had been encountered.

7. AIR MONITOR.

Captain David J. Anderson, AO 7[illegible]

AIR MONITOR'S MISSION REPORT

1. MISSION DESIGNATION. H + 24 - HIGH

2. PURPOSE. To obtain filter samples of the atomic cloud or cloud fall-out; to obtain atmospheric samples of atomic cloud through filling of B/31 equipment type J-5 oxygen bottles with air samples collected while in the atomic cloud.

3. TAKE-OFF AND LANDING, TRACK AND ALTITUDES.

a. Take-off: 1815Z, 22 April 1951

b. Landing: 0400Z, 23 April 1951

c. Track:

(1) Climb on course, heading of 00° from Kwajalein to 10,000' proceeding to 14°N, 167°38'E. Spiral climb to 30,000' at this point.

(2) Altitude 30,000', heading of 180° from spiral point to Kwajalein along line 137°38'E.

(3) Orbited over Kwajalein at 30,000' for approximately two (2) hours and twenty (20) minutes while filling B/31 bottles to 265 psi.

(4) After filling bottles, proceeded at 30,000' on heading of 180° to 4°N. Spiral letdown at this point to 10,000' taking up heading of 00° and returning to Kwajalein at 10,000'.

4. SPECIAL EQUIPMENT.

a. Aircraft equipped with type C-1 airfoil filter box; B/21 air air conductivity apparatus, and B/31 air sampling equipment.

b. Filter operator was equipped with rubber gloves, respirator, and one (1) 0-200'R dosimeter.

c. Air monitor was equipped with one (1) Victoreen 263B G-M counter and two (2) AN/PDR-T-1B ion chambers, one 0-200R and one 0-10R dosimeter.

d. One film badge was issued to each crew member.

e. Air radex and cloud trajectory chart was carried by the air monitor.

5. SIGNIFICANT READINGS.

a. Background readings of 0.05 mr/hr were indicated on the ground and maintained on the climb to approximately thirty-five (35) miles north of Kwajalein at an altitude of 6000', when an increase to 0.5 mr/hr with deflections to 1.5 mr/hr were noted. This higher level reading continued to a point approximately fifty-five (55) miles north of Kwajalein at which time the readings returned to the original 0.05 mr/hr background.

b. From a point 55 miles north of Kwajalein to the top of the spiral climb, the 263B reading gradually increased, reaching a steady 0.10 mr/hr at the top of the climb at 30,0000'.

c. In the immediate area over Kwajalein at 30,000', the 263B occassionally deflected to 0.20 mr/hr. Using the B/21 equipment which had indicated a strong and definite increase in intensity in the Kwajalein area, and also refering to the radex provided, flight was continued to a position approximately directly over Kwajalein, where the B/21 was indicating at its maximum intensity as nearly as could be determined. This correlated closely with the air radex and cloud trajectory plot which also forecast the center of the cloud to be directly over Kwajalein.

d. Orbit over Kwajalein was maintained at 30,000' for two (2) hours and twenty (20) minutes, and B/31 oxygen bottles were filled to 265psi, at which time the automatic shut off valve turned off the air compressor. Aircraft then proceeded to let-down as noted in paragraph 3, above, and let-down to 10,000' was accomplished. Air monitor then proceeded into forward bomb-bay and closed shut-off valves on the J-5 bottles. The pressure indicator indicated a decrease in pressure to 240 psi by the time the 10,000' level was reached.

e. During the period the aircraft was in the orbit within the cloud, the 263B counter maintained a fairly consistent deflection to 0.2 mr/hr which is the most sensitive scale. Had the instrument been on a higher scale, the deflection would not have been judged significant, however. The B/21 equipment detected the cloud early and positively and was a more accurate reference for the operation than was the 263B counter.

f. The ion chambers showed an increase to 2 mr/hr at 30,000' which was undoubtedly due to drift since the 263B counter did not indicate any radiation as being present. During the periods that the aircraft orbited in the atomic cloud, the ion chambers did not register any readings.

g. After departing from the center of the cloud, the B/21 equipment continued on a high reading and the decrease in readings came about gradually for a period of approximately twenty (20) minutes. The 263B at the end of this twenty (20) minute period gradually reduced to normal background of 0.10 mr/hr.

h. On descending to 10,000' and clear air, the aircraft was pressurized and depressurized and all crew members were monitored for activity with negative results. The background on the 263B was 0.05 mr/hr in the rear of the aircraft as compared to 0.10 mr/hr in the nose.

i. The dosimeters showed no increase from the time of take-off to time of landing.

6. EVALUATION.

a. The mission was carried out as briefed and is assumed to have been accomplished as required.

b. The radex, the B/21 equipment and the 263B counter were of value in the order listed for locating the center of the cloud.

c. The B/31 equipment operated successfully but being unable to close the J-5 oxygen bottles immediately after filling caused a slight loss in pressure and a resultant loss in sample.

7. AIR MONITOR.

Captain, Sidney W. Ruffu, A01692871

[redacted]

PART III

AIRCRAFT DECONTAMINATION

ACTIVITIES

EASY SHOT

[redacted]

SUMMARY OF AIRCRAFT DECONTAMINATION ACTIVITIES

CONDUCTED BY AIR TASK UNIT 3.4.4 IN CONJUNCTION WITH EASY SHOT

1. A statistical compilation of EASY shot aircraft decontamination and radiological findings pertaining to aircraft is contained in the attached sheet.

2. In the following paragraphs a general discussion of the pertinent findings associated with EASY shot a/c decontamination activities is presented.

3. In the aircraft decontamination report associated with DOG shot it was indicated that the method of decontamination employed on the Ranger test would be utilized experimentally on EASY shot aircraft since the personnel responsible for aircraft decontamination at Ranger indicated a high degree of success with their method. Briefly, the Ranger method employed a solution consisting of 100 gallons of water to one (1) pound of Trisodium Phosphate. The solution was applied continuously under pressure, until the decontamination was complete. This system of decontamination was used by ATU 3.4.4 on aircraft B-29 #202 primarily because of its high engine readings and it was felt that results obtained from such a high degree of radioactiv contamination would be representative of the results to be expected. Two (2) engines on aircraft #202 were flushed down with the water trisodium phosphate solution, expending 400 gallons of this solution on the two engines. The readings prior to application, were approximately 60 mr/hr. After flushing, the engines read approximately 50 mr/hr. On the remaining two (2) engines, a solution of one part gunk to four parts kerosene was applied in the usual manner followed by a fresh water rinse of approximately 200 gallons. These two (2) engines read 60 mr/hr prior to application of gunk-kerosene and later read approximately 30 mr/hr after completion of the operation. A query was directed to personnel on this station who had observed and participated in the Ranger aircraft decontamination operation relative to the exact method used, since the results obtained by the above operation would indicate that the water-trisodium phosphate method was somewhat inefficient. It was learned that at Ranger an almost continuous supply of water and trisodium phosphate was applied, utilizing a total of four (4) decontamination trucks in a continuous filling and washing operation. Because of the copius amounts of water required to effectively utilize the Ranger method, it was abondoned by this unit in consideration of the expense and limitation on water supplies at this station.

4. Another interesting phenomena was noted with respect to B-29 #202, which participated in the EASY shot as Nose. This aircraft had been subjected to two (2) decontaminations at Eniwetok prior to its return to this station. As can be noted by the attached statistical breakdown, the readings were still quite high upon its arrival at this station on the evening of EASY shot day.

Three washings of the aircraft engines and one of the skin were required after the aircraft's arrival at this station. Even with the three (3) engine washings, the engines still read approximately 18 mr/hr, which was the lowest level to which decontamination procedures would reduce the activity.

5. Upon comparison of the attached statistics with the statistics provided for DOG shot decontamination activities, it will be noted that a total of eighty-four (84) working hours were expended on DOG shot decontamination while EASY shot required only sixty (60) working hours. Despite the decrease in total working hours, seven (7) aircraft were decontaminated during EASY operations, whereas only five (5) aircraft were decontaminated on DOG shot. The decrease in working time is attributed to two factors:

a. Increased knowledge and proficiency on the part of both operating and supervisory personnel.

b. Use of aircraft washing brushes in the initial washdown of the aircraft. In previous operations gunk-kerosene solutions were merely applied under pressure. This procedure was revised for EASY shot to include the "scrubbing" of the aircraft skin with brushes while solution was being applied.

6. The increased efficiency of the operation for EASY aircraft as compared to DOG shot aircraft was further noted in the comparison of materials consumed, as will be evident in the following tables. The figures noted below are rounded off and are not precise.

| Item | Total Consumption | |
|---|---|---|
| | EASY | DOG |
| Water | 7000 gals | 13,000 gals |
| Gunk | 85 gals | 120 gals |
| Kerosene | 350 gals | 400 gals |
| Trisodium Phosphate | 30 lbs | 65 lbs |

7. In the DOG shot activities, solution of gunk and kerosene was mixed in the ratio of one to three, without the use of brushes. During EASY shot activities, the solution was weakened to the extent of creating a mixture of one part gunk to four parts kerosene and appeared to be just as effective as the original one to three ratio. It is possible that this solution can be reduced to the weaker side and still gain the desired effectiveness.

8. As noted above, the Ranger method was completely abandoned in the decontamination of aircraft at this station. The use of trisodium phosphate in solution of one pound to one hundred gallons of water was still continued however in using the Kerrick cleaner. This method is quite satisfactory on

[redacted]

loose parts, such as engine cowlings, but for large scale usage, i.e., on the skin of the aircraft, the use of the Merrick Cleaner necessitated the expenditure of three to four times the man-hours compared to that required by the gunk-kerosene applications followed by fresh water rinse.

[redacted]

STATISTICAL COMPILATION OF AIRCRAFT DECONTAMINATION ACTIVITIES - FAST SHOT - ATU 3.4.4

| A/C Type & No. | Mission | Intl Rdg (R/HR) Upn Lndg Eng. | Intl Rdg (R/HR) Upn Lndg Ship | Hrs Decay Prior Decon | No. of Eng. | No. of Washes Eng. | No. of Washes Ship | Total Hours in Decon | Total Hours Since Ldg. | Final Readings Eng. | Final Readings Ship | Water Used Gals. | Gunk Kero 1:4 Gals | Tri Sodium Phosphate & Water 1" to 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RB-29 740 | Pearl | 70 | 5 | 12 | 4 | 1 | 1 | 8 | 20 | 12 | 2 | 1042 | 95 | |
| TB-29 202 | Rose | 650 | 30 | 24 | 4 | 3 | 1 | 10 | 42 | 18 | 5 | 1864 | 115 | 400 |
| TB-29 335 | Juno | 150 | 5 | 12 | 4 | 2 | 1 | 10 | 22 | 12 | 2 | 1398 | 105 | |
| B-50 017 | Old Trek | 50 | 5 | 12 | 4 | 2 | 0 | 5 | 17 | 15 | 2 | 1042 | 30 | |
| B-50 023 | Old Trek | 80 | 5 | 12 | 4 | 2 | 0 | 5 | 17 | 15 | 2 | 1042 | 30 | |
| P2V | Patrol | 20 | 2 | 0 | 2 | 1 | 0 | 2 | 2 | 10 | 0 | 150 | 30 | |
| P2V | Patrol | 40 | 2 | 0 | 2 | 1 | 0 | 2 | 2 | 12 | 0 | 150 | 30 | |

SECRET

# PART IV

REPORT

OF

THE RADIOLOGICAL TECHNICAL BRANCH

OF

ATU 3.4.4

EASY SHOT

SECRET

ACTIVITIES REPORT OF TECHNICAL BRANCH - EASY SHOT

1. The report of activities during EASY shot, as pertains to the Radiological Technical Branch, ATU 3.4.4, Project Greenhouse, covers phases of Radiac, Radex, Cloud Trajectory forecasts and Personnel exposure for the period 20 - 23 April 1951. Summaries of the above are presented under the subjects of: Equipment, Radiation Areas Forecasts and Personnel Contamination.

2. Equipment (Radiac). On the 20th of April there were on hand eighteen (18) Ion chambers (AN/PDR-T-1B) in satisfactory condition having been calibrated 13 April. The calibrations indicated that the instruments performed better after they were vented. Charts showing altitude conversion factors up to 30,000' for correct intensity readings were verified and prepared for issue. Of the eighteen (18) Geiger-Mueller counters (IM-32PDR-8B), eleven (11) were in satisfactory condition for radiation detection use. Two (2) Gamma Survey Meters (263B* were available on the 20th. However four (4) more were received during the night from Eniwetok. Twenty of the twenty-nine (29) 0-200 MR dosimeters were in satisfactory condition and six (6) of the seven (7) 0-10R dosimeters on hand were serviceable. Sgt. Cormier had applied all known means to condition the radiac instruments and accomplished the task of maintenance, disposition and control of the equipment in good order. The radiacs were returned from the missions and ramp detection work without apparent damage. Recalibrations will be accomplished on all radiological instruments (including dosimeters) prior to next issue.

3. Radiation Area Forecasts. The presentation of radiation area forecasts, Atomic cloud movements and fall-out was accomplished by means of Radex, Cloud Trajectories, and Vertical cross sections showing wind displacements along the E-W components. Dr. Palmer and his staff of the Tropical Weather Research Project provided vital wind information as to movement and forecast trajectories under streamline analysis. The data and advice were of prime value in preparation of charts to indicate when and where radiological contamination was to be found. Air monitors expressed understanding as well as interest in the Radex briefings. Lt. Col Cody and Maj. Trexler were especially concerned with all the information as presented and commended the use of vertical cross sections to show displacement of the cloud for the first few hours.

a. Standing Operating Procedure, RADEX AND CLOUD TRAJECTORY, dated 14 April 1951, was put into effect for this period of activity. (Attachment #1). A strain was placed on the few people who provided this service, in that two of the officers designated with the responsibility were placed on flying duties right at the critical time. There were no available replacements who had had any training in Radex or wind displacement work. At the eleventh hour, however, Lt. Balfe, pilot, volunteered his services to duplicate charts and expeditiously turned out multiple radexes in time for briefing of all crews or Air Monitors going on radiological missions. Lt. Schertz (who had flown a ten hour mission that day) worked very arduously until 0300 on the construction of cloud patterns and fall-out requiring some 20 or 25 different charts. Sgt. Hackenberg did a commendable job on the numerous vertical wind displacement charts. (Attachment #3).

b. It should be pointed out that some missions required as many as four charts, plus a duplicate to be retained for record, as well as an additional radex and trajectory chart for Major Smith, of 3.1.7.0. This totalled in excess of 50 charts prepared between H - 10 and H + 24. Periods of intense activity in this work were from H - 10 to H + 4; H + 9 to H + 15; and from H + 22 to H + 26. A general briefing was given at 1000, 21 April (H + 4) for crews scheduled to fly at H + 12 and H + 24. This included a brief explanation of the nature of radiological contamination and atomic bomb explosion phenomena. Expected exposure and degree of harmful intensity were outlined with respect to the EASY shot and the tracks involved. It was stated, that, at the moment, Eniwetok should be receiving a sizable amount of fall-out which would be of more concern to the people on the ground that the intensity to be encountered on the forthcoming missions.

c. As to verification of the areas of expected contamination, debriefings revealed that, on the whole, the radexes, trajectories, and vertical wind patterns were very helpful and accurate. The following air monitors were interviewed: Maj. Halliday (B-47 pilot), CWO Magilavy, Lt. Col. Cody, Maj. Traxler, Lt. Col McKenzie, Captains Morehead, Turner, Ruffu, Hoyle, and Capt. Cordes (air monitor for drone operations) and Maj. Doets. Majors Smith and Russell gave information as to actual readings and location of radioactivity. The cloud trajectory, shown as attachment #2, was prepared in general by Dr Palmer and proved quite accurate, particularly in the findings of Col. McKenzie on H + 24 track at 20 to 25,000'. At H - 7 it was predicted that Eniwetok would have considerable fall-out. Informal reports from Eniwetok personnel verified this prognosis.

d. It is pointed out that to a great extent the limits of the H + 12, H + 24, and the special B-50 flights were determined by reference to radex and cloud trajectories at briefing. Economy was thereby realized in time, personnel, and aircraft operation.

[redacted]

RADIOLOGICAL SECTION
AIR TEST UNIT 3.4.4

STANDING OPERATING PROCEDURE                                        14 April 1951

RADEX AND CLOUD TRAJECTORY

1. The following 3.4.4 plan for preparing Radex and Cloud Trajectory briefs will be in effect for future A-Test periods.

2. Responsibility will be assumed by the following ATU 3.4.4 Officers:

| | |
|---|---|
| Captain Bradbury | Captain Cordes |
| Captain Nicholz | Lieutenant Schertz |

Sergeant Hackenberg, when available, will assist in furnishing past wind data and charts.

3. The office of the Tropical Weather Research Project may be used to collect and study wind data for preparation of displacement plots, during the period H minus 12 to H plus 24. Captain Stopincki and Lieutenant Miller have offered their services for this operation.

4. Schedule.

| | |
|---|---|
| a. D - 2 to D - 1 | All officers familiarize with plans and procedures. Execute one dry run. |
| b. H - 12 to H hour | Two officers on duty |
| c. H hour to H + 12 | Two officers on duty |
| d. H + 12 to H + 36 | Three officers on duty (hours staggered) |
| e. H + 36 to _____ | One officer on call (AF 142 R 1) |

5. Data and Equipment.

a. Wind study for Kwajalein and Eniwetok (E-W component study by Sergeant Hackenberg - when available).

b. Latest wind data and forecast of air movements over pertinent area. (Obtain from local weather station, tropical weather office and the Eniwetok weather central.).

c. Graph paper, charts, maps, pencils (colored), dividers, Weems plotter, plexiglass briefing board, and wax pencils.

[redacted]

6. Procedure.

a. Use Keesler AFB method for Air Radex plot for H hour to H + 6.

b. Prepare cloud trajectory and wind displacement plot after H + 6.

c. Deal with fall-out in so far as radiological hazard is involved (for strictly scientific missions extend fall-out areas to the limits where the sensitive instruments will detect radiation).

d. Prepare plots (for crews) showing expected areas of radiation contamination. Show position of A-cloud and fall-out for specific levels and times. (See secret ltr. TU 3.1.7.0, dtd 27 Mar 51, subj: R F C, ATU 3.4.4) Check with Major Smith, Navy 9, for any changes.

e. Brief crews using large plexiglass Air Radex Board (in Headquarters briefing room) with adequate explanation of nature of radiological contamination and expected exposure. Elucidate on degree of harmful intensity and pertinent facts relative to A-bomb explosion phenomena.

f. Maintain contact with the Offices of Major Smith and Mr. Coroniti, for information as to position and movement of cloud.

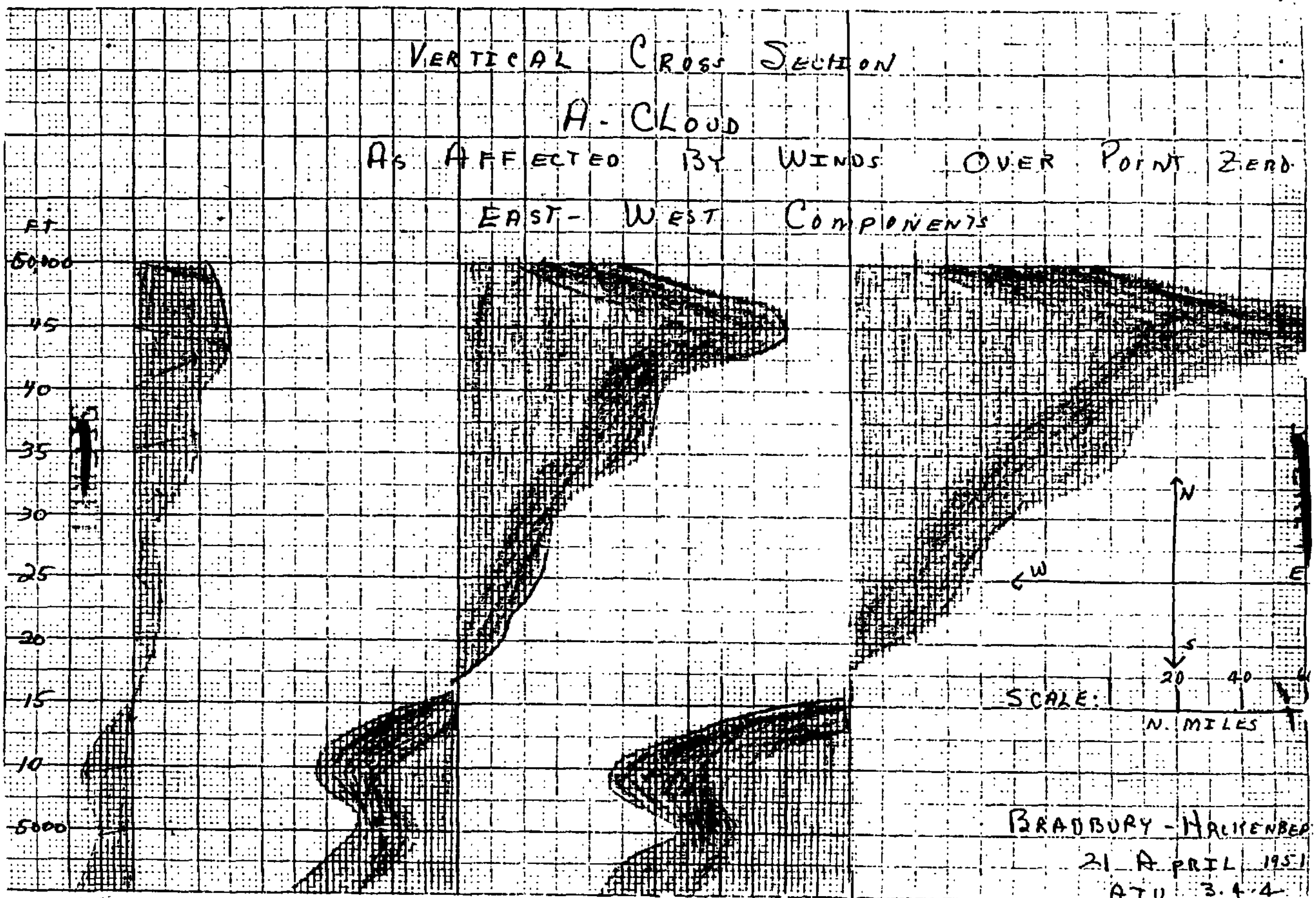
g. De-brief crews (air monitor particularly) returning from radiological missions and apply information in preparation of cloud trajectories for subsequent missions.

h. Maintain log of significant activities and retain duplicate copies of all radex and cloud trajectory plots given to crews.

7. The senior officer will be in charge and will be responsible to the Chief, Radiological Section for execution of the above plan.

DAVID MAGILAVY
CWO, USAF
Radiological Officer

[redacted]


VERTICAL CROSS SECTION
A-CLOUD
AS AFFECTED BY WINDS OVER POINT ZERO
EAST-WEST COMPONENTS
FT
50,000
45
40
35
30
25
20
15
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20
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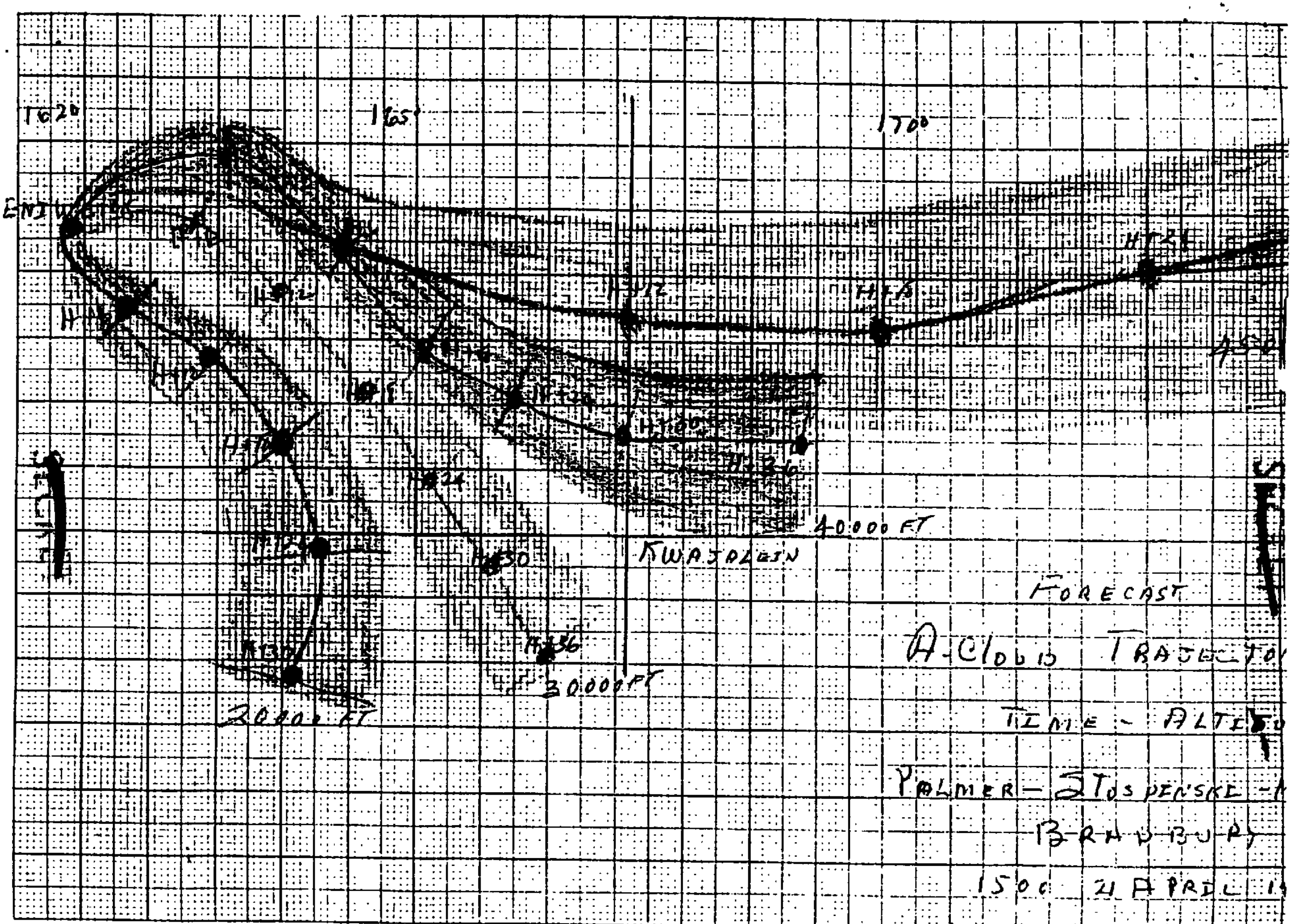
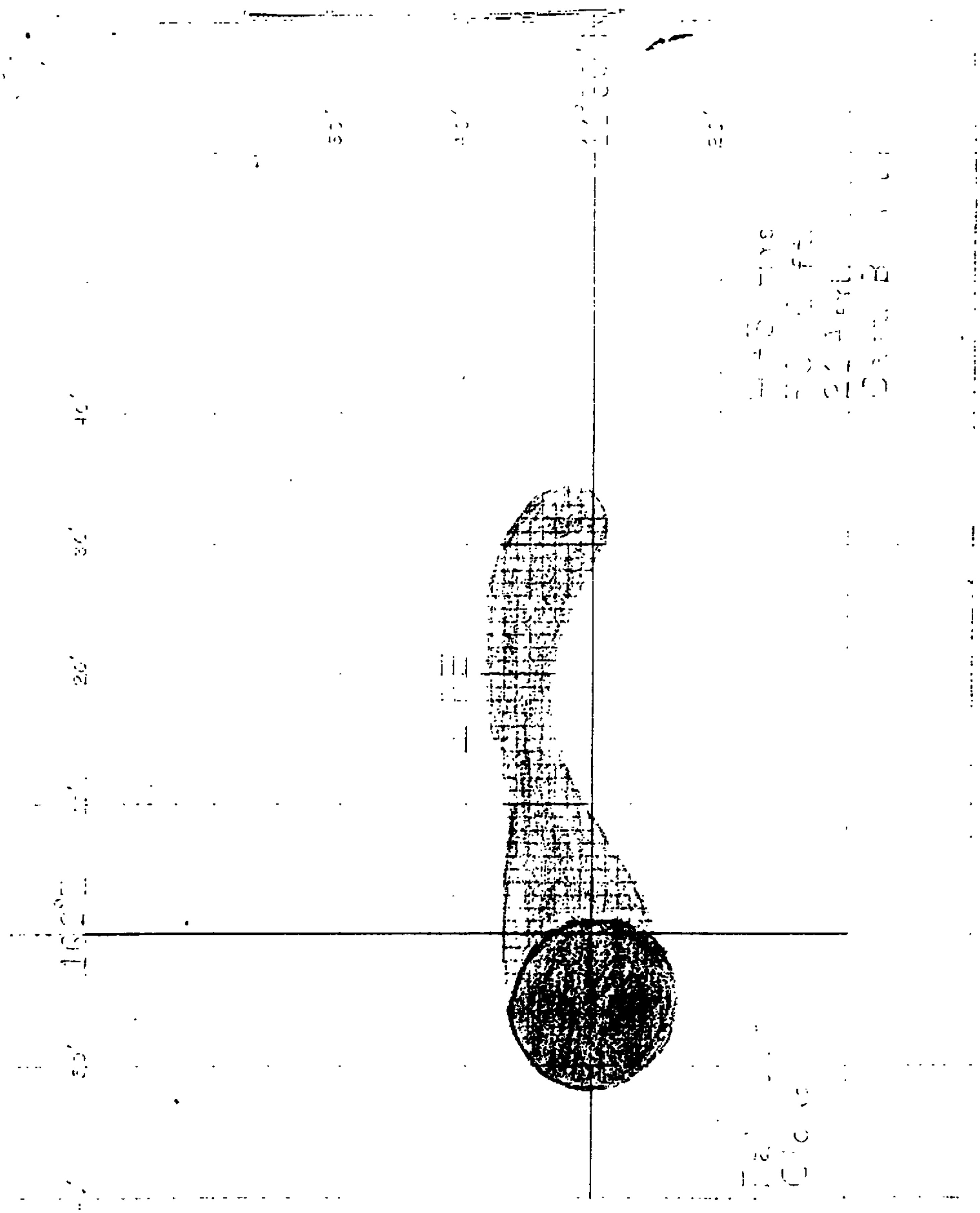
N. MILES
BRADBURY-HALLENBECK
21 APRIL 1951
ATU 3.4.4


1620
1635
1700
ENIWETOK
KWAJALEIN
40000 FT
30000 FT
20000 FT
FORECAST
BRADBURY
1500 4 APRIL



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# PART V

SUMMARY

OF

DEFICIENCIES

IN

RADSAFE PROGRAM

AT

KWAJALEIN

TO DATE

[redacted]

[redacted]

## GENERAL SUMMARY OF THE DEFICIENCIES IN THE RADIOLOGICAL SAFETY PROGRAM AT KWAJALEIN TO DATE

1. Certain generalized conclusions have been reached with respect to the conduct of the Radiological Safety Program at Kwajalein by ATU 3.4.4. These conclusions for the most part deal with the deficiencies existing in the program and are discussed in the following paragraphs.

2. The most glaring deficiency in the radsafe operation at Kwajalein exists with respect to the film badge service that was to be provided this unit.

a. One hundred and two (102) film badges from DOG shot were forwarded to Eniwetok for further forwarding to Parry Island for processing. To date no results have been received relative to the dosage readings of these film badges.

b. One hundred and sixty-four (164) film badges from EASY shot were forwarded to Eniwetok for further forwarding to Parry Island for processing. No results have as yet been received for EASY test film badges.

c. As a result of inconsistent findings in both ground and air uses of pocket dosimeters on DOG shot, it was established as a matter of policy by ATU 3.4.4, that film badges would necessarily be used as the primary source of dosage information. Inconsistent dosimeter readings were most noticeable when used by decontamination crews on the ground and under unpressurized and varying altitude conditions when used in the aircraft.

3. As far as this unit is concerned, the film badge service provided this unit has been worthless, since no data whatsoever has been received to date. Regardless of the dosages which may have been received by personnel operating from Kwajalein, if an adequate Radsafe Program is to be conducted, all avenues of approach should be fully utilized. The film badge findings are believed important if for nothing else than correlation purposes. The fact that personnel may not have received maximum allowable dose during a given operation is irrelevant. The question which the film badge service was to satisfy is, "Precisely what dosage was received?" To date this question has not been answered and the value of the effort expended in issuing, collecting and processing of film badges is zero. The results of the film badge readings may be of value to the processing unit at Parry Island, but the real value in the findings lies in their correlation with the work or working area of the individual to whom the badge was initially issued. The information with which to establish such a correlation is available only in the files of ATU 3.4.4.

4. On EASY shot day minus one, this unit advised ATU 3.4 that the automatic supply of three hundred (300) film badges had not as yet been received. The ATU 3.4 reply indicated that 300 badges had been forwarded by air on the 18th of April. A thorough search of all operations and supply units at Kwajalein revealed no such shipment. A supply of film

[redacted]

badges addressed to TU 3.3.3 at Kwajalein was received about the time the supply of 300 badges was to be received by ATU 3.4.4. No badges were found for ATU 3.4.4, however. Obviously the method of supply was not in accordance with established supply channels.

5. The second major deficiency observed in the Kwajalein operation is that pertaining to supply and maintenance of radiac instruments. During the entire project the fact that instruments were required to be transhipped to this station from Eniwetok and from Parry Island, has caused a considerable amount of unnecessary paper work, supply action and coordination. Had the original allocation of radiac equipment been initially shipped to Kwajalein for direct issue to ATU 3.4.4, a great deal of the confusion involved would have been eliminated.

6. The original plan for maintenance of radiac equipment as promulgated in ATG 3.4 Field Order No. 1 required that all radiac equipment be maintained by TU 3.1.5 at Parry Island. Because of the distance involved and the lack of "on-the-spot air transportation to Parry Island, it was determined to be more feasible, prior to DOG shot , to establish minor radiac repair facilities in ATU 3.4.4, to handle the maintenance problems on-the spot, as they occurred. An experienced radar mechanic, SSN 867, was allocated within ATU 3.4.4 for the purpose of calibration and maintenance of radiac equipment. It appears, however, that there exists an overemphasis or over-evaluation as to the complexity of the construction and maintenance difficulties involved in maintaining radiac equipment. The normal radiac survey meter is a basically simple electronic device. Given the necessary schematics, test equipment, and spare parts, a comparatively inexperienced radar mechanic can perform quality maintenance on these items. Yet requests for tubes and batteries for Victoreen 263B instruments, (a maintenance job which does not even require a technician), was turned down by TU 3.1.5 on the basis that the instruments should be returned to Parry Island. Requests for certain items of spares for the AN/PDR-8B was not filled because such items were not on hand at Eniwetok.

7. The task of operating a satisfactory radiological safety program on Kwajalein is not nearly so complex as it is being made to appear. There is no question that a satisfactory and efficient film badge processing service could be maintained at Kwajalein with a maximum of two photo lab technicians and the necessary photo and densitometer equipment. Radiac instrument repair is not a complicated matter, and one technician with the proper information test equipment and spare parts, could handle all the maintenance required at this location. In future planning of this type, it is strongly recommended that this factor be considered in its true light, and the Kwajalein unit be made self-sustaining in such matters. The Air Force will never gain the proper amount of field experience if the procedures currently in effect are permitted to continue through future operations of this type.

8. The third deficiency observed in the operation of the Radsafe Program at Kwajalein has been that of a conspicuous absence of supervision on and assistance from ATG 3.4 in the Kwajalein operation. Since the arrival of this unit at Kwajalein, this unit has been visited but once by the Staff Radiological Officer, ATG 3.4. This visit lasted for approximately one-half

hour. It is pertinent to note that ATU 3.4.4 has been charged with a mission that includes "responsibility for the operation of the ATG 3.4 radsafe program at Kwajalein". At the same time, however, it would appear that ATG 3.4 is not particularly concerned with either the quality of radsafe program at Kwajalein or the problems being encountered in the Kwajalein operation which are subject to ATG 3.4 assistance. An inspection of this Unit during the current week, by ATG 3.4 IG, did not include an inspection of the Radsafe activities to determine the adequacy or efficiency of same. This fact seems to be particularly significant in a negative sense since the primary mission of this organization includes the discharge of the ATG 3.4 Radsafe responsibility at Kwajalein.

9. The mission assignment placed on ATU 3.4.4 was, in one particular instance, incomplete. The ATU 3.4.4 mission required that radsafe facilities and services be provided for "all Air Task Units of ATG 3.4" stationed at Kwajalein. This apparently clear-cut assignment proved eventually to include certain facilities and services to be provided to TU 3.3.3 at this station, which was partially manned and equipped for radiological safety operations. Another factor with respect to the mission of ATU 3.4.4 is that of the aircraft decontamination facilities at this station. Even though the mission of ATU 3.4.4 included the requirement for establishing and maintaining an aircraft decontamination facility and indicated that such facility was available at the operating site, no such facility was provided this unit except that obtained through local negotiation and solely on the insistence of ATU 3.4.4. It was particularly difficult to obtain what facilities were finally allocated, since JTF-3 representatives consistently advised the CNOB Kwajalein, that no aircraft decontaminations facilities were required at Kwajalein. Such advice was obviously based on a lack of knowledge of the flying commitments of ATG 3.4.4 aircraft at Kwajalein and did considerable to aggravate and make difficult the acquisition of the aircraft decontamination area. Actual operations during DOG and EASY shots substantiated the requirement for aircraft decontamination facilities and proved further that had such facilities not been available at this station, considerable difficulty would have been encountered in sustaining radiological reconnaissance during test periods.