FILE NUMBER 922 - 3 - 3 VOL.

DEPARTMENT OF NATIONAL DEFENCE

NATIONAL SURVIVAL OPERATIONS
RCN NUCLEAR FALLOUT FORECASTING AND WARNING SYSTEM

FOR CROSS REFERENCES SEE INSIDE COVER

ROUTING				P.A. AND B.F. ENTRIES				REGISTRY ONLY	
REFERRED	REMARKS	Date of Pass	Initials	Date of P.A.	Initials	Date of B.F.	Cancel B.F.	Date Received	Inspected by
DLFOR	L5	29/7/67		5/4	M				

CLOSED

829603

VOL. 922 - 3 - 3 FILE NUMBER

RCAF

"B.F."— DO NOT HOLD THIS FILE WHEN LAPSES IN ACTION MAY EXCEED 48 WORKING HOURS

DND-701

000233

MAIN FILE No. 922-3-3 T.D. No. 2058

DEPARTMENT OF NATIONAL DEFENCE

T.D. No. 2058

TEMPORARY DOCKET

AIR FORCE

26-2-62

ROUTING				P.A. & B.F. ENTRIES				REGISTRY ONLY	
REFERRED	REMARKS	DATE OF PASS	INITIALS	DATE OF P.A.	INITIALS	DATE OF B.F.	CANCEL B.F.	DATE RECEIVED	Inspected
COPS/DDO	FEB 27 1962			28 Feb					

MAIN FILE NUMBER 922-3-3

INSTRUCTIONS

1. Temporary Dockets are to deal WITH ONE CASE ONLY.
2. T.D.'s NOT to be placed on main file UNLESS Central Registry informed by means of Form D.N.D. 710.
3. T.D. No. together with main file number to be quoted on all correspondence originated.
4. T.D.'s not to be passed from one service to another.
5. Action should be taken as soon as possible in order that main file may be kept up to date. If action cannot be taken within 48 working hrs., B.F. Docket.
6. T.D.'s to be requisitioned, passed, B.F.'d. etc., in the same manner as main files by means of Form D.N.D. 710.

DND 702
7530-21-562-7071

RESTRICTED

Our file ref. NSS 1616-7 Vol. 2 (Staff)

CANADA

DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN NAVY

Referred to C.O.P.S./D.M.
FEB 27 1962
File No. 922-3-3

2058

OTTAWA 2 FEB 1962

RADIOACTIVE FALLOUT READINESS
RCN NUCLEAR FALLOUT FORECASTING AND WARNING SYSTEM

Reference: (a) NSS 1616-1 (Staff) dated 22 January 1959 with enclosure "Notes for the Guidance of RCN Meteorologists in Predicting Radioactive Fallout (interim procedure 1957)". (To action addressees only).

Enclosure (A) "RCN Nuclear Fallout Forecasting and Warning System" (Preliminary Form 1961).

In a nuclear war radioactive fallout from nuclear explosions on land targets may affect large areas of adjacent waters out to distances of several hundred miles from coasts. This danger is especially great in Eastern North American coastal waters, where the prevailing EFWs carry fallout to seaward. Ships having prior knowledge of the probable fallout patterns which would result from detonations on certain pre-selected targets can take evasive action and preventive measures against contamination before the bulk of the fallout arrives.

2. Enclosure (A) describes a system of fallout warning and forecasting which is based on a method to be promulgated for NATO naval use in ATP-25 (NAVY), "Nuclear Fallout Forecasting and Warning Organization". Enclosure (A) is intended to provide the RCN with an adequate nuclear fallout warning system until ATP-25 (NAVY) appears.

3. Enclosure (A) will supersede the enclosure to reference (a) as the basis of Command fallout warning arrangements. Transparent plastic overlays of the fallout patterns shown in figures 1, 2, 3, and 4 of enclosure (A) are being prepared in Naval Headquarters. Enclosure (A) together with the overlays will be issued to all ships as part of the meteorological kit through Chart and Chronometer Depots. Issue will be made as soon as the overlays are available.

4. An adequate radioactive fallout warning system for ocean areas is urgently required in the RCN. In order to provide ships and other interested authorities with routine fallout

The Flag Officer Atlantic Coast. ...2

The Flag Officer Pacific Coast.

Copies to: ✓Chief of the Air Staff.

Maritime Commander Atlantic.

Maritime Commander Pacific.

NR

MWC 28 Feb 62

RESTRICTED

000235

predictions, it is recommended that Commands institute procedures along the following lines:

(a) A number of targets are selected for their suitability to give an estimate of the early fallout hazard which would result from sudden nuclear attack.

(b) A routine message based on format 2 of Appendix "B" to enclosure (A) is passed at least once per day to all operational units in the Command giving envelope details for 50KT and 5MT detonations on each target.

(c) As soon as details of an attack are known MHQs will follow up with an EFWARN message based on format 1 of Appendix "B" to enclosure (A).

The routine prediction will also provide ships in the immediate coastal area with an estimate of fallout patterns which would follow bursts in their own vicinity. More distant units will, however, require separate predictions of fallout patterns which would result from bursts of assumed yield in their neighbourhood. In the event of a nuclear explosion occurring in distant waters the advice available from shore based units will be limited by their knowledge of the upper winds in that locality; in some circumstances it may be impossible to supply more than an estimate of the EFW. Ships with facilities for observing upper winds and computing fallout patterns should be employed to supply fallout data to ships in company.

5. In addition appropriate instructions should be issued for the reporting of new bursts and the onset and cessation of fallout in accordance with message formats 3, 4, and 5 of Appendix "B" to enclosure (A).

6. This RCN method is for use over ocean areas and does not affect the National Attack Warning Procedures now in effect within the land areas of Canada.

NAVAL SECRETARY.

RESTRICTED

ROYAL CANADIAN NAVY

RCN NUCLEAR FALLOUT FORECASTING

AND

WARNING SYSTEM

(Preliminary Form, 1961)

RESTRICTED

ROYAL CANADIAN NAVY

RCN NUCLEAR FALLOUT FORECASTING

AND

WARNING SYSTEM

(Preliminary Form, 1961)

RCN NUCLEAR FALLOUT FORECASTING AND WARNING SYSTEM

(Preliminary Form, 1961)

PART 1

INSTRUCTIONS TO SHIPS

Introduction and Definitions - (for further details see CGO 2.00/9)

(1) Nuclear weapons produce clouds which rise to heights dependent principally upon the energy released and on the type of burst - air, surface, or sub-surface. Once the debris is injected into the atmosphere it is rapidly spread by diffusive processes and eventually deposited on the ground in a complex manner.

(2) The process of deposition of radioactive debris may be divided into three phases:

(a) Immediate - the deposit of heavy debris within half an hour of the burst, occurring mostly in the area in which physical damage is sustained.

(b) Medium Range - fallout which is deposited between a quarter to half an hour and approximately twenty hours after a nuclear explosion out to ranges which may, in the case of megaton weapons, extend some hundreds of miles from the point of burst.

(c) Long Range - the slow widespread fallout of very small particles which may continue for months or years, particularly after a high yield thermo-nuclear explosion.

The importance of immediate fallout is outweighed by the other close-in effects of the explosion and long range fallout does not give rise to tactically significant radiation doses. Medium range fallout covers a limited portion of the earth's surface and constitutes a hazard; it should be avoided, or protective measures taken against it. In subsequent paragraphs only medium range fallout will be considered and will be referred to simply as fallout.

(3) The point at the surface immediately below (or above) the position of the explosion is described as Surface Zero. (SZ).

(4) Fallout is important only after a burst whose fireball contacts the surface, i.e., where the radioactive substances in the fireball become attached to material from the surface. It may be important in the case of underwater bursts at shallow or intermediate depths, when the fireball cools before breaking the surface. It is negligible in the case of air bursts (i.e., where the fireball does not touch the surface) and localized around surface zero in the case of deep underwater bursts.

(5) There may be a fallout hazard from underwater bursts. For very shallow depths of burst the fallout pattern should be similar to that from a surface burst. However shallow burst depths are unlikely for tactical reasons. At intermediate burst depths most of the tactically significant fallout occurs close to surface zero within the zone of physical damage. If a nuclear cloud is formed most of the deposition from it will occur very quickly, within minutes rather than hours, and a fallout prediction and warning system designed to warn ships outside the range of immediate effects is inappropriate and unnecessary. In this case the situation requires prompt avoidance manoeuvres and other action, based on direct observation of the phenomena at surface zero.

(6) It is dangerous to assume, even close to surface zero, that the contaminated falling particles will follow the direction of the surface wind. The wind normally varies in direction and speed at different levels and the path followed by a falling particle is determined by the mean wind between its initial altitude and the surface. The deposition pattern at the surface will depend primarily on the size of the nuclear cloud and the upper winds. The worst contamination falls along a path down the averaged wind between the surface and the level of maximum contamination in the stabilized cloud, the maximum contamination being found in the lower third of the cloud (excluding stem). This wind is defined as the EFFECTIVE FALLOUT WIND (EFW).

(7) For purposes of aircraft routing it should be noted as a corollary to the above that particles in the process of falling may be found outside the predicted fallout pattern which applies only at the surface.

Forecast Patterns

(8) In order to simplify the presentation of fallout information in ships, while preserving reasonable accuracy, six diagrams lettered ALFA, through FOXTROT have been prepared (Figs. 1, 2, 3 and 4 show diagrams ALFA, BRAVO, CHARLIE, and ECHO. Diagrams DELTA and FOXTROT are the mirror images of CHARLIE and ECHO respectively). These diagrams are reproduced on the four transparent templates supplied. Each template shows SZ, the EFW, and the axis of the pattern (Fallout Axis) with a boundary enclosing the area within which an unprotected person standing on an exposed deck from which accumulated fallout is not removed would be liable to receive a total dose of 200 roentgens or more in the 48 hours following the burst. Providing ships can clear a fallout area in reasonable time, however, casualties from fallout are likely to be negligible in prewetted ships which have taken normal shielding precautions. Fallout landing on the sea is rapidly diffused and there is little danger to ships passing through water where deposition has ceased.

(9) The fallout computing centres (normally located at Maritime Headquarters and in ships in which a meteorological officer is borne) will select the appropriate template by means of the computational procedure described in Part 2 and will transmit envelope details to operational units by means of the appropriate message format from Appendix "A". On receipt of the message the receiving ship will:

(a) Plot the position of the burst on a chart, plotting sheet, or manoeuvring board;

(b) Through this point plot the fallout axis in the downwind direction of the EFW using any convenient scale;

(c) Lay off the downwind distance along the fallout axis;

(d) Place the appropriate template over the plotting sheet with SZ over the burst point and axis along the fallout axis;

(e) Prick off the contour which crosses the axis nearest to the point obtained in (c) of this paragraph;

(f) Remove the template and complete the contour.

(10) Too literal an interpretation should not be placed on the envelopes. They provide what is best described as a prudently pessimistic estimate of potential fallout hazard areas. Fallout may not occur at all over much of the area enclosed by an envelope but uncertainties regarding weapon yield, height of burst, and meteorological conditions do not allow an exact fallout pattern to be predicted with any confidence.

(11) Fallout is, of course, not deposited at all points in the pattern simultaneously. It will commence around SZ and thereafter move down the pattern with approximately the speed of the EFW. The approximate zone in which deposition at the surface is taking place at a given time after the burst may be obtained by the following procedure:

Step 1. Multiply the EFW speed by the time in hours after the burst;

Step 2. To the distance obtained in step 1 both add and subtract a safety distance, obtained from the table below, to allow for finite cloud size, diffusion, and wind fluctuations;

Step 3. With SZ as centre and the distances obtained in step 2 as radii, describe arcs across the fallout pattern.

The zone enclosed between these two arcs should contain, in most circumstances, the area over which deposition is taking place at the given time after the burst. Example 1 below the table illustrates this method.

(12) Conversely, the time after burst of the onset and cessation of fallout at a given distance down the pattern from SZ may be obtained as follows:

Step 1. To the given downwind distance from SZ add and subtract the appropriate safety distance obtained from the table below.

Step 2. Divide each of the two distances obtained in step 1 by the speed of the EFW.

The resulting quantities are the approximate times of onset and cessation of fallout at the specified distance from SZ. Example 2 below the table illustrates this procedure.

Yield	1KT	20KT	50KT	100KT	500KT	1MT	5MT	10MT
Safety distance (nautical miles)	1	3	4	5	9	13	24	32

Note.- If the yield is not known or can only be estimated to a crude approximation, the safety distance should be 5 nautical miles (n.m.) for KT weapons and 20 n.m. for MT weapons.

Example 1. Fallout message data (see Appendix "A")

D. 50KT
E. BRAVO
F. 25328
G. 30

Required: The area of deposition at the surface 45 minutes after burst time.

Step 1. 3/4 hour x 28 knots = 21 n.m.

Step 2. Safety distance for 50KT = 4 n.m. Addition and subtraction on 21 gives 17 n.m. and 25 n.m.

Step 3. With SZ as centre, describe arcs of radii 17 and 25 n.m. as in figure 5.

The required area is contained between these arcs and the envelope boundary, as shaded in figure 5.

Example 2. Fallout message data:

D. 1MT
E. DELTA
F. 26035
G. 180

Required: The times after burst of onset and cessation of fallout at a point 80 n.m. downwind along the fallout axis from SZ.

Step 1. Safety distance for 1MT = 13 n.m. Addition and subtraction on 80 gives 67 n.m. and 93 n.m.

Step 2. $\frac{67 \text{ n.m.}}{35 \text{ knots}}$ = 1.91 hours = 1 hour 55 minutes

$\frac{93 \text{ n.m.}}{35 \text{ knots}}$ = 2.66 hours = 2 hours 40 minutes

Therefore fallout can be expected to commence at the point in question 1 hr 55 mins after the burst and to cease 2 hrs 40 mins after the burst.

(13) From the foregoing paragraphs it will be apparent that ships which must, for operational reasons, remain in fallout hazard areas may often do so without undue risk provided that Commanding Officers note that the heaviest fallout is likely to occur downwind along the fallout axis, that the area where deposition is actually occurring will move as described in paragraphs (11) and (12), and that there is little danger to ships passing through water where deposition has ceased. How long a ship can remain in a fallout area or how long it should steam in a given direction into a fallout area can only be determined by judicious consideration of these factors together with the ship's radiation intensity measurements.

Statistically Derived Patterns

(14) For planning purposes, or where no fallout forecasts or current meteorological observations are available, the statistical EFW data given in Appendix "A" to CGO 2.00/9 may be used. These show the mean annual direction, speed, and most probable sector for 40,000 ft EFWs at a number of locations in the North Atlantic and North Pacific. As 40,000 ft is approximately the level of the tropopause in middle latitudes, which exerts a stabilizing influence on nuclear clouds, the data are applicable to a wide range of yields.

General Rules for Avoiding Fallout in the Absence of EFW Information

(15) In the absence of predictions of fallout areas, ships becoming aware of a nuclear explosion should ascertain the mean fallout axis from Appendix "A" to CGO 2.00/9 and, operational and navigational circumstances permitting, should steer in order to open to a safe distance from a line in this direction passing through the estimated position of the burst.

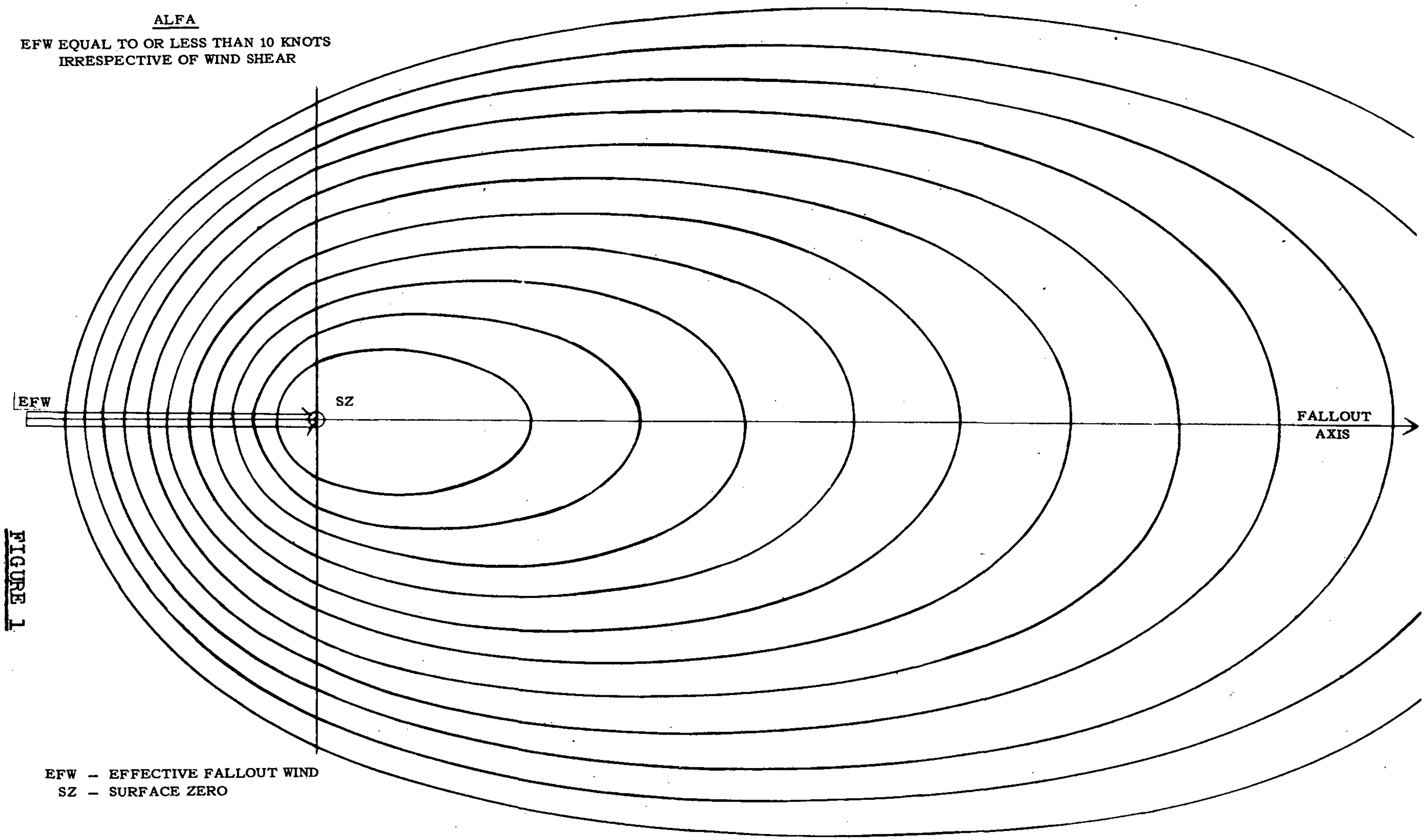

ALFA
EFW EQUAL TO OR LESS THAN 10 KNOTS
IRRESPECTIVE OF WIND SHEAR
EFW
SZ
FALLOUT
AXIS
EFW – EFFECTIVE FALLOUT WIND
SZ – SURFACE ZERO

FIGURE 1

BRAVO

EFW GREATER THAN 10 KNOTS
WIND SHEAR EQUAL TO OR LESS THAN 10 DEGREES

EFW – EFFECTIVE FALLOUT WIND
SZ – SURFACE ZERO

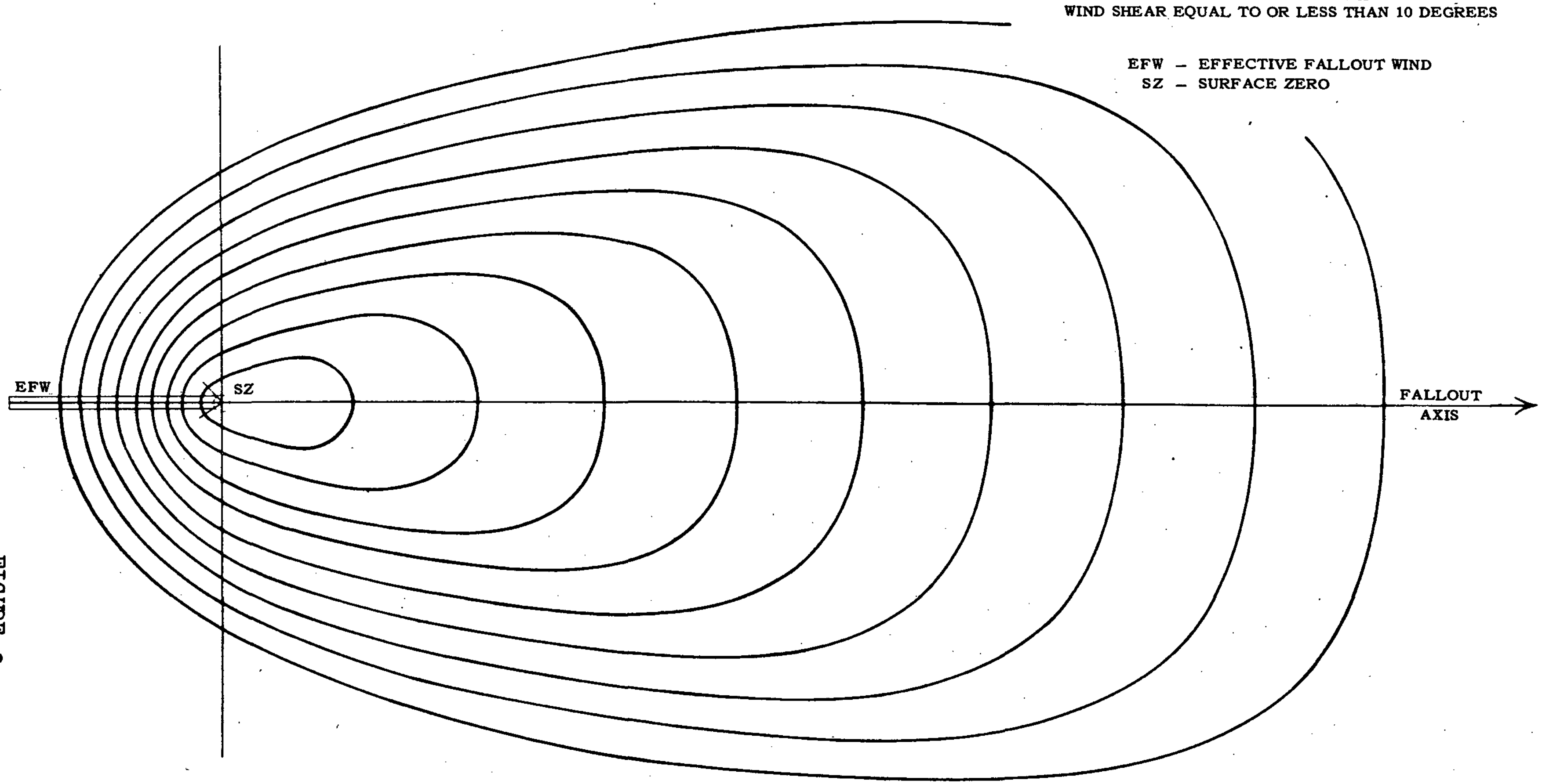


FIGURE 2

CHARLIE

EFW GREATER THAN 10 KNOTS
WIND SHEAR GREATER THAN 10 DEGREES BUT LESS THAN 20 DEGREES
VEERING

EFW – EFFECTIVE FALLOUT WIND
SZ – SURFACE ZERO

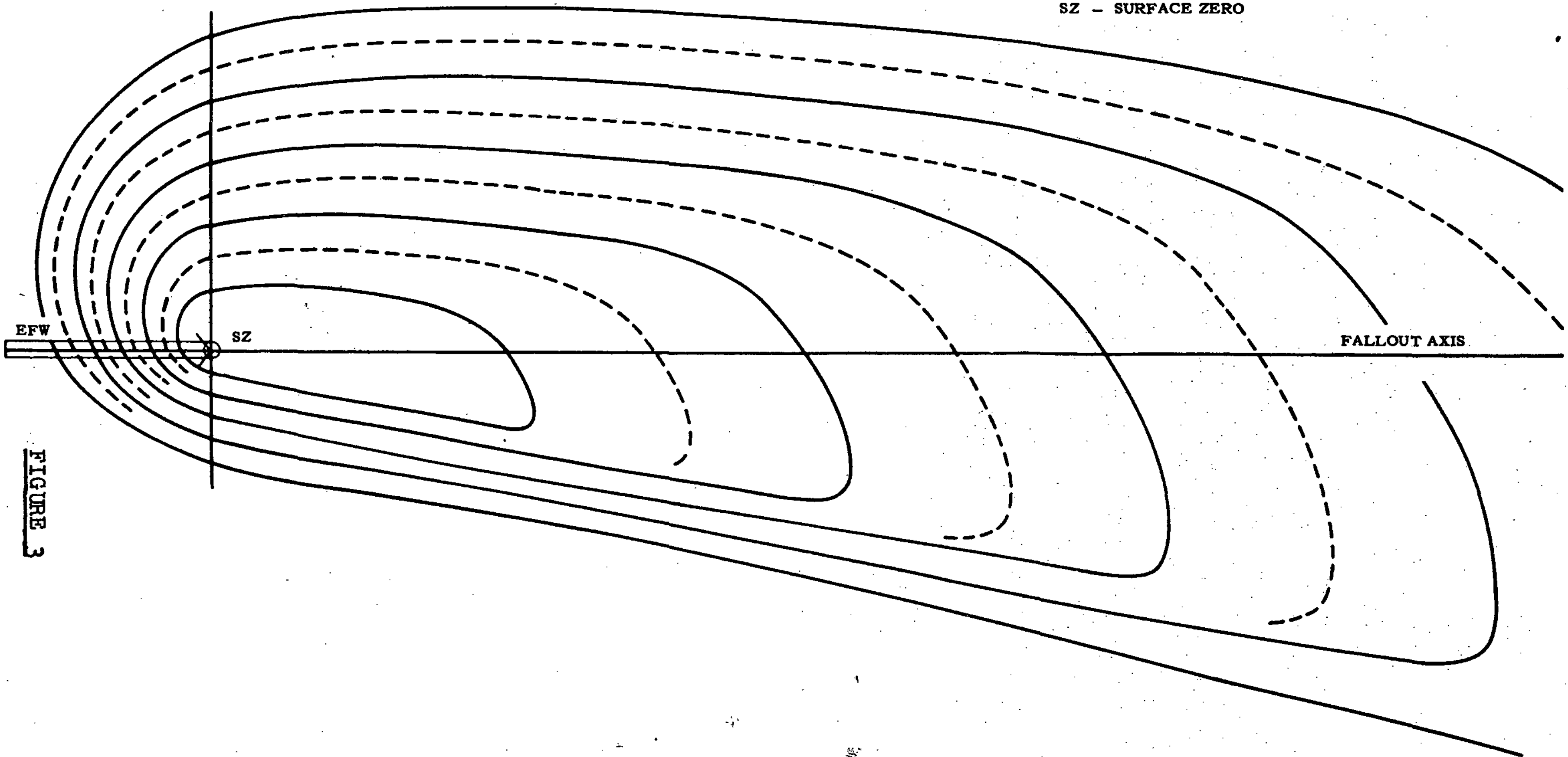


FIGURE 3

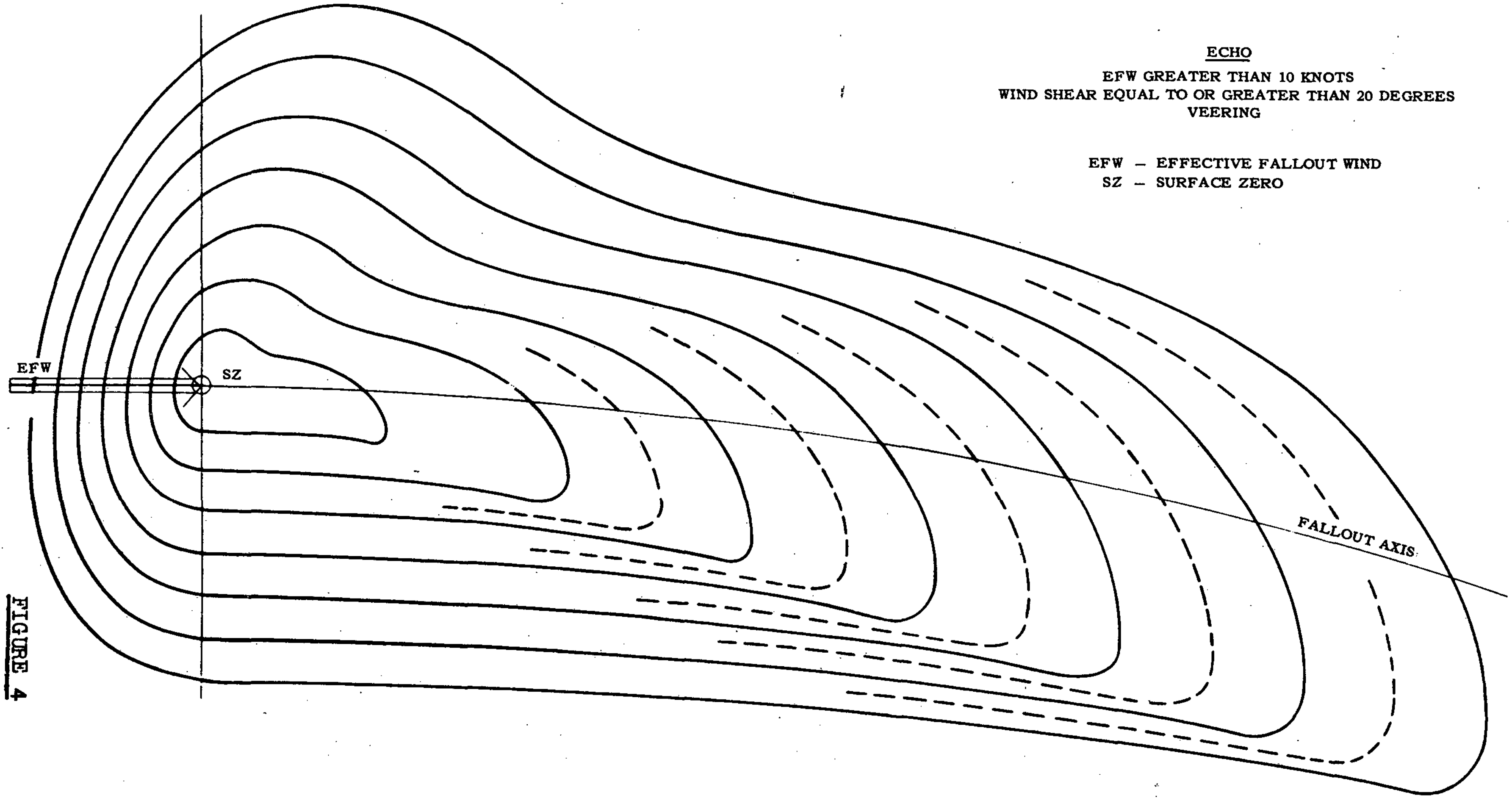

ECHO
EFW GREATER THAN 10 KNOTS
WIND SHEAR EQUAL TO OR GREATER THAN 20 DEGREES
VEERING
EFW – EFFECTIVE FALLOUT WIND
SZ – SURFACE ZERO
EFW
SZ
FALLOUT AXIS

FIGURE 4

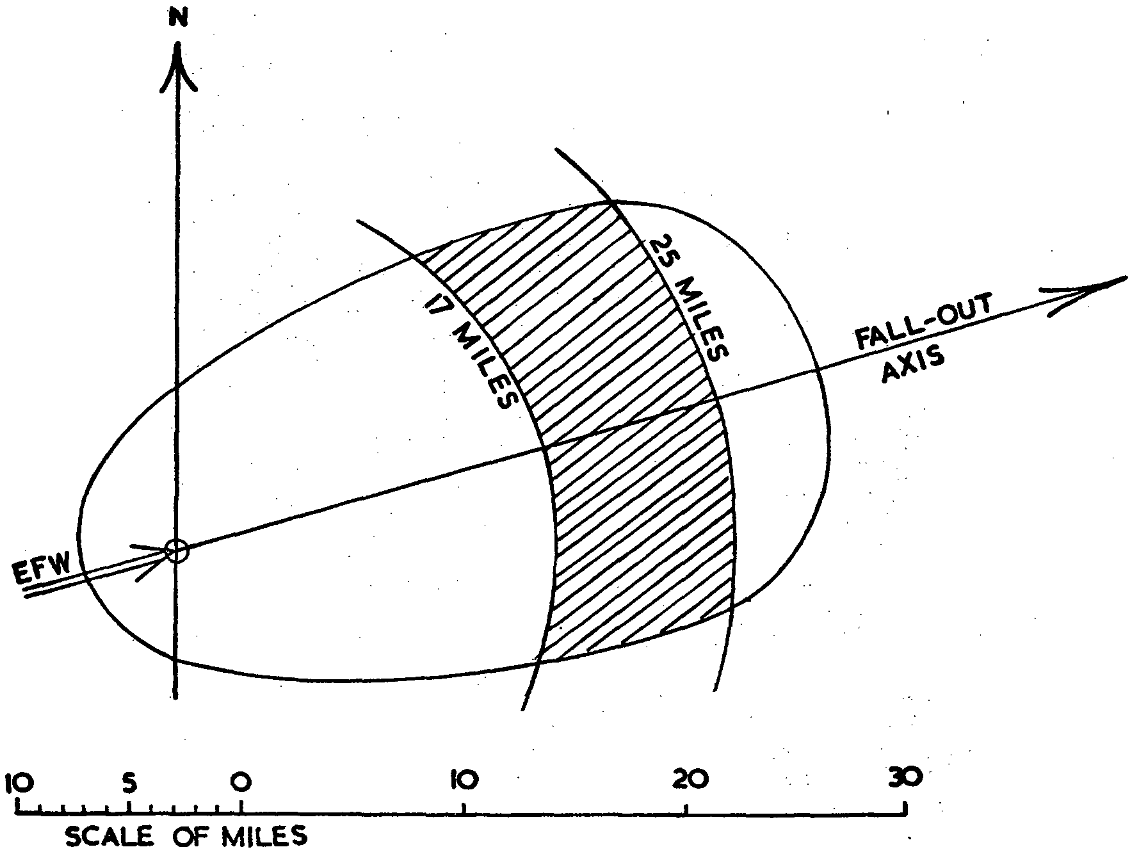


FIGURE 5

RESTRICTED

SIMPLE COMPUTATIONAL PROCEDURE FOR USE WITH RCN NUCLEAR FALLOUT FORECASTING AND WARNING SYSTEM

PART 2

(1) It is recommended that, for the present, RCN forecast offices select the appropriate fallout envelope by means of the following simple procedure.

(2) A surface burst is assumed and changes with altitude in rate of fall of contaminated debris are neglected. The predicted contour encloses an area within which an unprotected person remaining in the open on a flat surface from which accumulated fallout is not removed is liable to receive a dose of 200 roentgens or more in the 48 hours following a nuclear explosion..

(3) It is assumed that a single wind in the centre of successive 10,000 foot layers is representative of the whole layer. Thus the 5,000 ft wind is used for the layer O - 10,000 ft, etc.

(4) The layer winds are added vectorially to obtain a wind vector plot such as OABCDEF in figure 1.

(5) The level of maximum contamination for the yield in question is obtained from graph I and the EFW determined by joining SZ to this level on the vector plot. The direction of this line gives the EFW bearing, and its length in nautical miles divided by the number of 10,000 layers between the surface and the maximum contamination level gives the EFW speed. The examples below are computed from the wind vector plot shown in figure 1.

Level of max. contamination	EFW vector	EFW Direction	EFW Speed
10,000 ft	OA	320°	OA/1 = 26 kts
20,000	OB	265°	OB/2 = 20 kts
30,000	OC	251°	OC/3 = 26 kts
40,000	OD	255°	OD/4 = 42 kts
45,000	OD'	258°	OD'/4.5 = 43 kts
50,000	OE	260°	OE/5 = 46 kts
60,000	OF	264°	OF/6 = 48 kts

(6) Forecast winds should, of course, be used in preference to observed winds in the preparation of the vector plot. Where a complete set of forecast upper winds is not available the EFWs may be adjusted by applying to them the average of the expected changes at the 500 mb and 300 mb levels, but caution should be exercised in using this method beyond 12 hours.

Selection of Appropriate Fallout Template

(7) From graph I the heights of the bottom and top of the cloud for the yield under consideration are selected. Mean vector winds (MVWs) from the

surface to the bottom and top of the cloud are then constructed on the wind vector plot in the manner described for the EFW in paragraph (5).

(8) The appropriate template is then selected according to the following rules:

(a) if the speed of the EFW (computed for the level of maximum contamination) is equal to or less than 10 knots, irrespective of wind changes with height, select template ALFA;

(b) if the speed of the EFW is greater than 10 knots, and:
- (i) if the angular difference between the direction of the MVW to the top and bottom of the cloud, i.e., wind shear through cloud, is equal to or less than 10°, select template BRAVO.
- (ii) if the MVW veers more than 10° but less than 20° in going from bottom to top of cloud select template CHARLIE.
- (iii) if the MVW backs more than 10° but less than 20° in going from bottom to top of cloud select template DELTA.
- (iv) if the MVW veers 20° or more in going from bottom to top of cloud select template ECHO.
- (v) if the MVW backs 20° or more in going from bottom to top of cloud select template FOXTROT.

(c) if the manner in which the MVW changes between bottom and top of cloud is not known select template BRAVO (EFW greater than 10 knots).

(9) The final parameter necessary to define the fallout envelope, the downwind ~~downward~~ distance along the fallout axis to the 200r/48 hour contour, is obtained from graph II as a function of EFW speed and weapon yield.

(10) The fallout message is then coded according to the appropriate format from Appendix "A".

(11) Two examples of the above procedure follow:

Upper Winds

Level (feet)	Direction (degrees true)	Speed (knots)	Level (feet)	Direction (degrees true)	Speed (knots)
3,000	160	6	35,000	330	56
5,000	190	5	40,000	340	65
7,000	230	11	45,000	330	27
10,000	240	12	52,000	320	19
14,000	270	17	60,000	330	16
18,000	260	14	67,000	360	17
24,000	300	28	75,000	340	10
30,000	320	43	83,000	340	7

Mean Vector Wind from Surface to:	10,000 ft = 200°/7 knots
	20,000 ft = 239°/10 knots
	30,000 ft = 273°/12 knots
	40,000 ft = 303°/18 knots
	50,000 ft = 312°/23 knots
	60,000 ft = 310°/23 knots
	70,000 ft = 312°/21 knots
	80,000 ft = 315°/20 knots
	90,000 ft = 316°/19 knots

Example 1 Estimated yield 20 Kilotons

From Graph I,	height of bottom of cloud	= 25,000 ft.
	height of level of max. contamination	= 30,000 ft.
	height of top of cloud	= 40,000 ft.

EFW to 30,000 ft. is 273° at 12 knots

Hence direction of Fallout Axis is 093°

By interpolation, MVW to bottom of cloud is 256°

MVW to top of cloud is 303°

Hence wind veers from bottom to top of cloud and the angle exceeds 20°.

Therefore correct pattern is ECHO.

From Graph II, for 20 KT and EFW speed 12 knots, downwind distance to boundary contour = 11 n.m.

Summary of data to be transmitted (See Appendix "A"):

D. 20KT
E. ECHO
F. 27312
G. 11

Example 2 Estimated yield 1 Megaton

From Graph I,	height of bottom of cloud	= 51,000 ft.
	height of level of max. contamination	= 60,000 ft.
	height of top of cloud	= 74,000 ft.

EFW to 60,000 ft. is 310° at 23 knots

Hence direction of Fallout Axis is 130°

By interpolation, MVW to bottom of cloud is 312°
MVW to top of cloud is 313°

Difference less than 10° (speeds greater than 10 knots).

Therefore correct pattern is BRAVO.

From Graph II, for 1 MT, and EFW speed 23 knots, downwind distance to boundary contour = 140 n.m.

Summary of data to be transmitted:

D. 1 MT
E. BRAVO
F. 31023
G. 140

FIGURE I.

WIND VECTOR PLOT

BASIC WIND DATA

Height			Direction	Speed
5,000 FT.	(OA)	=	320°	26 KTS.
15,000 FT.	(AB)	=	230°	35 KTS.
25,000 FT.	(BC)	=	240°	48 KTS.
35,000 FT.	(CD)	=	260°	72 KTS.
45,000 FT.	(DE)	=	270°	65 KTS.
55,000 FT.	(EF)	=	280°	60 KTS.

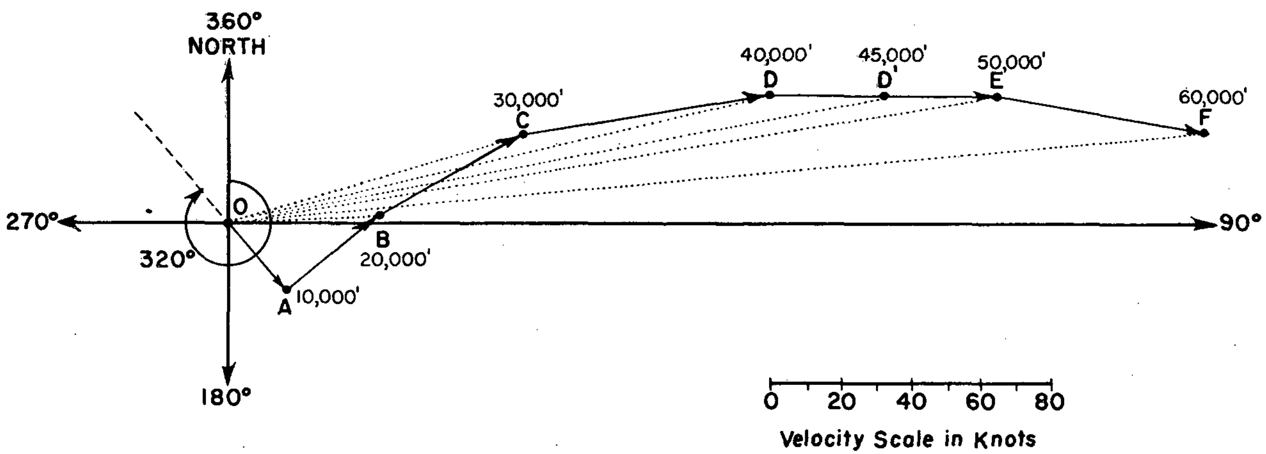
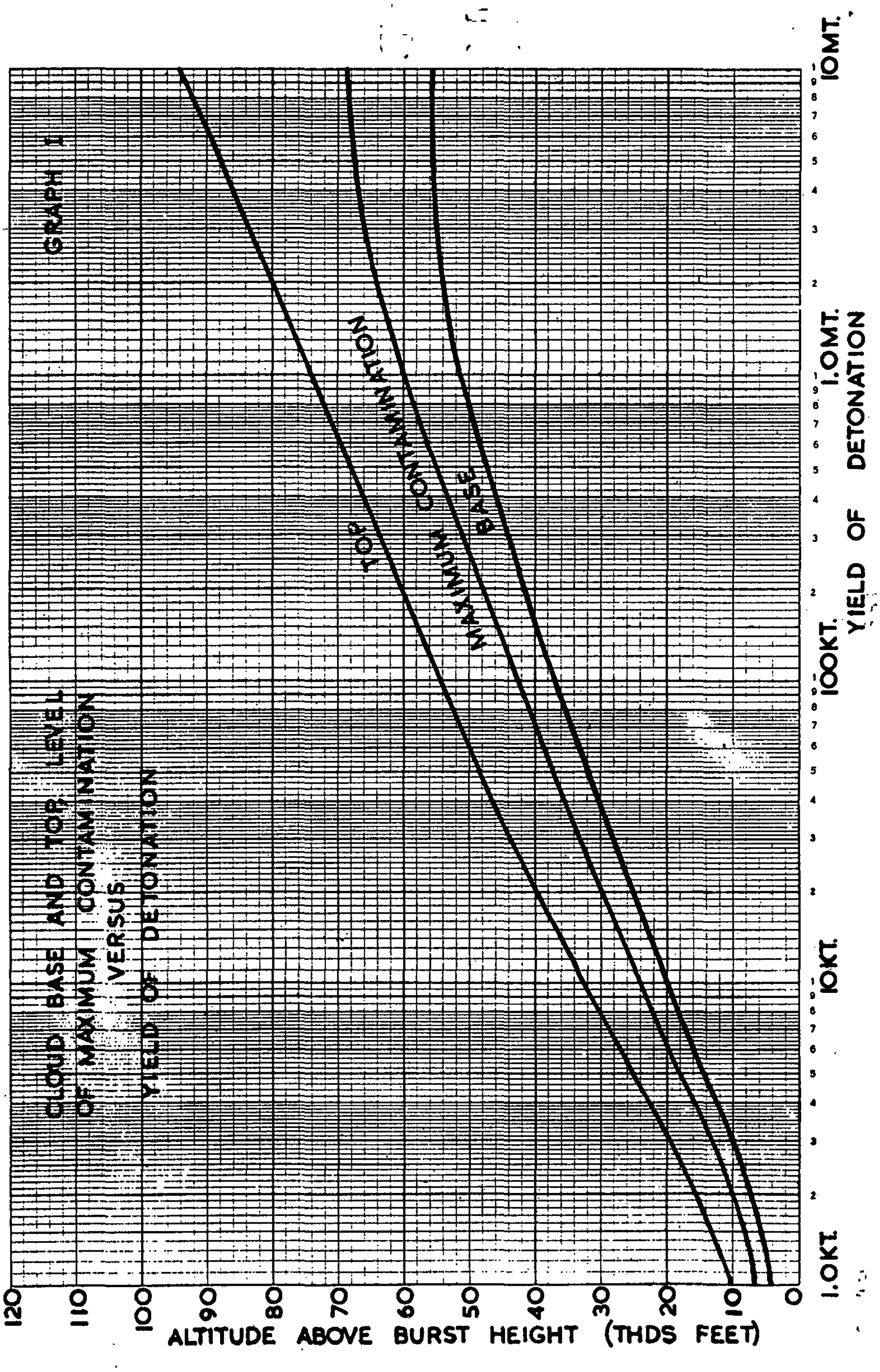
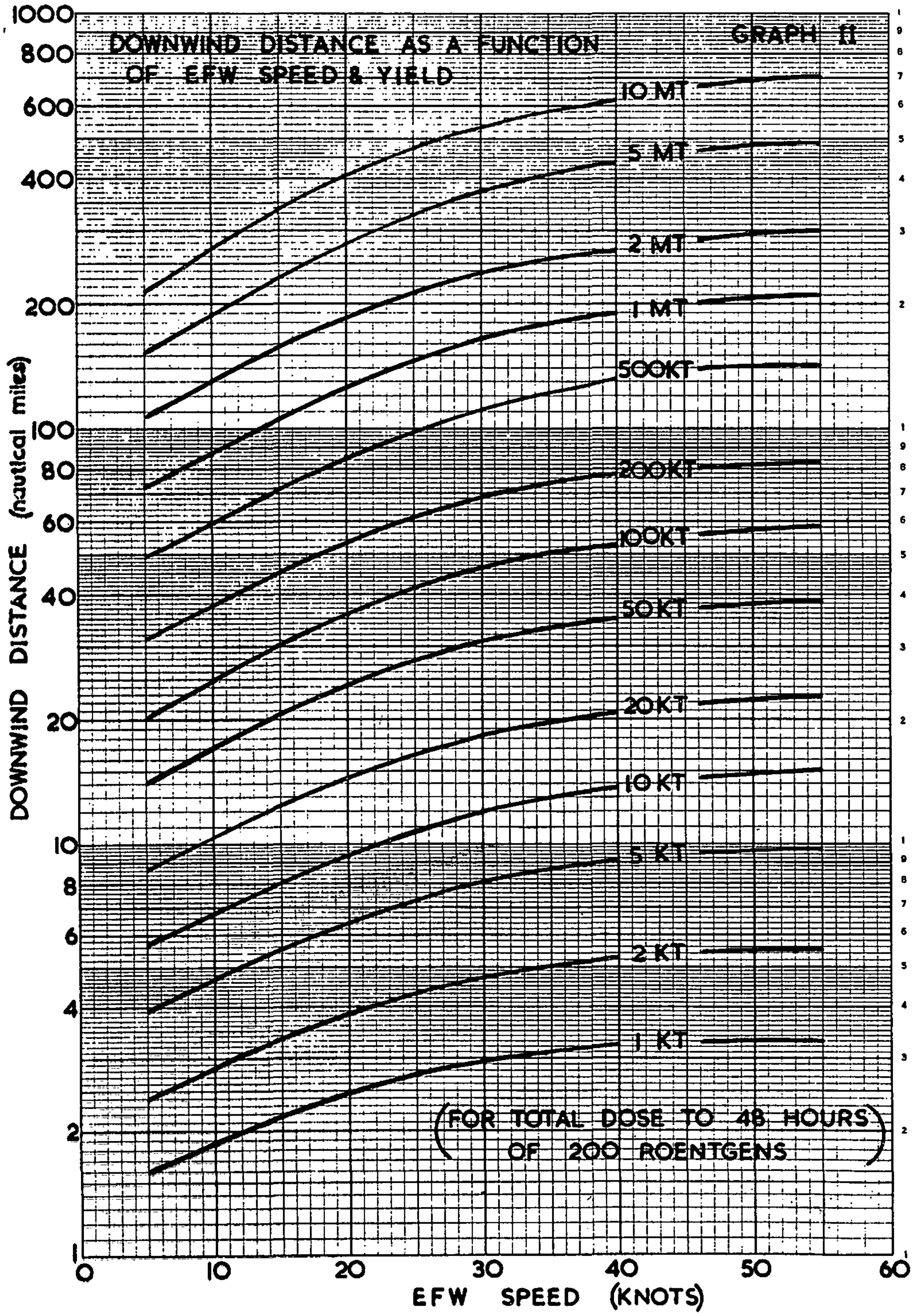


FIGURE 1


GRAPH I
CLOUD BASE AND TOP LEVEL
OF MAXIMUM CONTAMINATION
VERSUS
YIELD OF DETONATION
TOP
CONTAMINATION
MAXIMUM
BASE
1.0KT.
10KT.
100KT.
1.0MT.
10MT.
YIELD OF DETONATION
120
110
100
90
80
70
60
50
40
30
20
10
0
ALTITUDE ABOVE BURST HEIGHT (THDS FEET)

GRAPH I


DOWNWIND DISTANCE AS A FUNCTION OF EFW SPEED & YIELD
GRAPH II
10 MT
5 MT
2 MT
1 MT
500KT
200KT
100KT
50 KT
20KT
10 KT
5 KT
2 KT
1 KT
(FOR TOTAL DOSE TO 48 HOURS OF 200 ROENTGENS)
DOWNWIND DISTANCE (nautical miles)
1000
800
600
400
200
100
80
60
40
20
10
8
6
4
2
1
0
10
20
30
40
50
60
EFW SPEED (KNOTS)

GRAPH II

Appendix "A" to
"RCN Nuclear Fallout Forecasting and Warning System"
(Preliminary Form 1961)

FORMAT OF FALLOUT MESSAGES

(1) Warning of Fallout following an actual burst

A. Prefix - EFWARN
B. Position of burst (latitude and longitude or other reference system)
C. Date and time of burst
D. Yield of detonation
E. Pattern designator (ALFA-FOXTROT)
F. Effective fallout wind direction and speed (direction from which EFW is blowing in degrees true and speed in knots, e.g. 19015 means EFW blowing from 190° at 15 knots)
G. Distance in nautical miles from surface zero to the 200r/48hr total dose contour

Example:

(A) EFWARN. (B) 44°20'N 65°10'W. (C) 170945Z. (D) 5MT.

(E) DELTA (F) 23025 (G) 300

(2) Pre-burst Predictions of Fallout

A. Prefix - EFCAST
B. Identifier for preselected target (this group is not necessary when the prediction is made for a force at sea for an assumed burst in its vicinity)
C. Period for which prediction is valid (or for a force at sea: prediction from . . . . until further notice)
D. Yield of weapon to which E, F, G relate
E. Pattern designator (ALFA-FOXTROT)
F. EFW direction and speed
G. Distance in nautical miles from SZ to 200r/48hr total dose contour
(H. Yield of weapon to which K, L, M relate)
(K. Pattern designator)
(L. EFW direction and speed)
(M. Distance from SZ to 200r/48hr contour)

Where predictions for a second yield are passed

(Notes.- 1. Group D (andH) may be omitted when predictions for assumed yields are being transmitted in accordance with previous arrangements.

2. Where predictions for a number of preselected targets and yields are being transmitted, EFCAST prefixes the message and E, F, G, (K, L, M) are given for each target following its identifier, e.g. where E, F, G are for 50KT and K, L, M for 5MT:

(A) EFCAST
(B) Target 1 identifier (C) 18-18Z (E) CHARLIE (F) 22020 (G) 24 (K) ECHO (L) 24030 (M) 370
(B) Target 2 identifier (C) 18-18Z (E) FOXTROT (F) 18015 (G) 20 (K) ALFA (L) 20508 (M) 170
ETC.

3. When significant upper wind changes are expected to occur during the prediction period the latter may be broken up into smaller intervals of time and groups C, D, E, F, G (H, K, L, M) repeated for each interval.

(3) Report of New Burst

A. Prefix - NEW BURST
B. Type of burst (air, surface, or sub-surface)
C. Estimated yield of weapon (kiloton or megaton)
D. Position of burst
E. Date and time of burst

(4) Report of First Fallout Detection

A. Prefix - FALLOUT
B. Position of reporting ship
C. Date and time

(5) Report of Cessation of Fallout

A. Prefix - FALLOUT CEASED
B. Position of reporting ship
C. Date and time