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6515. File # 969-108

DEPARTMENT OF NATIONAL DEFENCE

NUCLEAR, BIOLOGICAL CHEMICAL WARFARE FALLOUT PREDICTIONS

RCAF

FOR CROSS REFERENCES SEE INSIDE COVER

ROUTING				P.A. & B.F. ENTRIES				REGISTRY ONLY		
REFERRED	NEW COVER	REMARKS	DATE OF PASS	INITIALS	DATE OF P.A.	INITIALS	DATE OF B.F.	CANCEL B.F.	DATE RECEIVED	IN-SPECTED
Daird/K-4		PER REQUEST CR MAR 7 1963					15 Jul 63		JUN 13 1963	0
Daird		PER REQUEST CR JUN 20 1963			20 Jun				JUN 27 1963	19
Daird		PER REQUEST CR JUL 3 - 1963			9 Jul				JUL 10 1963	19
Daird 4-4		per BF 15-7-63					16 Sep 63		JUL 22 1963	
Daird/K-4		PER BF CR SEP 15 1963			26 Sep				SEP 27 1963	1

CLOSED

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

58-63

AMENDMENT LIST #1 TO NCAF PAMPHLET 176

THE PREDICTION OF RADIOACTIVE FALLOUT

- 1 The changes indicated in the following paragraphs are to be incorporated into NCAF Pamphlet 176.
- 2 Art 2.08 para (1) line 5. Change "divided" to "divide".
- 3 Table 2(c). Change "4,5000,000,000" to "4,500,000,000".
- 4 Art 2.13 para (1). Delete all commas.
- 5 Art 3.07 para (2), line 8. Change "drom" to "from".
- 6 Art 3.18. Change formula to read $R_t = R_{1t}^{-1.2}$
- 7 Art 3.19, first line. Change "radioacvity" to "radioactivity".
- 8 Art 4.03.
 - (a) Fourth line, change "solidifices" to "solidifies" and
 - (b) Last line, add "from" after first "to".
- 9 Art 4.07, second line. Change "its" to "is".
- 10 Art 4.09. In heading delete "Test", and in first line of paragraph change "burst" to "bursts".
- 11 Art 4.10, third line. Change "in" to "of".
- 12 Art 4.12 para (1) first line. Delete "up" and "the rising".
- 13 Art 5.02
 - (a) Number the existing para as para "(1)".
 - (b) In the second line of para (1) change "of" to "or".
 - (c) Add a new para (2) as follows:

"(2) RAWIN reports for levels 50,000 to 100,000 feet should be kept on file or plotted, for use in preparing high level winds as required. Two useful plotting techniques are described below.

 - (a) Prepare ozalid charts on which columns, as shown in Fig 5(a)(1), have been marked above each RAWIN station. The direction and wind speed can then be plotted opposite the appropriate levels.

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Distinguishing colours may be used for each set of observations, if it is desired to keep a record of more than one set of observations on each chart.

- (b) On a separate chart for each 10,000 foot level, maintain a plot of the reports received for each level over a period of several days using a distinguishing colour for each set of observations."

(d) Add a new Fig 5(a)(1) as attached.

14 Art 5.04 para (1)(b), line 5. Delete hyphen in coincide.

15 Art 5.07.

- (a) Para (1)(a) second line, change period "(.)" to comma "(,)"

- (b) Add new paras (3) to (11) as follows:

"(3) The fallout wind forecasts prepared for National Survival purposes provide winds for 6000 foot layers.

These winds may be used to prepare a wind plot in a similar manner to that described in (1) above. It should be noted, however, that each vector in the wind plot represents the distance which a particle, that takes one hour to fall through the layer, would travel.

Where 10,000 foot layer winds were used, the plot was based on a rate of fall of 10,000 feet an hour, whereas, if 6,000 foot layer winds are used the plot is based on a rate of fall of 6,000 feet an hour. The assumed rate of fall is important later when determining the effective wind speed."

"(4) Winds at the constant pressure chart levels can also be used in the preparation of the wind plot by using the procedures described below. In this method it is assumed that:

- (a) the radioactive particles fall at a constant rate of 10,000 feet an hour, and

- (b) the wind at the constant pressure chart level represents the mean wind through a layer extending above and below the chart

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level (These layers are not all of the same thickness).

(5) Table 5(a)(i) gives the following information;

- (a) the constant pressure chart levels for which winds would be available,
- (b) the layer which each wind could be assumed to represent,
- (c) the thickness of the layer that each wind represents, and
- (d) the wind adjustment factor for each level
(The adjustment factor is based on the fraction of an hour that the particle will spend in falling through the layer).

Constant Pressure Chart Level (lbo)	050	700	500	300	200	100	50	30
Layer represented	0-7,000	7-13,000	13-25,000	25-35,000	35-45,000	45-60,000	60-75,000	75-85,000
Thickness of layer	7000	6000	12000	10000	10000	15000	15000	10000
Adjustment Factor	.7	.6	1.2	1	1	1.5	1.5	1

Table 5(a)(i) - Wind Layers and Wind Adjustment Factors

(6) A typical set of winds is given below in Table 5(a)(ii).

Constant Pressure Chart Level	Wind
850 mbs	180 15
700 mbs	230 15
500 mbs	240 25
300 mbs	270 50
200 mbs	280 30
100 mbs	290 10
50 mbs	360 10
30 mbs	090 10

Table 5(a)(ii) - Fallout Winds

(7) The layers represented by the various winds are of different thicknesses. Therefore, to determine the distance travelled by a particle carried by the wind as it falls through each layer, it will be necessary to

multiply the wind speeds by the adjustment factors.

The adjusted wind speeds (distances to be used for the vector lengths when preparing the wind plot) for the above winds are given below in Table 5(a)(iii).

Layer	Wind	Adjustment Factor	Wind Speed Times Adjustment Factor (Vector Length)
0-7,000'	180 15	.7	10.5
7-13,000'	230 15	.6	9
13-25,000'	240 25	1.2	30
25-35,000'	270 50	1	50
35-45,000'	280 30	1	30
45-60,000'	290 10	1.5	25
60-75,000'	360 10	1.5	15
75-85,000'	090 10	1	10

Table 5(a)(iii) - Adjusted Fallout Winds
Giving Vector Lengths.

(8) Wind forecasts for levels above 30 mbs are not being prepared for National Survival purposes. The 30 mb winds (75-85,000) can either be assumed to represent the wind in any higher levels that are required, or if desired winds for these levels may be forecast from the actual wind data available in the forecast office. An adjustment factor of 1 should be used for each additional 10,000 foot layer that is plotted.

(9) The wind plot is prepared in the usual manner using the wind directions and the adjusted wind speeds (the wind speed times the adjustment factor). Points on the plot representing the top of each layer should be labelled as follows: 7, 13, 25, 35, 45, 60, 75 and 85 etc. A typical wind plot is shown in Fig 5(f)(i).

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(10) After the wind plot has been completed the points at which the even 10,000 foot levels will occur, or any other levels that may be required, can be obtained by interpolation. The danger sector or fallout area can then be determined in the usual manner.

(11) When determining the effective wind speeds from the above plot it must be remembered that it was based on the assumption of a constant rate of fall of 10,000 feet an hour and that the time of fall from any level is obtained by dividing the height of the level by 10,000."

(c) Add new Fig 5(f)(i) as attached.

16 Art 5.08 para 2 and in table heading. Change "Table 5(a)" to read "Table 5(a)(iv)".

17 Art 5.11 para (4). Delete sub-para (b) in entirety and renumber sub-para "(c)" as "(b)".

18 Art 5.11. Add new paras (5) (6) (7) and (8) as follows.

"(5) Fallout originating upwind of GZ is carried downwind as it falls. It is therefore unlikely in moderate or strong winds, that there would be any radioactivity upwind of GZ other than that:

- (a) resulting from neutron activity (range about 1,100 yds from the fireball);
- (b) thrown out by the explosion; or
- (c) carried out by the base surge (underground or underwater burst).

(6) The possibility of fallout occurring upwind of GZ may be estimated by plotting the area of landing of various particles. Approximations, as to the distribution of fallout particles at the time of stabilization of the cloud and as to the rate of fall of particles that may be used for this purpose, are listed below.

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- (a) The largest particles, 1000 microns in diameter, are concentrated in the top of the stem. They will fall at a rate of 10,000 feet in about 2.5 minutes.
 - (b) Particles of 500 microns in diameter may be found out to about $\frac{1}{2}$ cloud radius. They will fall at a rate of 10,000 feet in about 10 minutes.
 - (c) Particles at the cloud edge are not likely to exceed 250 microns in diameter. Particles this size will fall at a rate of about 10,000 feet in about 30 minutes.
- (7) The place of landing for 1000 micron particles from $\frac{2}{3}$ stem height and for 1000, 500 and 250 micron particles from cloud bottom height should be determined. This can be done as follows.
- (a) Determine the effective wind speeds for $\frac{2}{3}$ stem height and cloud bottom height.
 - (b) Determine time of fall for 1000 micron particles from $\frac{3}{2}$ stem height and for 1000, 500 and 250 micron particles from cloud bottom height using the approximate rates of fall given in para (6).
 - (c) On the $\frac{2}{3}$ stem height effective wind line plot a circle of stem radius at a distance downwind of GZ equal to the product of the effective wind speed along the line and the time of fall for 1000 micron particles from $\frac{2}{3}$ stem height.
 - (d) On the cloud bottom effective wind line plot circles of
 - (i) stem radius at a distance downwind of GZ equal to the product of the effective wind speed along this line and the time of fall of 1000 micron particles from cloud bottom height,

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(ii) of $\frac{1}{2}$ cloud radius at a distance downwind of GZ equal to the product of the effective wind speed along this line and the time of fall of 500 micron particles from cloud bottom height,

(iii) of cloud radius at a distance downwind of GZ equal to the product of the effective wind speed along this line and the time of fall of 250 micron particles from cloud bottom height.

(8) The place of landing of particles from $\frac{2}{3}$ stem height and cloud bottom height in a typical example are shown in Fig 5(g)(i). In this case the probability of fallout upwind of GZ would be remote."

19 Art 5.11. Add a new diagram Fig 5(g)(i). (Place of Landing of Various Particles).

20 Art 5.13. Delete para "(5)" and "(6)" in entirety and add new paras "(5)" to "(22)" as shown below.

"(5) Because in a military situation factors such as yield, fission-fusion fraction and height of burst cannot be precisely measured, it is not possible to predict with any degree of confidence, the precise radiation intensities that would result from a nuclear burst. However, if ranges of values, which are reasonable in the light of current information at the time of the burst, were assumed for these factors, it would be possible to produce an assessment of the situation which may be useful to those required to make operational decisions in an emergency or in the conduct of exercises.

(6) In the following paragraphs methods are described for:

- (a) determining the line of maximum radiation intensity;
- (b) completing the fallout prediction parameter sheets;
- (c) determining the downwind extent of fallout that would give selected radiation dose rates, along the line of maximum radiation intensity;
- (d) drawing approximate radiation dose rate contours;

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(e) determining the range within which the radiation intensity at the station could be expected to be; and

(f) preparing forecast radiation intensity - time graphs.

(7) If there is a uniform variation of effective wind lines with height from $2/3$ stem height to the top of the cloud, the maximum radiation intensity on the ground could be expected to occur along the effective wind line for the level of maximum intensity within the cloud, that is, for the level approximately $1/3$ from the base to the top of the cloud.

(8) Should the variation in effective wind lines with height not be uniform, so that some of the effective wind lines are either crowded together or overlap, then the line of maximum intensity may not coincide with the effective wind line for the level of maximum intensity in the cloud. The areas where the crowding or overlapping occurs would receive fallout from a thicker layer or layers of the cloud, resulting in more intense radiation than would otherwise have been expected. In such cases the line of maximum intensity would have to be adjusted accordingly. In Fig 5(g)(ii) the $1/3$ base to top of cloud level is at 70,000 feet but because of the overlapping of effective wind lines the line of maximum intensity has been taken at a slightly higher level.

(9) A sample Fallout Prediction Parameter Sheet is shown in Fig 5(g)(iii). These sheets are completed as follows:

(a) Use a separate sheet for each nuclear detonation and enter the NUDET number, date, time of burst and location of GZ in the spaces at the top of the page.

(b) In the column "Reported Value" enter the reported values for any nuclear cloud or burst parameters that have been reported for the particular burst.

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- (c) On the basis of the reported parameters and Figs 5(h) 5(j) 5(k)⁽¹⁾ and 5(m) calculate the remaining values and complete the "Value Used" column. For the calculation of the downwind distance see para 11 below.
 - (d) On the basis of Art 5.21(a) make a prudently pessimistic estimate of the maximum yield probable and prudently optimistic estimate of the minimum yield probable and enter these values in the appropriate space under "Probable Range of Values".
 - (e) In a similar manner based on art 5.21(b) make a prudently pessimistic and prudently optimistic estimate of the FY/TY and enter these values in the appropriate spaces.
 - (f) In a similar manner based on art 5.21(c) make a prudently pessimistic estimate of the lowest probable height of burst and a prudently optimistic estimate of the highest probable height of burst and enter these values in the appropriate spaces.
 - (g) On the basis of the values entered in the pessimistic and optimistic estimate columns calculate the remainder of the items and complete these columns. For the calculation of the downwind distances see Para 11 below.
 - (h) Enter a reasonable figure in the space for the "probable error in the location of GZ" and complete the "area in which GZ located".
- (10) Estimates of the downwind extent of various radiation doses within the danger sector, based on the estimated or assumed nuclear burst and nuclear cloud parameters, should be made using the procedures described below. This method provides a means of estimating the downwind distance, along the line of maximum radiation intensity, at which radiation

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intensities could be sufficient to give exposed unprotected personnel a total dose of:

- (a) 20R in the first six hours after the onset of fallout;
- (b) 100R in the first 4 hours after the onset of fallout;
- (c) 200R in the first two hours after the onset of fallout; and
- (d) 400R in the first hour or 800R in the first 2 hours after the onset of fallout.

(11) To determine the downwind extent of the radiation dose contours proceed as follows:

- (a) Determine the effective wind speed in miles an hour. This is obtained by dividing the distance in statute miles from GZ to the point on the wind plot corresponding to the cloud base height, by the time of fall. The time of fall is determined by dividing the height of the base of the cloud by the rate of fall on which the wind plot was based. Accordingly, where the fallout wind plot has been prepared as described in Art 5.07 para (1) and where 10,000 ft layer winds have been used, the time of fall is obtained by dividing the height of the base of the cloud by 10,000. However, if 6,000 foot layer winds were used and the wind plot was prepared as described in art 5.07 para (3) the height of the base of the cloud should be divided by 6,000. (It should be noted that the time of fall column in Fig 5(h) pertains only to those wind plots based on the variable rate of fall used in the National Survival Method).

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(b) Determine the downwind extent of total dose of 100R in the first four hours after the onset of fallout along the line of maximum radiation intensity as follows.

- (i) Obtain the "Downwind Distance" of the contour for 100R in the first four hours after the onset of fallout for a contact surface burst by using the yield and effective wind speed in the nomogram Fig 5(j) (Downwind Extent of the Zone of Immediate Operational Concern). To do this lay a hairline through the values for yield and effective wind speed and read off the value for "Downwind Distance".
- (ii) If the burst is not on the surface, determine the "height of burst (HOB) adjustment factor" using the yield and HOB with the appropriate "HOB Adjustment Factor" nomogram. (Fig 5(k) or 5(l) depending on whether the yield is less than or greater than 100KT). To do this lay a hairline through the value for the yield and height of burst in the nomogram and read off the HOB adjustment factor. The downwind distance is then multiplied by this factor. (Use of the height of burst adjustment factor is an additional refinement to the procedures described in RCAF Pamphlet 99).

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(iii) If part of the yield is due to fusion, the fission yield to total yield (FY/TY) adjustment factor is determined using the yield and the ratio of the FY/TY in the "FY/TY Adjustment Factor nomogram (Fig 5(m))". To do this lay a hairline through the values for yield and FY/TY ratio in the nomogram and read off the value for the FY/TY adjustment factor. The distance obtained in (i) or (ii) is then multiplied by this factor.

(c) The downwind extent of the contour for a total dose of 20R in the first 6 hours after the onset of fallout along the line of maximum radiation intensity can be obtained by multiplying the distance obtained in (b) by 2.

(d) The downwind extent of the contour for a total dose of 200R in the first two hours after the onset of fallout is obtained by dividing the distance obtained in (b) by 2; and

(e) the downwind extent of the contour for a total dose of 400R in the first hour after the onset of fallout or 800R in the first two hours after the onset of fallout can be obtained by dividing the distance obtained in (d) by 2.

(12) It should be noted, particularly with regard to the contours for 200 and 400R doses, that estimation of the probable doses is complicated by the fact that the radiation intensities are changing rapidly in the period under consideration because:

(a) fresh fallout is arriving over a large part of the period; and

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(b) decay rates are still very high.

(13) The downwind distances as determined in Para (11) should be plotted along the line of maximum radiation intensity as determined in paras (7) and (8).

(14) As a first approximation radiation dose contours can then be indicated by drawing curves through these downwind distances and extending them back within the danger sector around ground zero taking into consideration the place of landing of particles as discussed in Art 5.11 para (7).

A typical pattern is shown in Fig 5(m)(i).

(15) The location of the station should then be indicated on the fallout prediction plot. By interpolation a rough estimate should be made of the radiation dose to be expected at the station over the appropriate interval of time. From this information the dose rates at specific times can be calculated using a radiac calculator.

(16) A radiation intensity-time graph should then be prepared on squared paper as follows:

- (a) Select appropriate scales for time and for intensity along the base and the side of the graph respectively.
- (b) Along the time scale indicate H-hour, the forecast time of beginning and the forecast time of ending of fallout.
- (c) Estimate the peak radiation intensity and plot this value at an appropriate time interval before the ending of fallout.
- (d) Estimate the intensity at H + each successive hour and plot these values.

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(e) Draw a smooth curve from the point for the time of arrival through the points for the peak intensity and each successive intensity value. This curve represents the radiation intensities that might be expected to result, provided that the parameters used in the calculations and the assumption as to the nature of the radioactive particles, actually applied to the burst in question. A typical expected radiation intensity curve is shown in Fig 5(m)(ii).

(17) In view of the significant errors that may exist in the reported yield, estimated FY/TY ratio and the reported height of burst, values for the radiation intensities at the station should also be computed using the parameters under both the pessimistic and optimistic estimate columns in the fallout prediction parameter sheet Fig 5(g)(iii). These values should then be used to prepare curves for the pessimistic and the optimistic radiation intensity values at the station. Typical curves are shown in Fig 5(m)(ii) as maximum intensities expected and minimum intensities expected. The range of values represented by these curves may then be used in briefing those concerned on the expected radiation intensities.

(18) Actual radiation intensity reports should be plotted on the radiation intensity-time graph as received. A typical actual intensity curve is also shown in Fig 5(m)(ii).

(19) Study of the range of values which would normally appear on the "Fallout Prediction Parameter Sheet" and the above radiation intensity-time graphs will provide convincing proof that it is not possible to make a precise forecast of the radiation intensities. Nevertheless, use of the above techniques should permit a rational preliminary appraisal of the fallout situation and should provide a framework into which the measurements of radiation intensities can be fitted as received.

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(20) It is to be noted that ranges of radiation intensities to be expected at the station may be forecast in a similar manner using the data contained in TM 23-200.

(21) Where the station is expected to be affected by the fallout from more than one burst, the contribution from each, to the dose rate at a particular time or to the total dose over a particular period, can be estimated independently and the results totalled to arrive at their combined effect.

(22) It must be remembered that:

- (a) forecast contours are merely a first approximation to the probable radiation intensities;
- (b) the radiation intensities, obtained using the contours, are directly related to the values used for;
 - (i) the assumed yield of the weapon,
 - (ii) the assumed fission-fusion fraction, and
 - (iii) the estimated height of burst; and
- (c) where RCAF personnel are to be briefed on intensities, the values used for the above variables shall be stressed and the effects of errors in them shall be pointed out."

21 Art 5.13, add a new Figs 5(g)(ii), 5(g)(iii), 5(m)(i) and 5(m)(ii).

22 Delete Figs 5(k) and 5(l) and add new Figs 5(k) and 5(l).

23 Art 5.14 para (1)(a) line 3. After "fall" add "as in the National Survival Method".

24 Art 5.14 para (1)(c) line 2. Delete "as arcs, tangent" and replace by "perpendicular".

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25 Art 5.14 para (1)(c) lines 3 and 4. Delete "using a radius equal to the cloud radius".

26 Art 5.14. Add new paras (3) (4) and (5) as follows:

"(3) Where it is only required to forecast the time of arrival or ending of fallout at a particular station, the lapsed time to time of arrival or ending can be roughly determined by dividing the distance from the station to the leading or trailing edge of the cloud (GZ circle) respectively by the effective wind speed along the effective wind line on which the station is located. These lapsed times are then added to H-hour to get the time of arrival and ending of fallout.

(4) More precisely, fallout can only reach the station from those levels whose effective wind lines are within a distance from the station which is not in excess of the actual radius of the cloud or stem at the particular level. At levels below the bottom of the stabilized cloud, the circulation within the cloud is sufficiently strong that it is probable that very little fallout is lost by the rising cloud. Therefore, it is unlikely that significant fallout from a level below cloud bottom would reach the station unless the station were located within a stem radius of the effective wind line for that level. Similarly, for any level above two thirds thickness from base to top of the cloud, it is unlikely that fallout would reach the station unless it were considerably less than a cloud radius from the station. Accordingly, to determine the lapsed times between the detonation and beginning or ending of fallout, estimate the levels from which fallout would reach the station (their effective wind lines will be a cloud radius or less from the station) and then estimate the lapsed time to beginning and ending of fallout for each level of interest as in Para (3) measuring the distances parallel to rather than along the effective wind

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line for each level of interest. Time of beginning will be H-hour plus the shortest lapsed time to arrival and time of ending will be H-hour plus the longest lapsed time to ending.

(5) An additional method for determining the time of arrival of fallout is given in Art 6.04 Para (1)(f)(v)."

(6) An empirical method of estimating time to peak intensity and time to ending of fallout based on test explosions makes use of the following formulas;

$$T_p = \frac{2}{3} \times T_a, \text{ and}$$

$$T_c = 5 \times (T_a)^{0.7} \text{ where;}$$

should be 2/3 times T_a

T_p = Time from H-hour to peak intensity,

T_a = Time from H-hour to arrival of fallout, and

T_c = Time from H-hour to cessation of fallout.

The above formulas show fallout occurring for long periods and could be expected to give best results relatively close to GZ and in light wind situations, that is, in situations similar to test conditions. They may not give a good forecast in moderate or high winds, at larger distances downwind or where the wind shear is such that fallout will only reach the station from a thin layer of the cloud or stem.

- 27 Art 5.14. Delete Fig 5(n) and replace with new Fig 5(n).
28 Art 5.15 para 1(b). Change comma before "or" to semi colon.
29 Art 5.15 para (2). Add a new sentence as follows:
"While this would affect the distribution of fallout within the danger sector, it would not significantly affect the width of the danger sector."

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30 Art 5.15 para (4). Delete this para in entirety and replace by the following:

"(4) The possibility of rainout may be determined using the following procedures.

(a) Step 1. Determines the freezing level and extent of the rain area for the time of arrival of fallout.

(b) Step 2. On a squared paper overlay, determine the danger sector at the freezing level. To do this prepare effective wind lines for the layer extending from the freezing level to the top of the nuclear cloud. This can be done using either the particle path method (Art 5.04) or the wind plot method (Art 5.07). If the wind plot method is used, begin the wind plot with the layer ^{beginning at} ~~above~~ the freezing level. If the freezing level is not at the even 10,000 foot layer, the vector for the layer in which the freezing level is located should be multiplied by a factor (the number of thousands of feet from the freezing level to the next 10,000 foot level). Do not omit to add the strips one cloud radius wide when completing the danger sector at the freezing level. A quicker method of determining the danger sector at the freezing level is as follows.

(i) Mark on the wind plot the point corresponding to the height of the freezing level.

(ii) Place an overlay, on which north-south orientation lines have been marked, over the wind plot and label the above point for the freezing level as the new GZ.

Using the new GZ and the original wind

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plot draw the outside effective wind lines for the layer from 2/3 stem height to cloud top (the outside effective wind lines will not necessarily be for the same levels as in the surface danger sector). Then complete the danger sector in the usual manner using the new GZ and new effective wind lines.

- (c) Step 3. Move the overlay so that it is correctly oriented with the new GZ over the GZ of the original wind plot and indicate the area of precipitation on it. As rain falls almost vertically, unless the winds are very strong

between the freezing level and the ground, that portion of the precipitation area that is within the rainout will occur within ~~this boundary~~. Using the rainout area, it may be possible to estimate

danger sector at the freezing level

- (i) the "hot spots" where rainout will add to the general fallout, and
- (ii) the areas of low activity where fallout would have been more intense had it not been rained out upwind.

31 Art 5.15 Para 5. Delete sub-para (b) and relabel sub-para (c) as (b).

32 Art 5.15. Delete Fig 5(o) and replace with new Fig 5(o).

33 Art 5.15. Delete paras (6) and (7) in entirety and add a new para (6) as follows:

"(6) Where rain is originating in a cumulonimbus cloud, large rapidly falling drops can occur considerably above the freezing level. Rainout due to large raindrops or hail from 20,000 or 30,000 feet can be dealt with in a similar manner, to that described above for rain, by determining the danger sector at 20,000, 30,000 or other appropriate level. In such cases it may be advisable to give consideration to the downwind displacement of the rain or hail as it falls from the level selected."

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34 Art 5.16 para (3). Change last line to read "Table 5(c)".

35 Art 5.17 para (1).

(a) Delete "are" and replace by "were previously", and

(b) Add new sentences as follows:

While the capability to prepare UF Wind messages has been retained by the individual RAIN stations, for use if required in an emergency, the preparation of the reports by these stations has been discontinued. UF wind messages for stations in US and adjacent areas in Canada are prepared by numerical weather prediction methods in the US and are distributed over the American weather teletype networks.

36 Art 5.17, Fig 5(r). Separate the two groups 61009 and /81108 at the top of the figure.

37 Art 5.17, para 2, line 3. Add "for" after "station".

38 Art 5.21 sub-para (a). Delete clause (i) in entirety and replace by:

"(i) Preliminary reports of a nuclear detonation may only indicate that a large, medium or small burst has taken place. In this event the yield may be assumed to be as follows:

Large	over 1 MT
Medium	100KT to 1 MT
Small	under 100 KT

39 Art 6.03. Add a new para "(4)" as follows:

"(4) Consideration is now being given by the Army to the use of winds at the constant pressure chart levels for National Survival fallout prediction purposes. Where they are used, the wind plot is prepared for each 6,000 foot level as heretofore. The layers for which each of the new winds will be used are listed in Table 6(a)(i).

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Wind Level	Layers for Which Wind is Used
850 mbs	0-6,000'
700 mbs	6-12,000'
500 mbs	12-18,000 and 18-24,000
300 mbs	24-30,000 and 30-36,000
200 mbs	36-42,000 and 42-48,000
100 mbs	48-54,000 and 54-60,000
50 mbs	60-66,000 and 66-72,000
30 mbs	72-78,000, 78-84,000 84-90,000 and 90-96,000 etc.

Table 6(a)(1) - Layers for Which Constant Pressure
Winds are Plotted"

40 Art 6.04 para (2). Add brackets to para number.

41 Art 6.04. Add a new Fig 6(b)(1).

42 Art 6.04. Add a new para (3) as follows:

"(3) For the planning and conduct of reentry operations the following method is used to estimate the possibility of fallout occurring upwind of GZ.

(a) Use the yield in nomogram Fig 6(b)(1) (Contour Radii for Upwind Contamination Estimate) to determine the radius distances for an 80 percent FY/TY weapon for;

(i) Blast damage "A" ring (nearly total destruction),

(ii) 100R an hour at H+1,

(iii) 10R an hour at H+1, and

(iv) 1R an hour at H+1.

(b) If the FY/TY ratio differs from 80 percent, adjust the value of the various radiation intensity radii by dividing them by 80 percent and multiplying by the actual FY/TY ratio (expressed as a percentage).

...22

- 22 -

- (c) Delineate the upwind semi-circle by drawing the crosswind axis through GZ at right angles to the fallout sector bisector.
- (d) Draw in the "A" (nearly total destruction) ring using GZ as centre.
- (e) Select a point on the sector bisector a distance downwind from GZ equal to 0.4 times the effective wind speed (0.4 hours is assumed to be the minimum time to the onset of fallout upwind of GZ).
- (f) Draw arcs in the upwind semicircle for those portions of the three intensity contours that lie outside of the "A" ring and label them with the adjusted intensity values obtained in (b) above. The location of contours within the "A" ring are considered to be uncertain and are not indicated."

- 43 Art 6.04. Para "(3)". Change para number to "(4)".
- 44 Art 6.04. Delete existing Fig 6(c) and add new Fig 6(c).
- 45 Art 6.05. Fig 6(c). Change "12 knots" to "12 mph".
- 46 Art 6.05 para 3(b). Change "downwind" to read "downwind".
- 47 Art 7.03 para 4;
 - (a) Add a new sub-para (a) as follows:
 - "(a) Step 1. Estimate the nuclear detonation and nuclear cloud parameters in accordance with Art 5.13 para 11(b)(iii)".
 - (b) Add a new sub-para (b) as follows:
 - "(b) Step 2. Estimate the wind flow,"
 - (c) Sub-para (a), change the original sub-para "(a)" to sub-para "(c)" and "Step 1" to "Step 3".

...23

- 23 -

- (d) Sub-para (b), change the number of the original sub-para "(b)" to sub-para "(d)" and "Step 2" to "Step 4".
- (e) Add a new sub-para (e) as follows:
"(e) Step 5. Estimate the upwind extent of fallout in accordance with Art 5.11 para 7".
- (f) Change the original sub-para "(d)" to "(f)" and "Step 4" to "Step 6".
- (g) Change the original sub-para "(c)" to sub-para "(g)" and "Step 3" to "Step 7" and add "(this step is optional)".
- (h) Change the original sub-para "(o)" to sub-para "(h)" and "Step 5" to "Step 8". and delete the words "or snowout".
- (j) Change the original sub-para (f) to sub-para "(H)" and "Step 6" to "Step 9".
- (k) Change the original sub-para "(f)" to sub-para "(k)" and "Step 7" to "Step 10".
- (l) Change the original sub-para "(h)" to sub-para "(l)" and "Step 8" to "Step 11".

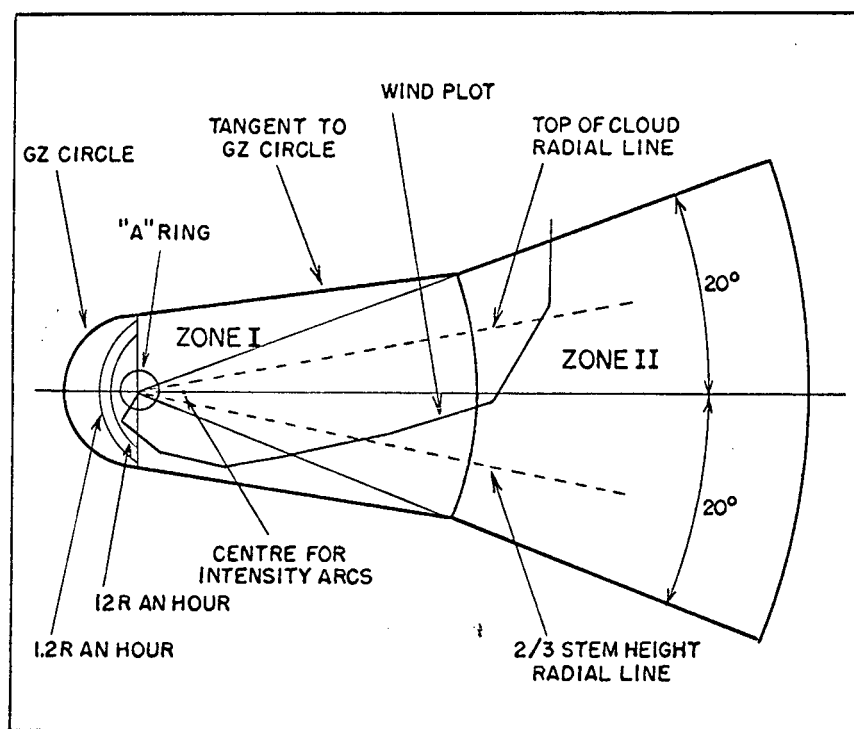
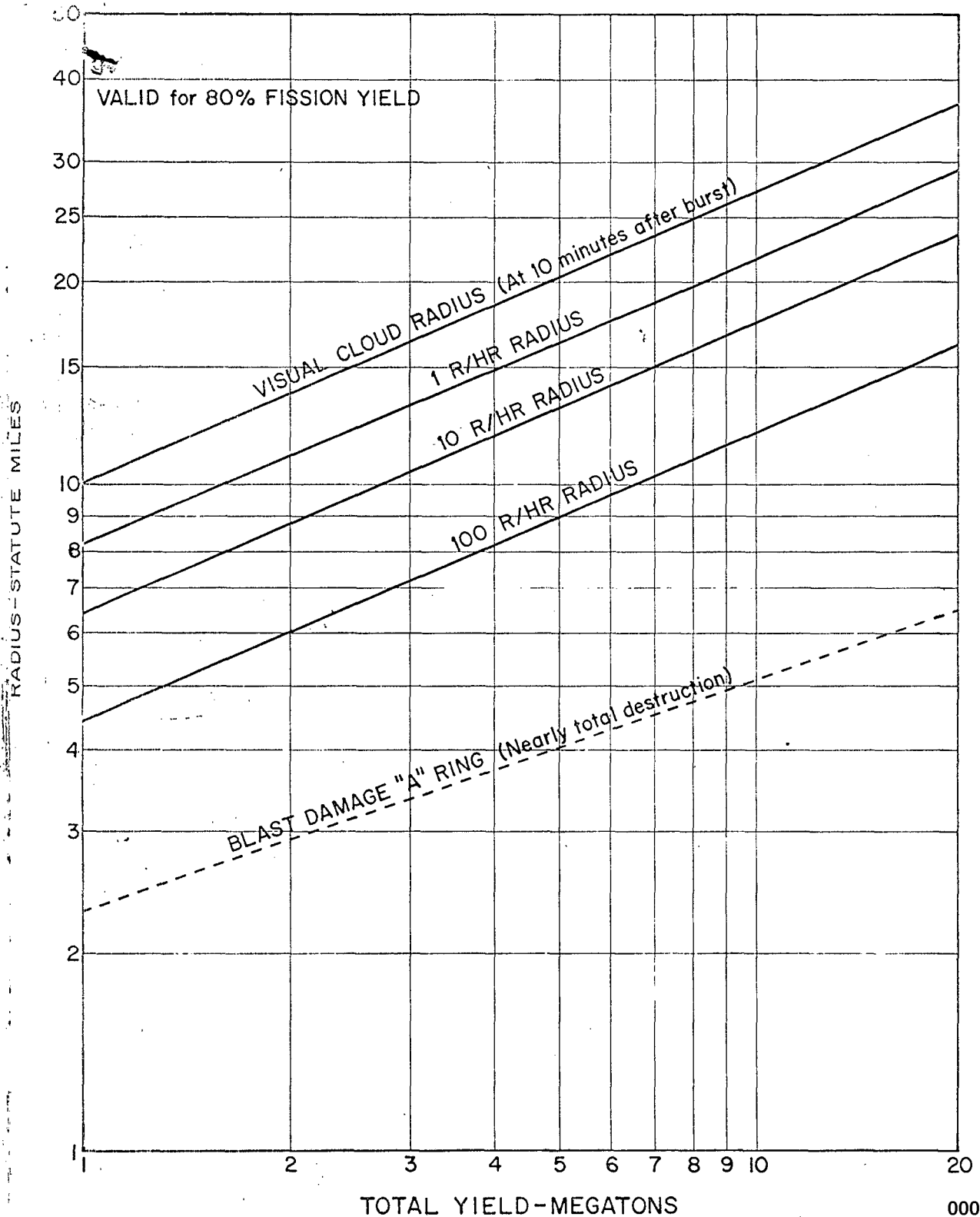
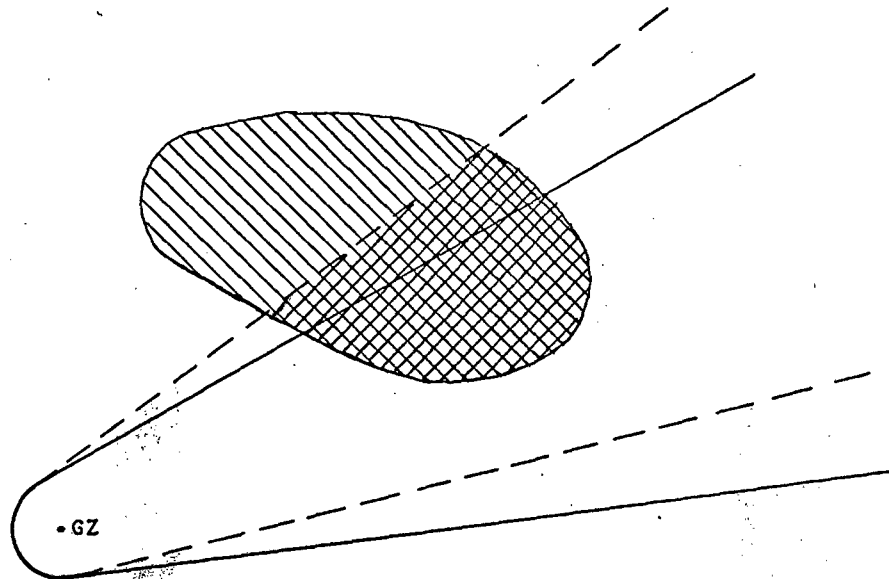


Fig 6 (c) - Fallout Envelope and Upwind Intensity Estimate







000028

Fig 6 (b)(1) Contour Radii for Upwind Contamination Estima



LEGEND

-  Rain area
-  Rainout area
-  Danger sector at surface
-  Danger sector at freezing level

5 (0)
Figure ~~25~~ The Rainout Area

Fig 25

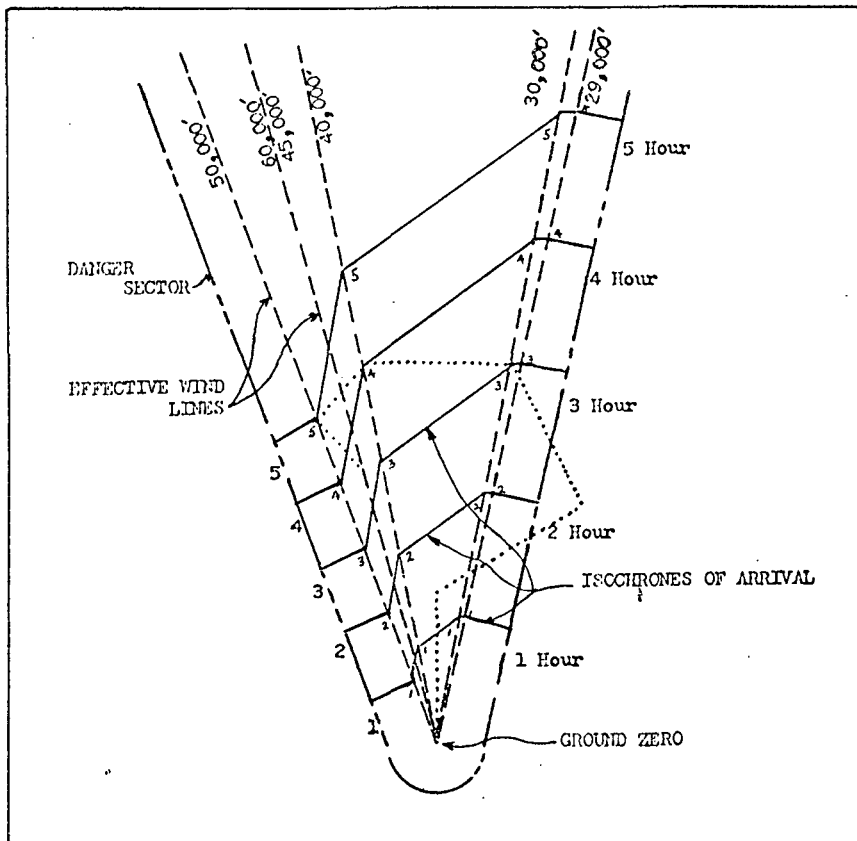


Figure 5(n) - Isochrones of Arrival

60

10

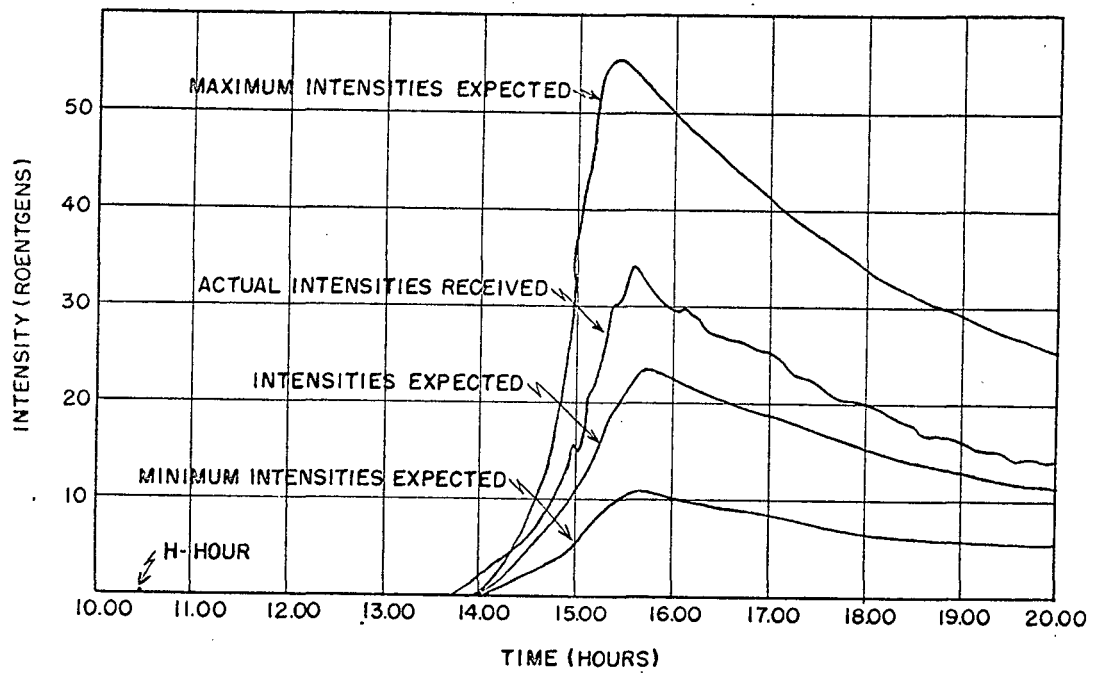


Fig. 26 - Radiation Intensity-Time Graph
5 (m) (1)

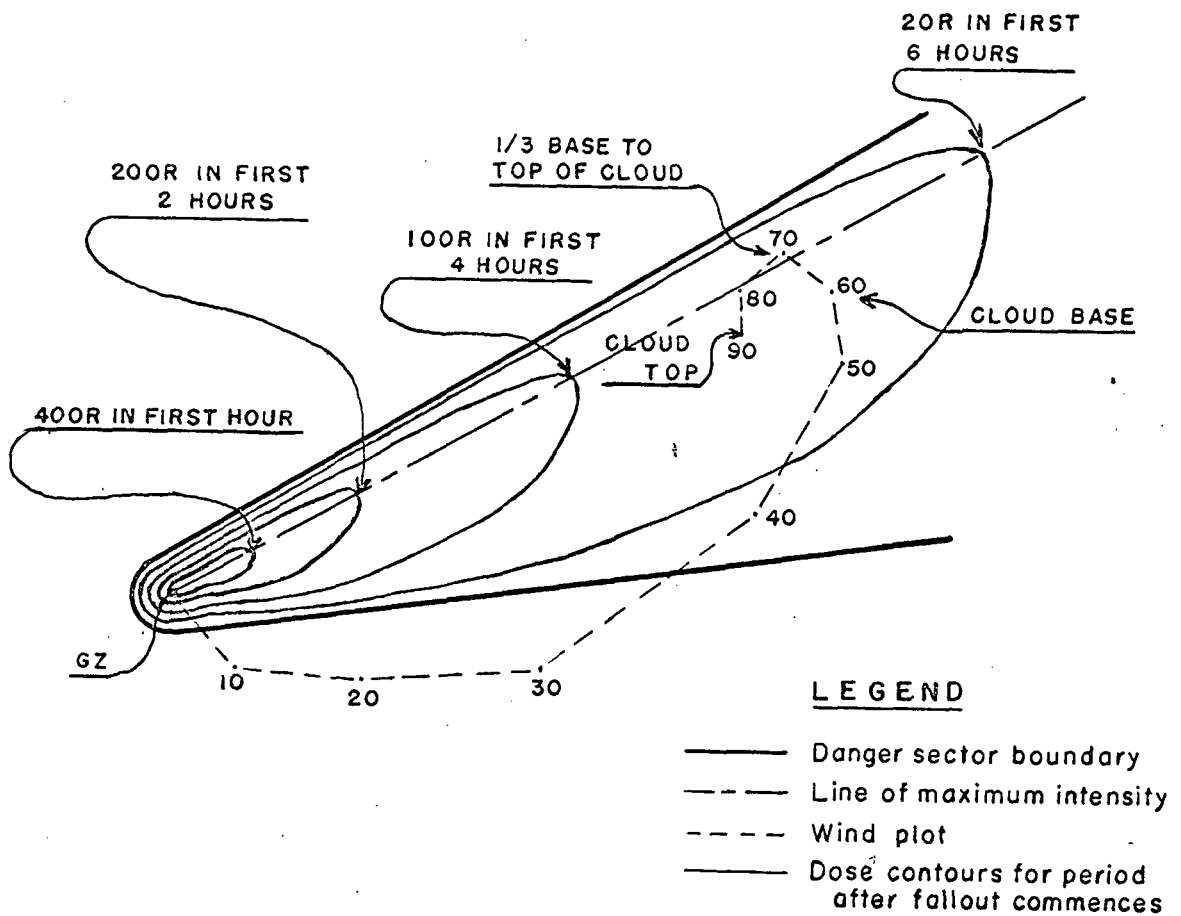
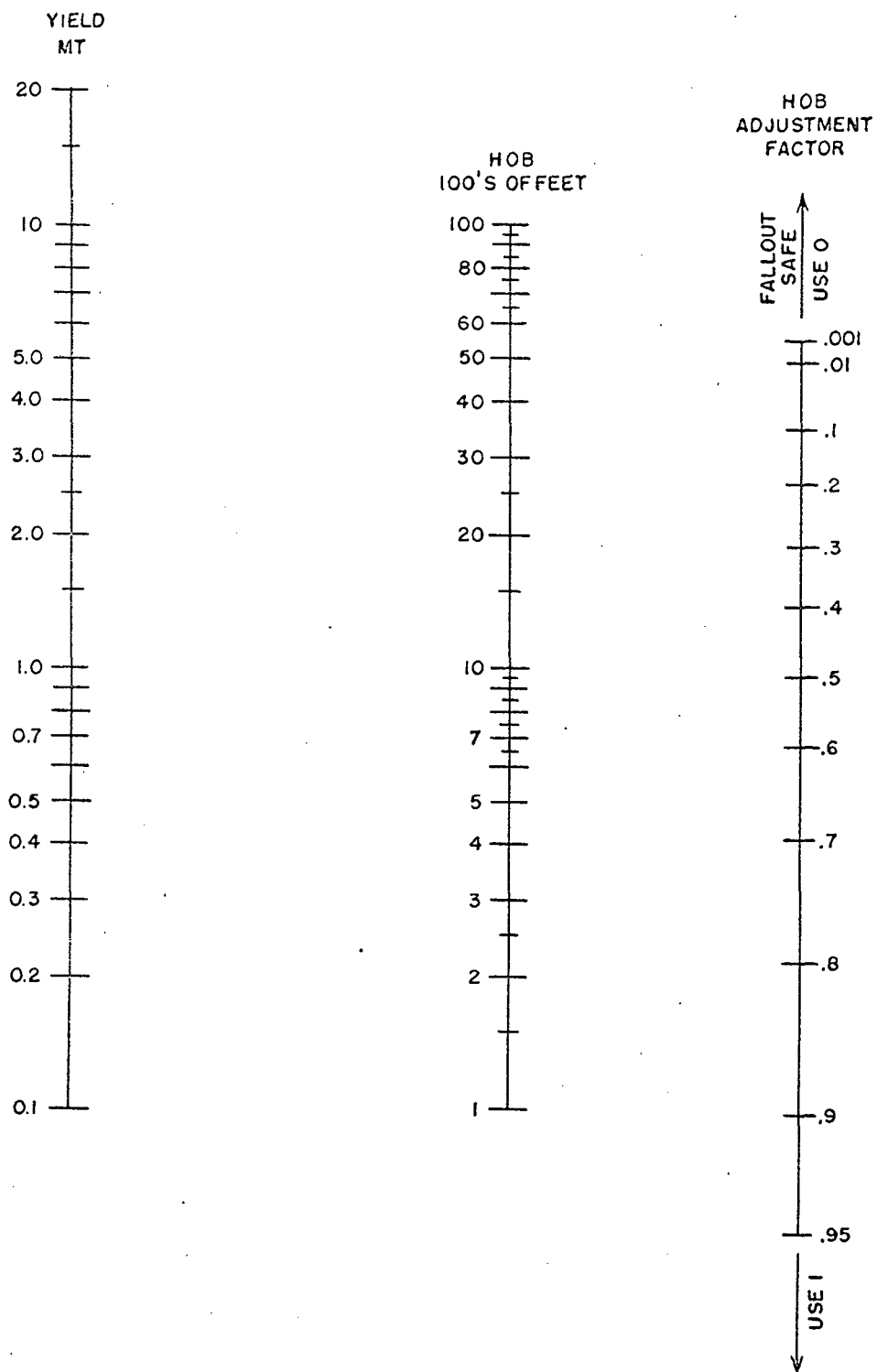


Figure 11 - The Danger Sector and Radiation Dose Contours
5(m)(i)



5 (1)
Fig. 24 - Height of Burst Adjustment Factor (Yield > 100KT)

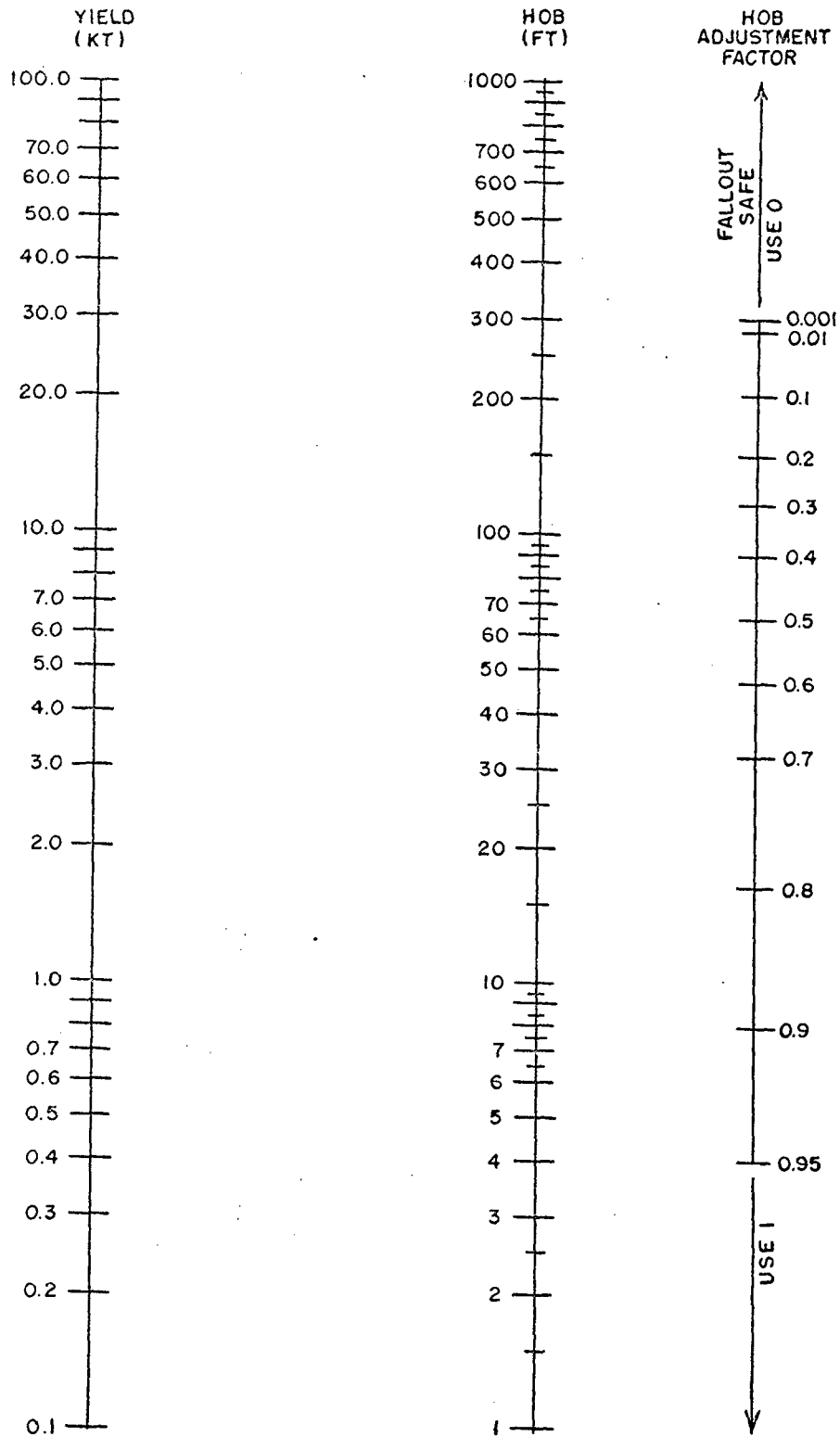


Fig. 25 - Height of Burst Adjustment Factor (Yield < 100KT)
s(k)

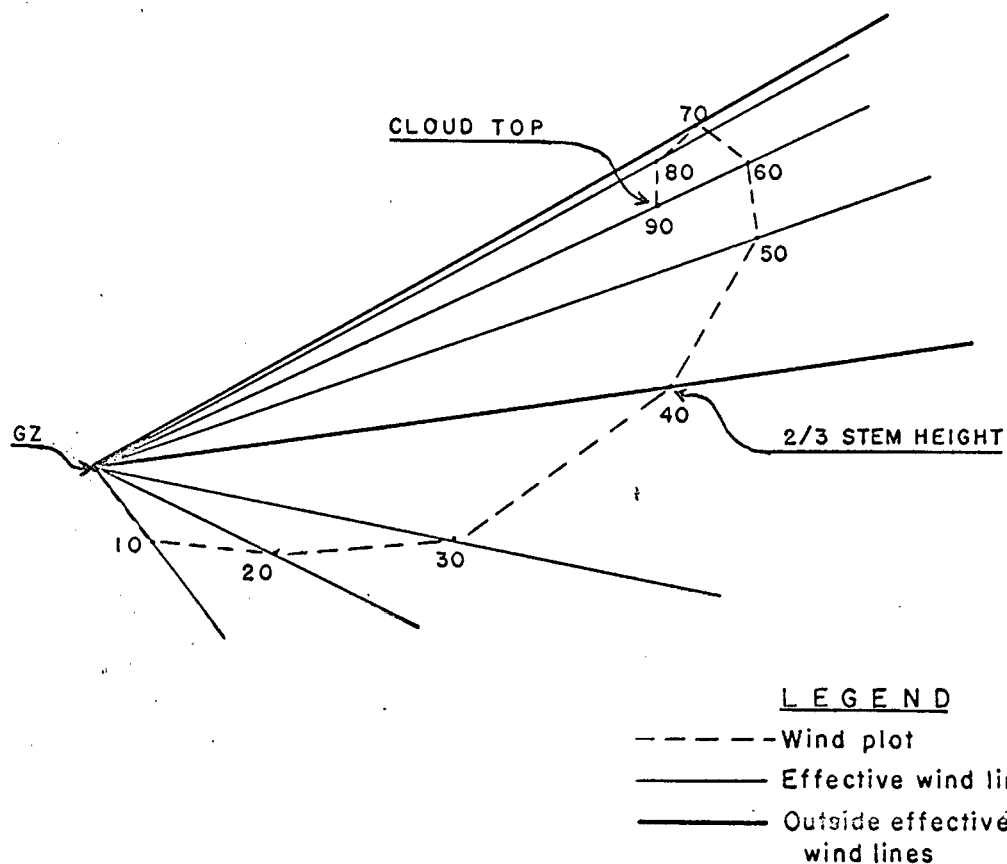
FIG 24 - - FALLOUT PREDICTION PARAMETER SHEET
(m) 5

PARAMETER		REPORTED	VALUE	USED	ESTIMATE	ESTIMATE	PROBABLE RANGE	OF VALUES	REMARKS
YIELD									
RY/TY									
RY/TY FACTOR									
HOB									
HOB FACTOR									
CLOUD TOP									
CLOUD BASE									
1/3 BASE TO CLOUD TOP									
2/3 STEM HEIGHT									
CLOUD RADIUS									
LINE OF MAXIMUM INTENSITY	BEARING	EFFECTIVE	WIND SPEED						
DOWNWIND DISTANCE (100R IN FIRST 4 HOURS AFTER FALLOUT BEGINS)									
BEARINGS OF OUTSIDE EFFECTIVE WIND LINES	LEFT	RIGHT							
PROBABLE ERROR IN LOCATION OF GZ									
AREA IN WHICH GZ IS LOCATED									

FALLOUT PREDICTION PARAMETER SHEET

NUDET NO _____ DATE _____ TIME OF BURST _____

LOCATION OF GZ _____



5 (g)(ii)
Figure 5 - Wind Plot and Effective Wind Lines

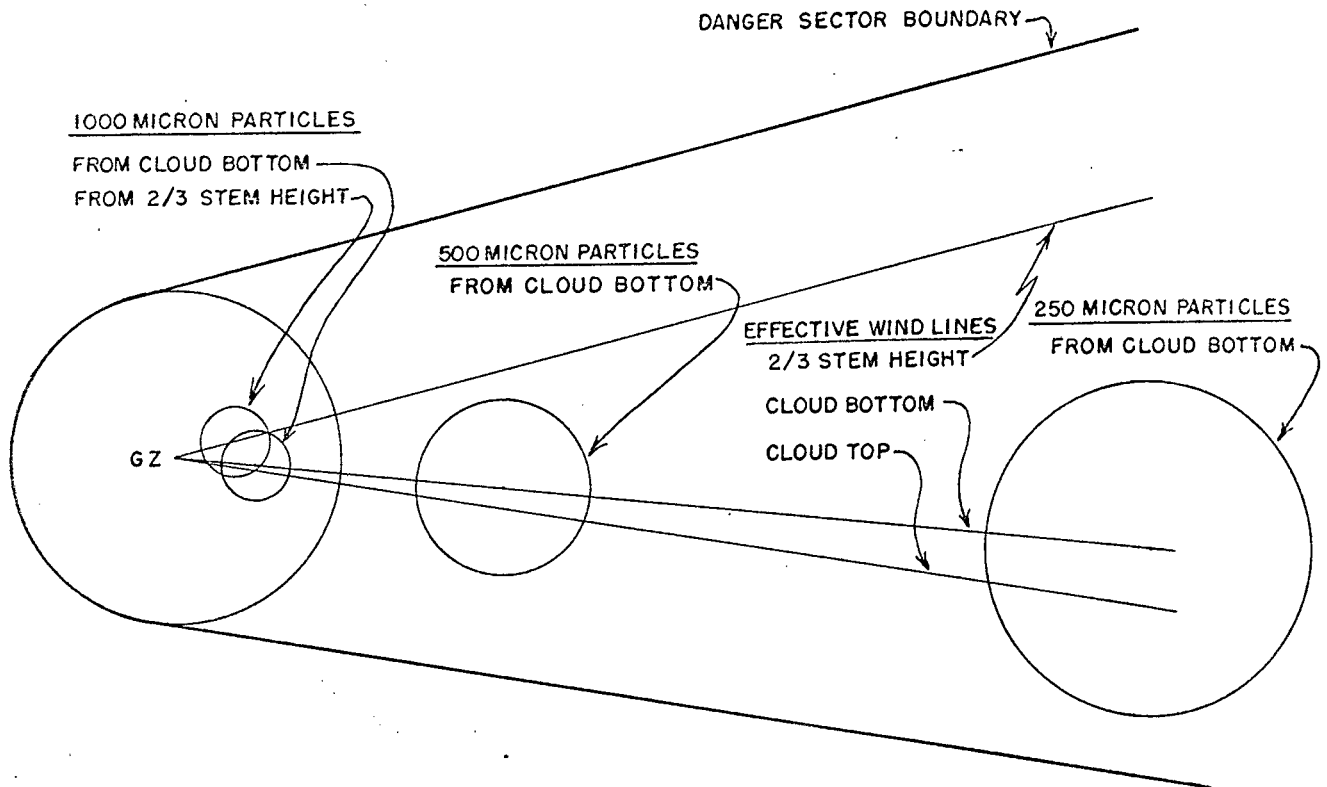


Fig. 19 - Place of Landing for Various Particles

5 (g) (i)

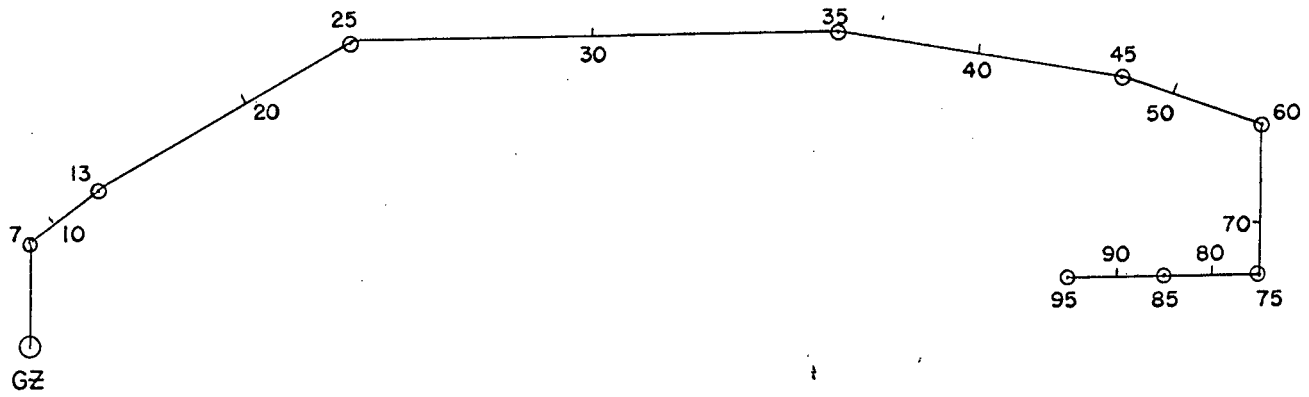


Fig 5 (f)(i) - A Wind Plot Based on Constant Pressure Chart Level Winds

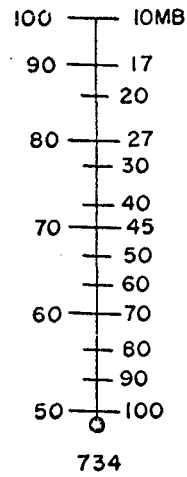


Fig 5(a)(i) - Column for Plotting High Level Winds

Following Amendment passed to EDP 3 (27943) 19 Feb 63

Great Falls ADS Str Alsasch
 Str Damm.

On 15 Sep review requested to add
Penhill & Yorkton under Great Falls ADS.

Penhill expected operational 10th
Yorkton " " 1 Nov 63.

BF 16 Sep.

MM RCCPFZ

CSCR 8/06

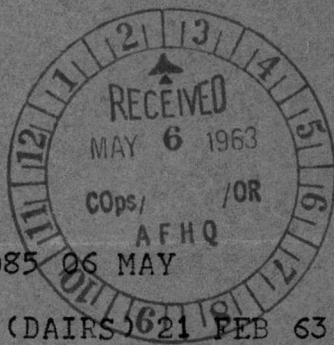
M 061355Z

FM CANAIRDEF

TO CANAIRHED

BT

S E C R E T ND85 06 MAY



MAY 6 15 17 '63

SECRET

YOUR S969-108 (DAIRS) 21 FEB 63 SUBJECT PROVISION OF FALLOUT ADVICE
 PD IN ACCORDANCE WITH THE RCAF PROGRAM OF ACTIVITIES CMM STATIONS
 YORKTON CMM DANA AND PENHMLD WILL BE SAGE OPERATIONAL 1 JUN CMM
 15 JUN AND 1 JUL RESPECTIVELY PD IN ACCORDANCE WITH PARA 2 OF THE
 REFERENCE CMM MAY THIS CHANGE BE INCLUDED IN THE RCAF EDP

BT

06/1442Z

Note
 Mind declassified
 15 May 63.

SECRET

Add after Gnd. Fld. ADS
 Gnd. Fld. - Dana
 ADS - Yorkton

Paraphrase not required

Reply or Reference in an

Unclassified Message Prohibited

BF 15 Jul 63

also

AFHQ
COMM CENTRE

8969-108

NNNNVV CSA048VV CRA057

FEB 28 20 58 '63
HH

MM RCCPFZ

DE RCCSCR 30/28

M 281635Z

FM CANAIRDEF

TO CANAIRHED

BT

SECRET ND42 28 FEB

YOUR 8969-108(DAIRS) 21 FEB SUBJECT CLN PLAN FOR THE PROVISION
OF FALLOUT ADVICE PD ACCORDING TO QUOTE THE RCAF PROGRAMME OF
ACTIVITIES UNQUOTE SC15 SERIES OF RCAF PUBLICATIONS PAGE 15-5-1
(COMPILED BY DADSI) CMM STATION ALSASK WILL BE OPERATIONAL UNDER
SAGE 15 APR PD IN ACCORDANCE WITH PARA 2 OF THE REFERENCE CMM MAY
THIS CHANGE BE INCLUDED IN THE RCAF EDP

BT

28/1953Z

SECRET



DAIRS	
DADSI	
CR/PA	

SECRET

Paraphrase not required

Reply or Reference in an

Unclassified Message Prohibited

now 26 June 1963

①
② EDP 2
Requires an entry under formations with a follow-up ADS and
prediction capability for Great Falls ADS and
opposite it under column (b) - entry for other aircraft.
Still to be done
54-4
26892

000042

SECRET

S969-108(DAIRS)

Ottawa 4, Ontario
21 Feb 63

Ref your A461 dated 8 Feb

Air Officer Commanding
Air Defence Command
RCAF Stn St Hubert
PQ

Plan for the Provision of Fallout Advice

1 The requirement for a listing for Stn Edgar in the "Plan for the Provision of Fallout Advice" indicated in your above-referenced signal is noted. The entry was omitted because, until such time as the Ottawa Sector HQ moves to North Bay, the requirements at Stn Edgar would be met by the provisions of the introductory paragraph.

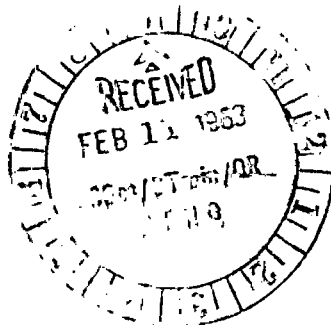
2 A number of additional amendments will be required when the Ottawa ADS is SAGED and when the LRRs at Gypsumville, Dana, Yorkton, Alsask and Penhold are activated. It is requested that confirmation of the requirement for such amendments be forwarded to this HQ about one month before each of the changes are to become effective.

W. C. Klassen
(WC Klassen) W/C
for CAS

W. C. Klassen
MN. LG TIBBLES/FH
26892

copies to:
DAIRS/Sac
Orig
Circ
file ✓

FEB 8 22 29 '63



HAIRS

VV CSA039VV CRA072 HH

MM RCCPFZ

DE RCCSCR 56/08

M 082105Z

FM CANAIRDEF

TO CANAIRHED

BT

S E C R E T A461 8 FEB

YOUR S969-108(DAIRS) 5 FEB SUBJECT PROVISION OF FALLOUT PREDICTION
ADVICE PD SUB-APP A OF REF DOES NOT INCLUDE STN EDGAR PD AT PRESENT
CMM THIS STN WOULD RECEIVE FALLOUT ADVISE FROM BOTH SYRACUSE
SECTOR HQ AND OTTAWA SECTOR HQ PD SINCE THE FORMER IS THE STATIONS NEXT
SENIOR FORMATION CMM IT WOULD PASS FALLOUT ADVICE TO THE STATION IN
ACCORDANCE WITH NORAD REGULATIONS PD HOWEVER CMM THE STATION
RECEIVES ADVICE FROM OTTAWA SECTOR HQ ONLY BECAUSE THEY ARE COLOCATED
- A SITUATION WHICH WILL CHANGE IN A FEW MONTHS PD THEREFORE CMM
SUB-APP A OF REF SHOULD INCLUDE SYRACUSE SECTOR HQ IN COLUMN A AND STN
EDGAR IN COOLUMN B

BT

08/2148Z

P A OF REF SHOULD INCLUDE SYRACUSE SE
 IN COOLUMN B
 48Z
 34-4
 Garyant
 2/1/63
 18/1/63

~~SECRET~~
S969-108(DAIRS)

Ottawa 4, Ont
5 Feb 63

Ref Your S969-100-8(CStaff0) dated 30 Oct 62
Our S969-108 (C0ps) dated 4 Dec 62

Air Officer Commanding
Maritime Air Command RCAF
5217 South Street
Halifax NS

Provision of Fallout Prediction Advice to RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

1 Arrangements have now been finalized with the Commands for the provision of fallout prediction advice to those RCAF formations which do not have a meteorological-nuclear defence team. It is planned that these arrangements will be incorporated into the RCAF EDP. However, as it is anticipated that there may be some delay before the next EDP amendment is promulgated, it is considered desirable to provide advance information on the agreed arrangements to the Commands.

2 The general arrangements for the provision of fallout prediction advice for RCAF formations are shown at Appendix "A".

LG Tibbles/hr
S4-4 20892

Similar Copies to: ADC-Cur S969-108(CCps) d 30 Nov 62
Your S969-108(ACC) d 14 Dec 62 (WC Klassen) W/C for CAS

DAIR Sec
orig
circ
file ✓

TC-Your S969-100-2(CStaff0) d 12 Oct 62
Attach

ATC-Cur S969-108(CCps) d 3 Dec 62
Your S096-103(L/ACC) d 20 Dec 62

ATC- Your S969-100(CSD) d 3 Oct 62

2DP.

DNPO

000045

SECRET

SECRET

APPENDIX "A"

TO: S969-108(DAIRS)

5 JUL 63

GENERAL ARRANGEMENTS FOR THE PROVISION OF
FALLOUT ADVICE TO RCAF FORMATIONS

1. At stations having a Meteorological-Nuclear Defence (Met-NDef) team, fallout advice for all units on the station, including lodger units, will be provided by that team. At stations not having a Met-NDef team, and which, therefore, lack their own fallout prediction capability, fallout advice will be provided by an adjacent station, or in the case of ADC formations by an appropriate NORAD formation.
2. Listed at Sub-appendix "A" are:
 - (a) those RCAF formations which have a fallout prediction capability, and
 - (b) NORAD formations which will provide fallout advice to RCAF ADC formations, and
 - (c) RCAF formations for which the formations listed in (a) or (b) above will be responsible for providing fallout advice.
3. Advice provided to stations which lack a fallout prediction capability will include:
 - (a) Whether the station is expected to be affected by fallout, and
 - (b) time when fallout is expected to begin,
 - (c) time when fallout radiation is expected to reach peak intensity, if available, and
 - (d) a qualitative indication of the intensity of the expected radiation, if available.

Amended information will be provided on the above as new information becomes available on meteorological, burst or nuclear cloud parameters, or as pertinent radiation intensity reports are received.

4. The units concerned will coordinate directly with each other periodically to ensure the continued existence of workable arrangements for the provision of fallout advice.
5. Where teams at more than one level of command are located on a station, the station Met Section will be responsible for providing the meteorological data required for fallout prediction and assessment by each of the teams. The teams should coordinate their activities to minimize any duplication of effort.

SUB APPENDIX "A"

PLAN FOR THE PROVISION OF FALLOUT ADVICE

Column (a) below lists the RCAF and a number of NORAD formations having a fallout prediction capability. In addition to providing fallout advice for their own local requirements and for lodger units on or adjacent to them, these formations will provide fallout advice for other formations as listed in column (b).

(a) FORMATIONS WITH FALLOUT PREDICTION CAPABILITY	(b) FORMATIONS TO BE PROVIDED WITH FALLOUT ADVICE BY DESIGNATED FORMATIONS IN(a)
AFHQ (Ottawa) (Supported by Uplands Met Section)	Ottawa ADS and stations for which Ottawa ADS is respon- sible (until Met-NDef team is operational)
AEAFHQ (Trenton) (Supported by Trenton Met Section)	
ADCHQ (NNRHQ)	
Ottawa ADS (When Met-NDef team is operational)	Stn Parent Stn Senneterre Stn Falconbridge Stn Foymount Stn Mont Apica Stn Moosonee Stn Ramore Stn Chibougamau Stn La Macaza
Bangor ADS	Stn Sydney Stn St Margarets Stn Moisie Stn St Sylvestre Stn Beaverbank Stn Lac St Denis
Goose NORAD Sector	Stn Gander
Boston ADS	Stn Barrington
Sault Ste Marie ADS	Stn Pagwa
Duluth ADC	Stn Armstrong Stn Sioux Lookout

(a)
FORMATIONS WITH FALLOUT
PREDICTION CAPABILITY

(b)
FORMATIONS TO BE PROVIDED
WITH FALLOUT ADVICE BY
DESIGNATED FORMATIONS IN (a)

Grand Forks ADS

Grand Falls ADS
Spokane ADS

Seattle ADS

Stn Uplands

Stn St Hubert

Stn Bagotville

Stn Chatham

Stn Cold Lake

MACHQ (Halifax)
(Supported by Command Weather
Office, CANCOMARLANT)

AEMACHQ (Mt Uniacke)

Stn Greenwood

Stn Summerside

Stn Cmoxx

Stn Torbay
(Supported by CANCOMARLANT until
Met-NDef team is operational)

AMCHQ (Rockcliffe)
(Supported by Rockcliffe Met Section)

Stn Beausejour

~~Stn Dams~~
~~Stn Blenheim~~
Stn Saskatoon Mtn
Stn Kamloops

Stn Baldy Hughes
Stn Puntzi Mtn
Stn Holberg

AFHQ

11 Wg (Aux) Montreal
(Deploys to Three Rivers)
Stn St Jean
11 TSU Montreal

4014 MU (Aux) Quebec

5 SD Moncton

Stn Vancouver
19 Wg (Aux) Vancouver
(Deploys to Cassidy)

(a)
FORMATIONS WITH FALLOUT
PREDICTION CAPABILITY

Stn Rockcliffe

ATCHQ (Trenton)
(Supported by Trenton Met Section)

Stn Trenton

Stn Downsview
(Supported by Trenton Met Section)

Stn Namac

Stn Rivers
(AETCHQ Met/NDef team, supported by
Rivers Met Section, will meet
requirements when deployed to Rivers)

Stn Whitehorse
(Supported by DOT Met Office)

RCAF Unit Fort Churchill
(No NDef component)

Stn Goose Bay
(Supported by DOT Met Office)

TCHQ (Winnipeg)
(Supported by Stn Winnipeg Met Section)

AETCHQ (Rivers)
(Supported by Rivers Met Section)

Stn Centralia

(b)
FORMATIONS TO BE PROVIDED
WITH FALLOUT ADVICE BY
DESIGNATED FORMATIONS IN (a)

NIMC Ottawa

Stn Downsview
Stn Camp Borden
(Until Camp Borden Met-NDef
team is operational)

12 TSU Weston
1 SD Downsview
14 Wg (Aux) Toronto
(Until 14 Wg (Aux) deploys to
Camp Borden)

18 Wg (Aux) Edmonton
(Until 18 Wg (Aux) deploys to
Penhold)
7 SD Lancaster Park

CJATC Rivers

Stn Clinton
Stn Hamilton
16 Wg (Aux) Hamilton
(Until 16 Wg (Aux) deploys
to Camp Borden)
4004 MU (Aux) London

(a)
FORMATIONS WITH FALLOUT
PREDICTION CAPABILITY

Stn Moose Jaw

Stn Penhold

Stn Winnipeg

Stn Camp Borden
(When Met-NDef team is operational)

(b)
FORMATIONS TO BE PROVIDED
WITH FALLOUT ADVICE BY
DESIGNATED FORMATIONS IN (a)

23 Wg (Aux) Saskatoon

30 Wg (Aux) Calgary
(Deploys to Penhold)
Stn Calgary

17 Wg (Aux) Winnipeg
(Until 17 Wg (Aux) deploys
to Gimli)

SECRET

Our file ref. **S096-103(D/AOC)**



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

TRENTON Ont
20 Dec 62

2360

Ref Your S969-108(COps) 3 Dec 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Referred to	<i>Cops</i>
DEC 28 1962	
File	<i>469-1108</i>
Chg'd to	<i>C.O.P.S.</i>

Nuclear Fallout Advice for RCAF Stations Not
Having a Meteorological/Nuclear Defence Team

1 This Command is in agreement with the suggestion to amalgamate the CJATC Rivers Nuclear Intelligence Staff with the TC SQND upon the move of TC EHQ to Rivers.

2 As you know, the ATC EDP requires 435 Sqn to deploy to Rivers during an emergency. Therefore, there will be three different organizations requiring the services of the Nuclear Intelligence Staff -- CJATC Rivers, 435 Sqn and TC EHQ.

3 It is the opinion of this Command that there should be only one Nuclear Defence organization developed at CJATC Rivers and that this single agency should provide, on a priority system to be determined, nuclear information to any one of the organizations deployed to Rivers during an emergency.

*(GJJ Edwards) G/C
for AOC ATC*

DAIRS

Referred, please

R. L. O. F. L.

Cops load

27 Dec 62.

26665.

37

54

*Your action, please
Hoffman
27 Dec 62.*

*cell and labt
report required.*

T.D. No. 2353

DEPARTMENT OF NATIONAL DEFENCE

SECRET

TEMPORARY DOCKET

AIR FORCE

14 Dec 62

[illegible]

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.

2-7194

Our file ref. **SECRET**
S969-108(AOC)



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Office of the Air Officer Commanding,
Air Defence Command
St. Hubert, Que.

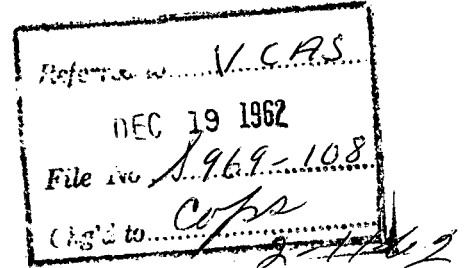
2353

14 DEC 1962

Ref Your S969-108(COps) 30 Nov 62
Our S969-108(AOC) 8 Nov 62
Our S096-105-6(AOC) 8 Nov 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Meteorological and Nuclear Defence Service
Ottawa NORAD Sector HQ



1 Your referenced letter requests clarification on:

- (a) The arrangements for providing Ottawa NORAD Sector with fallout advice.
- (b) The requirement for meteorological staff for the NNRHQ ALCOP at Edgar.

In respect to fallout advice, the Nuclear Defence staff of ADCHQ could not move to Ottawa Sector HQ at Edgar in an emergency. The officers comprising this staff are required to augment the NNRHQ Battle Staff in an emergency. However, as stated in paragraph 2 of reference 2, the Sector Commander has assigned an officer of his headquarters to fulfill the fallout prediction function. Since his appointment, this officer has become acquainted with his duties through participation in Region and Sector exercises. Also, he will soon attend a course at the Joint NBC School, Camp Borden. The procedures used by Ottawa Sector HQ to provide fallout advice to stations are described in Annex J to NNR Air Defence Plan 1-62.

There would be a requirement for a meteorological staff at the NNRHQ ALCOP at Edgar in war until the CC/DC is formed at North Bay. As indicated in the DND Emergency Plan for Meteorological Services, a meteorological officer from Station St Hubert would be available for this purpose. However, the ADCHQ Meteorological Officer is a member of the NNRHQ Battle Staff; consequently, as pointed out in our reference 3, he would not be available for the ALCOP. Therefore, a replacement would be required.


AND PASSED TO **V.C.A.S.**

000055

SECRET

2

4 From the foregoing, it can be seen that adequate arrangements have been made to provide fallout advice to stations within Ottawa NORAD Sector while the Sector HQ is at Edgar. However, it is requested that your headquarters select a Meteorological Officer for war-assignment to the NNRHQ ALCOP in place of the ADC Meteorological Officer.


(MM Hendrick) A/V/M
AOC ADC

MESSAGE FORM

8969-108 (DARS)

FOR COMMEN/SIGNALS USE

NUMBER

PRECEDENCE - ACTION ROUTINE		PRECEDENCE - INFO DEFERRED	DATE - TIME GROUP 29/2150Z	MESSAGE INSTRUCTIONS
FROM	CANAIRHED			PREFIX GR
TO	CANAIRDEF			SECURITY CLASSIFICATION UNCLAS
INFO				ORIGINATOR'S NUMBER ASO 414 29 JAN

YOUR ED13 23 JAN 63 PD UPLANDS SHOULD PASS ADVICE TO AFHQ OPS
CENTRE PD MAISON WILL BE AFFECTED BY 6 FEB 63

PAGE OF PAGES		REFERS TO MESSAGE		DRAFTER'S NAME (LG TIBBLES)		OFFICE DAIAS/S4-4		TEL. 26892			
		CLASSIFIED YES <input type="checkbox"/> NO <input type="checkbox"/>									
FOR OPR'S USE	R	DATE	TIME	SYSTEM	OPERATOR	D	DATE	TIME	SYSTEM	OPERATOR	RELEASING OFFICER'S SIGNATURE (LG TIBBLES)

NNNNVVV . PCB126SCB140SA109

UU

AFHQ
COMM CENTRE

JAN 24 04 56 '63

RR RCCPFZ

DE RCCSC 365/23

R 232140Z

FM CANAIRDEF

TO CANAIRHED

BT

UNCLAS ND13 23 JAN

REF OUR S969-108(SOOP) 14 DEC 62 PD REQUEST ANSWER TO PARA 3 A

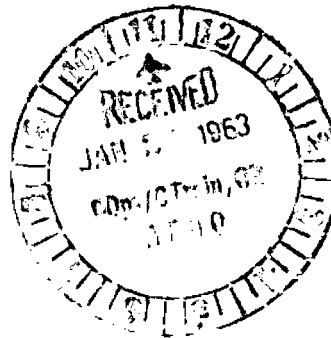
OF REFERENCE IN ORDER THAT INFORMATION CAN BE INCLUDED IN ADC EDP

CURRENTLY UNDER REVISION

BT

C WA ~~UNDER REVISION~~

23/2141Z



~~DCAS~~

~~DNDU~~

~~DAKS~~

S. 969-108..... 2353. 2351
J/CAF/ DNDU
LID 14 Dec 62



ACTION REQUEST

TO D Air S. DATE _____
LOCATION _____

FROM _____ RE FILE NO. _____

FOR:

<input checked="" type="checkbox"/> ACTION <i>please</i>	<input type="checkbox"/> NOTE & FORWARD
<input type="checkbox"/> APPROVAL	<input type="checkbox"/> NOTE & RETURN
<input type="checkbox"/> COMMENTS	<input type="checkbox"/> P.A. ON FILE
<input type="checkbox"/> DRAFT REPLY	<input type="checkbox"/> REPLY DIRECTLY
<input type="checkbox"/> INFORMATION	<input type="checkbox"/> REPLY, PLEASE
<input type="checkbox"/> INVESTIGATE AND REPORT	<input type="checkbox"/> SEE ME, PLEASE
<input type="checkbox"/> INVESTIGATION	<input type="checkbox"/> SIGNATURE
<input type="checkbox"/> MAKE.....COPIES	<input type="checkbox"/> TRANSLATION
<input type="checkbox"/> MORE DETAILS	<input type="checkbox"/> YOUR REQUEST
<input type="checkbox"/> NOTE AND FILE

PREPARE MEMO TO:

REPLY FOR SIGNATURE OF:

REMARKS EITHER ADC IS MAKING
HEAVY GOING OF THIS OR
WE HAVE NOT BEEN TOO
PRECISE IN OUR DIRECTIONS - I THINK
IT IS THE FORMER. -

SECRET

IN REPLY PLEASE QUOTE

No S969-108(SOOP)



CANADA

Department of National Defence

Royal Canadian Air Force

2351

St Hubert Que
14 Dec 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Referred to DND
DEC 17 1962
File No S969-108
Sgt to CofA
2/11/62

NBCW - Fallout Prediction

Fallout Advice to Stations and Units of Other Commands

1 On instructions from your headquarters, certain ADC stations have been directed to provide fallout advice to stations and units of other commands in the event of nuclear war.

2 ~~However, correspondence from other CHQ indicates that they have received information on this topic that perhaps inadvertently was not forwarded to this headquarters.~~ This information concerns the data to be included in fallout warning reports to assisted stations and units. Consequently, the attached letter, based on letters from other CHQ, has been forwarded as interim instructions to the ADC stations involved in this fallout warning service.

3 Further on this subject, the Nuclear Defence Officer at Station Uplands has raised some problems in respect to his responsibility to AFHQ. Briefly, these problems are:

(a) Since AFHQ intends to divide into three groups on the declaration of a certain readiness state, it is assumed that Station Uplands would provide fallout advice to the group remaining in Ottawa. However, when the NDO approached the AFHQ/AU, he could find no person concerned with this matter. Consequently, it is requested that this headquarters be informed of the AFHQ responsible for this function and of a firm date for effecting liaison.

(b) A possibility exists that 410 AW(F) Squadron at Uplands may deploy to other airfields on the declaration of an early NORAD Defence Readiness Condition. In this event, the Nuclear Defence and Meteorological staffs may deploy with other supporting personnel to these airfields. If this were to occur, they could not provide AFHQ with fallout advice. Therefore, perhaps Station Rockcliffe should be assigned the task of providing fallout information to AFHQ.

4 Your comments are invited on the attachment and on the problems concerning Station Uplands.

(FA Wingert) S/L
for AOC ADC

SECRET

DEPARTMENT OF NATIONAL DEFENCE

Royal Canadian Air Force

St Hubert PQ
14 Dec 62

Ref Our A332 16 Nov 62

Commanding Officer

RCAF Station Uplands Ont
RCAF Station St Hubert PQ
RCAF Station Bagotville PQ
RCAF Station Chatham NB

NBCW - Fallout Prediction

Fallout Advice to Stations and Units of Other Commands

1 Our referenced message prescribed the stations and units of other commands to which ADC stations are to provide fallout advice in the event of war. A list of reporting and receiving stations will be included in a subsequent amendment to the ADC EDP.

2 It may appear that this fallout prediction service duplicates that provided by the National Survival Nuclear Detonation and Fallout Reporting System (NDFRS). In part this is true. However, a study of the NDFRS shows that an RCAF station with Meteorological and Nuclear Defence personnel most likely would have more precise data on which to base their fallout prediction. Also, the NDFRS is designed primarily to provide an area Army Commander with information over the whole of his wide area of responsibility. An RCAF Commander, on the other hand, would be concerned only with the probability of fallout over a relatively small area. For these reasons, the RCAF has not adopted NDFRS Fallout Warnings as the primary source of fallout information. They should be used only as required in the overall assessment of the likely fallout picture.

3 The fallout advice provided to stations and units of other commands will be based on nuclear detonations reported by the ADC Station's NORAD Sector HQ and the NDFRS. However, AFHQ has not as yet prescribed the information that would be required by the assisted stations or the form in which it is to be transmitted. This headquarters has requested AFHQ to provide this information. As an interim measure, ADC stations should plan to provide fallout advice in two forms, depending on the role of the recipient, as follows:

(a) Local Fallout Prediction. This report should include:

- (i) The time at which fallout is expected to arrive at the station.
- (ii) The time a peak radiation intensity is expected to occur.
- (iii) Qualitative advice as to the likely intensity of the radiation.
- (iv) Amended information on the above items as available.

SECRET

2

(b) Area Fallout Prediction. This report should include:

- (i) The ground zero of the NUDET(s) causing fallout.
- (ii) Cloud radius
- (iii) Bearings of effective winds over the area.
- (iv) Qualitative advice on the radiation intensities over a large area.
- (v) Amended information on the above items as available.

4 Nuclear Defence Officers should liaise directly with the stations and units to whom they would pass fallout information.


(FA Wingert) S/L
for AOC ADC

DEPARTMENT OF NATIONAL DEFENCE

MINUTE SHEET

Referred to

REMARKS

To be signed in full showing Appointment, Telephone Number & Date

CPS

Since you have approved the original plan in respect to "Provision of Fallout Advice to RCAF Stations Not Having a Met-Nuclear Defence Team", would you prefer that I sign future correspondence which will be concerned with the details or minor amendments to the plan? Before signing, all correspondence would be co-ordinated with DND O.

DAIR S

W. Klassen
DAIR S.

yes

Mitchell
5.12.62

~~SECRET~~
S969-108(COps)

Ottawa, Ontario
4 December 1962

Ref your S969-100-3(CStaffO) dated 30 Oct 62
our S969-108(COps) dated 25 Sep 62

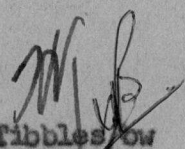
Air Officer Commanding
Maritime Air Command
5217 South Street
Halifax NS

Provision of Fallout Advice to RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

1 Further to our above referenced letter, ADCHQ has advised that the provision of fallout advice to Stns Beaverbank and Barrington can be handled by the Boston and Bangor Air Defence Sector Headquarters. Accordingly, the arrangements which have been made for your headquarters and Stn Greenwood to provide fallout advice to these units may now be cancelled.

ORIGINAL SIGNED BY
L. J. BIRCHALL A/C

(LJ Birchall) A/C
for CAS


LGTibbles/ow
DAirS/544
2-6892
Copies to:
DAirS
COps (2)
Orig
Circ
~~File~~

Ottawa, Ontario
3 December 1962

Reference your S096-108(D/AOC) dated 31 Oct 62
our S969-108(COps) dated 25 Sep 62

Air Officer Commanding
Air Transport Command
RCAF Stn Trenton Ont

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological - Nuclear Defence Team

1 It is now planned that the arrangements, for the provision of fallout advice to formations which lack a fallout prediction capability, will be incorporated into the RCAF EDP. The recommendations contained in your above-referenced letter will be included except for those cases where they refer to formations located on stations which have a fallout prediction capability as these formations will receive fallout advice from the station on which they are located.

2 With regard to CJATC Rivers, the AOC TC has indicated that the TC SOND will be an essential part of the TC RHQ staff. The TC SOND will have a primary responsibility for providing advice to the Control Centre Commander at TC RHQ on nuclear aspects of operations, which will include an appreciation of the fallout threat to Rivers. The AOC TC has indicated that it would, therefore, be preferable for TC RHQ to be shown as providing fallout advice to CJATC Rivers from the time of TC RHQ activation (on Simple Alert). TC RHQ would of course be supported by the Rivers Met Section, which would provide any fallout advice that may be required until such time as the TC RHQ contingent arrives.

Handwritten initials
LQ:nbles/bv
DAirS/S4-4
2-6892

Copies to: 3 Your concurrence in the arrangements outlined in para 2 is requested.

COps (2)
DAirS
Orig
Circ
File

ORIGINAL SIGNED BY
L. J. BIRCHALL A/C

(LJ Birchall) A/C
for CAS

3969-108(Cops)

Ottawa, Ontario
30 November 1962

Ref your 969-108(AOC) dated 8 Nov 62

Air Officer Commanding
Air Defence Command
RCAF Stn St Hubert PQ

Meteorological Nuclear Defence Staff for Ottawa ADS

1 The above-referenced letter indicates that it is not planned to move Meteorological-Nuclear Defence staff to the Ottawa NORAD Sector HQ at Edgar in an emergency. However, the ADC EDP shows Edgar as the Alternate Command Post for NNRHQ and the DND Emergency Plan for Meteorological Services (EPMS) indicates that one Met Officer will move from each of ADCHQ and Stn St Hubert to Edgar in an emergency.

2 As the plans for Edgar may have undergone changes since the ADC EDP and DND EPMS were prepared, further clarification would be appreciated on:

- (a) arrangements for the provision of fallout advice to the Ottawa ADS; and
- (b) the requirement for meteorological staff at Edgar.

29T. LK
DAIRS
LGTibbles/bw
DAIRS/S4-4
2-6892
Copies to:
DAIRS
Orig
Circ
File

ORIGINAL SIGNED BY
L. J. BIRCHALL A/C

(LJ Birchall) A/C
for CAS

COps (2)

30 Nov LPR

CSC 1569.1

TD, 14 JPA

TO: CAS/Secretariate NATO/NORAD Registry

Correspondence placed on: File _____

Vol _____

TD _____

Book Number: _____

000069

RR 211820Z

FM CANAIRTRAIN

TO CANAIRHED

BT

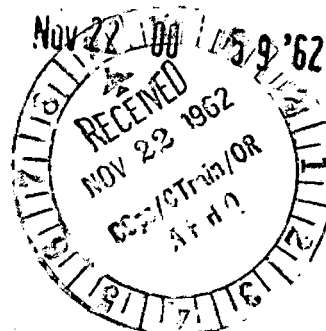
SECRET ND89 21 NOV

OUR S963-100-7(CSTAFFO) 12 OCT PD REQUEST EXPEDITE REPLY TO OUR
RECOMMENDATION PARA 4 REF LETTER CONCERNING PROVISION OF NUCLEAR
FALLOUT ADVICE TO RIVERSFPD THIS REPLY NECESSARY TO FINALIZE TC
PLANS AND ADVISE UNITS ACCORDINGLY PD ADVISE ALSO IF INTENTION TO
INCORPORATE OVERALL PLAN IN RCAF EDP PD SUGGEST APPENDIX Q TO
ANNEX II CONCEPT OF METEOROLOGICAL OPERATIONS COULD BE USED PD
PARA 4(B) (1) (B) OF THIS APPENDIX ALREADY COVERS THE TASK IN THIS
RESPECT FOR THE AIR FORCE WEATHER SERVICE AS FOLLOWS QUOTE IN
CONJUNCTION WITH THE NUCLEAR DEFENCE STAFF PREDICTION AND ASSESSMENT
OF RADIOACTIVE FALLOUT UNQUOTE THEREFORE DETAILS ON PROVISION OF
FALLOUT ADVICE PARTICULARLY TO UNITS NOT HAVING THE MET-NUCLEAR
DEFENCE STAFF COULD BE COVERED IN A NEW SUB APPENDIX

BT

21/8945Z

AFHQ
COMM CENTRE



DNDU

Paraphrase not required
Reply or Reference in an
Unclassified Message Prohibited

On AS 0417 29 Nov Refers

000070

MESSAGE FORM

FILE 969-108(DAIRS)

FOR COMMCEN/SIGNALS USE

NUMBER

PRECEDENCE - ACTION		PRECEDENCE - INFO		DATE - TIME GROUP		MESSAGE INSTRUCTIONS	
DEFERRED		DEFERRED		29 20 50 Z			
FROM	CANAIRHED					PREFIX	
TO	CANAIRTRAIN					GR	
INFO	YOUR ND89 21 NOV CMM YOUR RECOMMENDATION PARA 4 ACCEPTABLE PD ARRANGEMENTS TO BE INCORPORATED IN EDP					SECURITY CLASSIFICATION	
						SECRET	
						ORIGINATOR'S NUMBER	
				ASO417		29 NOV	
PAGE OF PAGES		REFERS TO MESSAGE		DRAFTER'S NAME		OFFICE	
		CLASSIFIED YES <input type="checkbox"/> NO <input type="checkbox"/>				DAIR/S4-4 2-6892	
FOR OPR'S USE	R	DATE	TIME	SYSTEM	OPERATOR	DATE	TIME
					D		
						RELEASING OFFICER'S SIGNATURE	
						(LG Tibbles)	

AFHQ
COMM CENTRE
Nov 16 21 37 '62

RECEIVED

RECEIVED
1962

43 DND 20
COP - DADS
GUC

MMVV CSA031 CRA061 HH
RR RFEMC RFEMBM RFEMEK RFEPFZ RFEPTX RFEMR
DE RFEMCR 47/16 3/19
R 162040Z
FM CANAIRDEF
TO RFEMBM/STN UPLANDS
RFEMC/STN ST HUBERT
RFEMEK/STN BAGOTVILLE
RFEPFZ/CANAIRHED
RFEPFZ/CANAIRHED AU
ZEN/STN CHATHAM
ZEN/STN ST JEAN
ZEN/11 TSU MTL
ZEN/11 WG (AUX) MTL
ZEN/4014 MU (AUX) QUEBEC
ZEN/5SD MONCTON
INFO RFEPTX/CANAIRLIFT
RFEPMR/CANAIRMAT
ZEN/CANAIRTRAIN

BT

S E C R E T A332 16 NOV

ADC UNITS AS LISTED ARE TO PROVIDE RADIOACTIVE FALLOUT PREDICTION
AND WARNING SUPPORT AS REQUIRED TO THE UNITS INDICATED PD STN
UPLANDS IS TO PROVIDE PREDICTION AND WARNING AND ADDITIONAL SUPPORT
AS REQUIRED BY AFHQ AND AFHQ AU PD STN ST HUBERT IS TO SUPPORT
11 WG (AUX) MONTREAL CMM STN ST JEAN AND 11 TSU MONTREAL PD BAGOTVILLE
IS TO PROVIDE PREDICTION AND WARNING TO 4014 MU (AUX) CMM QUEBEC
CITY PD STN CHATHAM IS RESPONSIBLE FOR THE PROVISION OF SUPPORT TO
5 SD MONCTON PD THE INFORMATION REQUIRED IS TO BE PASSED TO THE
UNITS CONCERNED BY THE MOST EXPEDITIOUS MEANS OF COMMUNICATIONS
AVAILABLE AT THE TIME PD FOR STN ST HUBERT 11 WG (AUX) DEPLOYS TO

SECRET

PAGE TWO RFEMCR 47/16

THREE RIVERS PQ FOR CANAIRLIFT YOUR S096-103(D/AOC) DATED 7 NOV
62 REFERS PD FOR CANAIRHED YOUR S969-108(COPS) DATED 29 OCT 62 REFERS

BT

16/2110Z

SECRET

Paraphrase not required
Reply or Reference in an
unclassified message prohibited

MAIN FILE No. S- 1969-108 T.D. No. 2309

DEPARTMENT OF NATIONAL DEFENCE

SECRET

TEMPORARY DOCKET

AIR FORCE

31 Oct 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
VCAAS	10V5	30	Amg						
Cops	referred	6 Nov	PS						
SAIRS		7 Nov	MP						
S4	—	8 Nov	hbk.	28/2/63	GL			FEB 28 1963	

000074

2309
T.D. No.
1969-108



ACTION REQUEST

TO

71RS

DATE

7 Nov 62

LOCATION

FROM

Cops Coord.

RE FILE NO.

FOR:

☐ ACTION

☐ APPROVAL

☐ COMMENTS

☐ DRAFT REPLY

☐ INFORMATION

☐ INVESTIGATE AND REPORT

☐ INVESTIGATION

☐ MAKE.....COPIES

☐ MORE DETAILS

☐ NOTE AND FILE

☐ NOTE & FORWARD

☐ NOTE & RETURN

☐ P.A. ON FILE

☐ REPLY DIRECTLY

☐ REPLY, PLEASE

☐ SEE ME, PLEASE

☐ SIGNATURE

☐ TRANSLATION

☐ YOUR REQUEST

PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

Referred please!

000075

SECRET

Our file ref. S096-103(D/AOC)



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Trenton Ont

31 Oct 62

2309

Ref your S969-108(COps) Dated 25 Sep 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ontario

Referred to	VCAFS
NOV 5 1962	
File No	S969-108
Chg'd to	Cops

9/11/62

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological - Nuclear Defence Team

1 Details of the arrangements for the provision of fallout advice to units which lack a meteorological - nuclear defence team have been examined. In general this Command concurs with the arrangements, with the following observations being provided.

2 It is noted that no provision is made in Appendix B to your letter for the support of 4007 MU(Aux) Ottawa, 4004 MU(Aux) London, 14 Wing(Aux) Toronto, Cassidy - British Columbia and Three Rivers - Quebec. These units and ATC deployment bases are detailed in para 2 of my letter S096-103(D/AOC) dated 6 Jun 62. These units and bases should be provided with fallout advice by Uplands, Centralia, Trenton, Comox and Bagotville respectively.

3 It is improbable that communications facilities in the event of a nuclear strike would permit the transmission of advice between Namao and Whitehorse. In such a case Unit NBCW personnel at Whitehorse should be able to produce nuclear fallout advice with the support of DOT meteorological personnel at that Station. Otherwise it is reasonable to expect Namao to provide the necessary support.

4 The support provided by Trenton to Downsview should be in keeping with the broad policy outlined in your letter S969-108 (COps) dated 22 May 62. "That information to be passed to adjacent formations should be restricted to the minimum that will meet their requirements." Since Downsview has Nuclear Defence personnel established, they should be capable of providing Unit Prediction with the information made available to them and Trenton's support should consist of the provision of amended meteorological information and advice on request.

(GJJ Edwards) G/C.
for AOC ATC

SA
For you.
27/11
Kopplarsen
8 Nov 62.

Entered in form

POFN
2857



ACTION REQUEST

DAIRS DATE *23 Oct 62*
LOCATION

FROM *Cops Coord.* RE FILE NO.
FOR:

<input type="checkbox"/>	ACTION	<input type="checkbox"/>	NOTE & FORWARD
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PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

For necessary please.

000078

SECRET

IN REPLY PLEASE QUOTE

No S963-100-7(CStaff0)

2295



CANADA

Department of National Defence

Royal Canadian Air Force

Referred to COPS
OCT 22 1962
File No. S969-108
Chg'd to David

Winnipeg Man
12 Oct 62

11/10/62

Ref Your S969-108(COps) 25 Sep 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Nuclear Fallout Advice for RCAF Stations Not Having Meteorological - Nuclear Defence Team

1 The arrangements as outlined your letter of reference for the provision of fallout advice to units which lack Meteorological - Nuclear Defence team support are satisfactory with the exception of the arrangements made for CJATC Rivers.

2 Para 3 of your letter suggests that because CJATC Rivers does not have a Nuclear Defence Officer the TC SOND should participate with the Rivers' Meteorological Officer in the preparation of advice on the fallout threat to Rivers. Your Appendix "B" shows TC Emergency Headquarters (TCEHQ) receiving fallout advice from Station Rivers with the remark that TCEHQ SOND will assist. In this regard, it is considered that TC's SOND and Meteorological staff are a necessary part of the TCEHQ, whose primary responsibility is to provide advice to the Control Centre Commander at TCEHQ on nuclear aspects of operations, which will also include an appreciation of the fallout threat to Rivers.

3 The fact that a Meteorological - Nuclear Defence Team is already organized to provide a service to the TCEHQ, it is considered that information of this type could be made available to CJATC Rivers as required.

4 It is recommended therefore, that Appendix "B" to your referenced letter be amended as follows:

Stations Receiving Advice	Unit Providing Advice	Service Provided	Remarks
Stn Rivers	TCEHQ	As required	From time of TCEHQ activation (on Simple Alert)

②
SA
For co-ordination
W. P. Klassen
23 Oct 62

(JA Verner) A/C
For AOC TC

for N
899

23/10

entire info

MAIN FILE No. S. 969-108 T.D. No. 2313

DEPARTMENT OF NATIONAL DEFENCE

SECRET

TEMPORARY DOCKET

AIR FORCE

8 Nov 62

REFERRED	REMARKS	DATE OF PASS	INITIALS	DATE OF P.A.	INITIALS	DATE OF S.F.	CENTRAL REGISTRY	INSPECTED IN C.R. BY
UCAS.	WITH REFERENCE 10V9	10/11/62	3 me					
COps	referred	9 Nov	PR					
DAIRS	✓	13 Nov	AP					
SA	—	14 Nov	WTK	28/2/63	C.N.			

REC 28 1962

000080

2313

T.D. No.

18

SECRET

NOTICE

1. The **BRANCH SECRETARIAT** must be informed when you pass a file by hand.
2. Secretariats or File Rooms must inform Central Registry by C.R. Pass Slip when a file is passed from hand to hand from one Branch Secretariat to another.
3. Do not hold files longer than absolutely necessary. This is what causes False Dockets. Files are urgently required by many Branches. If action cannot be taken inside 48 hours B.F. FILE.
4. Place file number on all outgoing letters.
5. Send all incoming correspondence to Central Registry for registration and filing **BEFORE TAKING ACTION**.
6. Do not pass loose papers.
7. Do not deface file covers.

SECRET



ACTION REQUEST

TO DAIRS DATE 13 Nov 67
LOCATION

FROM Cops Coord. RE FILE NO.
FOR:

<input type="checkbox"/>	ACTION	<input type="checkbox"/>	NOTE & FORWARD
<input type="checkbox"/>	APPROVAL	<input type="checkbox"/>	NOTE & RETURN
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<input type="checkbox"/>	INFORMATION	<input type="checkbox"/>	REPLY, PLEASE
<input type="checkbox"/>	INVESTIGATE AND REPORT	<input type="checkbox"/>	SEE ME, PLEASE
<input type="checkbox"/>	INVESTIGATION	<input type="checkbox"/>	SIGNATURE
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<input type="checkbox"/>	MORE DETAILS	<input type="checkbox"/>	YOUR REQUEST
<input type="checkbox"/>	NOTE AND FILE	<input type="checkbox"/>	

PREPARE MEMO TO:

REPLY FOR SIGNATURE OF:

REMARKS:

Referred, please.

Cops has not seen.

000082

Our file ref. **SECRET**
S969-108(AOC)



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Office of the Air Officer Commanding,
Air Defence Command
St. Hubert, Que.

Ref Your S969-108(COps) 29 Oct 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

8 NOV 1962
Referred to <i>V.C.R.S.</i>
NOV 9 1962
File No <i>S969-108</i>
Chg'd to <i>Cops</i>

2/11/62

NBCW - Fallout Prediction
Fallout Advice to ADC and Other Command Installations

1 Appendix A of your referenced letter accurately represents our recommendations regarding the provision of fallout advice to ADC installations which do not have a fallout prediction capability. Also, as requested by your letter, this headquarters will arrange to have fallout prediction support provided to non-ADC formations as outlined in Appendix B of your letter.

2 The footnote to Appendix A of your letter indicates that you are of the opinion that this headquarters plans to move a Meteorological-Nuclear staff to Ottawa NORAD Sector HQ in an emergency while it is located at Edgar. This would not be the case as this command would not have the personnel available. Fallout prediction information for stations in this sector would be passed through the sector HQ from NNRHQ. The sector commander has assigned an officer of his staff to handle the reporting function. This officer is familiar with the RCAF method of fallout prediction and could, therefore, provide some fallout advice to stations on his own. This situation will be rectified to a certain extent when the two headquarters move to North Bay. However, as pointed out in our message A189 dated 27 Aug 62, the situation at this sector HQ will remain unsatisfactory until an AS/NDef officer is established. It is hoped that this explanation of the fallout warning procedure for Ottawa NORAD Sector will be of interest to your headquarters.

*Not so!
Not personnel
NDO will move
to Edgar*

54

*Entered as appropriate
in file*

Admiral Ak
(MM Hendrick) A/V/M
AOC ADC

2 13/11

000083



ACTION REQUEST

TO DAIRS DATE 5 Nov 62
LOCATION _____

FROM Cops Coord. RE FILE NO. _____
FOR: _____

<input type="checkbox"/>	ACTION	<input type="checkbox"/>	NOTE & FORWARD
<input type="checkbox"/>	APPROVAL	<input type="checkbox"/>	NOTE & RETURN
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<input type="checkbox"/>	INFORMATION	<input type="checkbox"/>	REPLY, PLEASE
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<input type="checkbox"/>	MORE DETAILS	<input type="checkbox"/>	YOUR REQUEST
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PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

*For necessary action
please.*

000084

SECRET

Our file ref **S969-100-8 (CSTAFFO)**



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Referred to *C O P s*

NOV 2 1962

File No. *S969-108*

Chg'd to
Halifax NS

30 Oct 62

Ref Your S969-108 (COPs) D/25 Sept 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ontario

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological - Nuclear Defence Team

1 MAC Units are responsible for providing assistance and training to RCAF Stations Beavercreek and Barrington. As Maritime Air Command Headquarters is providing this service to Beavercreek and RCAF Station Greenwood is providing a like facility for Barrington, it is suggested that an extension of this service to include Unit prediction would be most feasible. In fact, it is considered that the RCAF means of communications with these units during an emergency are more reliable than those available to the Maritime Commander Atlantic.

2 In the absence of a Meteorological Nuclear Defence Team, at RCAF Station Torbay and, in addition, this being the location of the Alternate Maritime Command Atlantic Headquarters a request has been forwarded for provision of fallout advice to Torbay by the Maritime Commander Atlantic.

JD McCallum
(JD McCallum)G/C
for AOC MAC

②
54
For your action
WEXLasser
5 Nov 62

4 5/11

000085

Note to COps

1 Our letter at Flag 1 proposed a procedure for providing fallout warnings to ADC formations and requested ADC advice concerning details of the plan.

2 ADC's reply at Flag 2 was interpreted as concurring in our proposal for certain stations but recommending use of the NORAD fallout warning system at certain GCIs which are connected operationally to Direction Centres in the US. A draft plan was prepared on the basis of this interpretation and passed to ADC in our letter at Flag 3 for confirmation or comments. In its letter at Min 1 below ADC has now clarified its earlier reply in that they propose that all of its components operating under NORAD and not having a local Met-Nuclear Defence team should obtain fallout warnings under the NORAD system.

3 We agree with ADC recommended use of the NORAD system as clarified in Min 1 and our reply at fly, for your signature, has been prepared accordingly. It is interesting to note that in the Ottawa Sector of NNR the RCAF and NORAD fallout prediction systems naturally merge into one.

4 This letter requests confirmation that:

- (a) the ADC recommendations on the subject are now correctly represented in the attached Appendix "A"; and
- (b) designated ADC stations will provide fallout warnings to certain non-ADC formations which lack a fallout prediction capability, and which are listed at Appendix "B".

5. *This has been co-ordinated with acting DND.*

W.C. Klassen
(WC Klassen) W/C
DAirS
2-6179

4 31/10
29 Oct 62

000086

~~SECRET~~
S969-108(COps)

Ottawa, Ontario
29 October 1962

Ref Our S969-108(COps) dated 22 May 62
Your S969-108(CStaffO) dated 22 Jun 62
Our S969-108(COps) dated 25 Sep 62
Your S969-108(CStaffO) dated 15 Oct 62

Air Officer Commanding,
Air Defence Command,
RCAF Stn St Hubert, PQ.

Provision of Fallout Advice to RCAF Formations
Which Do Not Have a Fallout Prediction Capability

1 It is regretted that a misunderstanding has arisen between our headquarters concerning the arrangements for the provision of fallout warnings to those ADC units which lack their own fallout prediction capability. However, it is believed that agreement can readily be reached on this matter.

2 This headquarters is in complete agreement with your desire to avoid duplication of effort in the fallout prediction field. Our concern is to ensure that all RCAF formations that do not have Meteorological-Nuclear Defence teams will have access to fallout warnings. It is agreed that, in the case of such formations in ADC, it would be best to use the NORAD system as the primary source of fallout information. In fact, in the Ottawa ADS the NORAD and RCAF fallout warning systems naturally merge into one.

3 Accordingly, a statement, in keeping with the provisions of Annex J to ADNAC 1-61, has been prepared and is included at Appendix A. This statement lists the ADC stations which do not have their own fallout prediction capability and which would require such information from an outside source, and indicates the formations which would provide this advice. A statement of the RCAF formations outside of ADC, which because of their location could best be supported in this regard by an ADC station, is included at Appendix B.

4 It is requested that Appendices A and B to this letter be examined and that you confirm as soon as possible that:

- (a) Appendix A is an accurate representation of your recommendations on the subject, and that
- (b) you will arrange to provide fallout prediction support to designated non-ADC formations as listed at Appendix B.

5 Upon receipt of your confirmation, action will be taken to have the ADC MAC cancel any arrangements which he has made for the provision of fallout warning services to Stns Beaverbank and Barrington.

*with
DARS
SOL*

LGTibbles/bw
DAIRS/34-4
2-6892
Copies to:
COps (2)
DAIRS
Orig
Circ
File

ORIGINAL SIGNED BY
L. J. BIRCHALL A/C
(LJ Birchall) A/C
for CAS

Att.

000087

APPENDIX A
TO: 3969-108(GO's)
DATED: 29 OCT 62

STATIONS IN ADC WHICH LACK THEIR OWN FALLOUT
PREDICTION CAPABILITY AND WHICH WOULD REQUIRE
TO BE PROVIDED WITH FALLOUT ADVICE

ADVICE PROVIDED BY	STATIONS REQUIRING ADVICE	SERVICE PROVIDED	REMARKS
Ottawa ADS *	Parent	Unit Prediction **	
	Senneterre	" "	
	Falconbridge	" "	
	Foymount	" "	
	Mont Apica	" "	
	Moosonee	" "	
	Ramore	" "	
	Chibougamau	" "	
	La Macaza	" "	Operational 1 Dec62
	St Sylvestre	" "	After Ottawa ADS Saged
	Lac St Denis	" "	After Ottawa ADS Saged
Bangor ADS	Sydney	" "	
	St Margarets	" "	
	Molsie	" "	
	St Sylvestre	" "	Until Ottawa ADS Saged
	Beaverbank	" "	
	Lac St Denis	" "	Until Ottawa ADS Saged
Goose NORAD Sector	Gander	" "	
Boston ADS	Barrington	" "	
Syracuse ADS	Edgar *	" "	
Sault Ste Marie ADS	Pagwa	" "	
Duluth ADS	Armstrong	" "	
	Sioux Lookout	" "	
Grand Forks ADS	Beausejour	" "	
	Gypsumville	" "	Activated Sep 63
Minot ADS	Dana	" "	Activated Mar 63
	Yorkton	" "	Activated Aug 63
Great Falls ADS	Alsask	" "	Activated May 63
	Penhold	" "	Activated Mar 63
Spokane	Saskatoon Mtn	" "	
	Kamloops	" "	
Seattle ADS	Baldy Hughes	" "	
	Puntzi Mtn	" "	
	Holberg	" "	

NOTES: * Until the CC-DC forecast office commences operation at North Bay next year, the Meteorological and Nuclear Defence staff which would move to Edgar in an emergency, would give the latter station a fallout prediction capability with respect to the Ottawa ADS.

** Fallout warnings provided in accordance with Para 3.a(1)(b) of Annex J to ADNAC 1-61 will meet the requirement for unit prediction.

ade concurs

APPENDIX B
TO: S969-108(COps)
DATED: 29 OCT 62

FORMATIONS OUTSIDE OF ADC FOR WHICH ADC STATIONS ARE
REQUESTED TO SUPPLY FALLOUT PREDICTION SUPPORT

SUPPORT PROVIDED BY	FORMATION RECEIVING SUPPORT	SERVICE PROVIDED	REMARKS
Uplands	AFHQ	Unit Prediction and additional support as required	
St Hubert	11 Wg(Aux) Montreal	Unit Prediction	Deploys to Three Rivers
	Stn St Jean	" "	
	11 TSU Montreal	" "	
Bagotville	4014 MU(Aux) Quebec	" "	
Chatham	5 SD Moncton	" "	

add census

MAIN FILE No. S. 1969-108 T.D. No. 2289

DEPARTMENT OF NATIONAL DEFENCE

SECRET

TEMPORARY DOCKET

AIR FORCE

15 Oct. 62

[illegible]

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.
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 hrs. B.F. Docket.
6. T.D.'s to be passed, P.A.'d, B.F.'d, etc., in the same manner as main files.

SECRET

NOTICE

1. The **BRANCH SECRETARIAT** must be informed when you pass a file by hand.
2. Secretariats or File Rooms must inform Central Registry by C.R. Pass Slip when a file is passed from hand to hand from one Branch Secretariat to another.
3. Do not hold files longer than absolutely necessary. This is what causes False Dockets. Files are urgently required by many Branches. If action cannot be taken inside 48 hours **B.F. FILE**.
4. Place file number on all outgoing letters.
5. Send all incoming correspondence to Central Registry for registration and filing **BEFORE TAKING ACTION**.
6. Do not pass loose papers.
7. Do not deface file covers.

SECRET

DEPARTMENT OF NATIONAL DEFENCE

MINUTE SHEET

Referred to

REMARKS

To be signed in full showing Appointment, Telephone Number & Date

6 Ops

Min 3.

The correspondence referred to in Min 1 was prepared by I Air S. It is suggested that I Air S be asked to prepare the draft reply for your signature. DND will assist in the preparation of the reply.


DND
2-8228

18-10-62

2289

IN REPLY PLEASE QUOTE

No **SECRET**
S969-108(CStaffo)



CANADA

Department of National Defence

Royal Canadian Air Force

Referred to *C.O.P.S.*
OCT 16 1962
File No *S969-108*
Davis
St Hubert One

15 OCT 1962 *1/Pet/62*

Ref Our S969-108(CStaffo) 22 Jun 62
Your S969-108(COps) 22 May 62
Your S969-108(COps) 25 Sep 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

(4)

NBCW - Fallout Prediction
Fallout Advice to ADC Installation

1 A misunderstanding seems to exist between our headquarters regarding the sources of fallout information for installations of this command without a Meteorological-Nuclear Defence Fallout-Prediction Team. Paragraph six of our referenced letter stated that there should be no duplication of fallout reports to ADC installations. However, our letter provided, in paragraph seven and in the appendices, the information requested by reference two. This perhaps has caused the misunderstanding.

2 Whether they have a fallout prediction capability or not, all ADC installations would have in war two sources of fallout information. Those installations assigned to NORAD would have their NORAD - Sector HQ as their primary source of fallout information. The procedure for the NORAD reporting system is described in Annex J to NORAD Operation Order No 1-61, August 61. The second source of fallout information for these installations is the Canadian Army Nuclear Detonation and Fallout Reporting System (NDFRS). The details of this latter system are given in the "NSAWS Operating Instructions and Procedures" published by Army Headquarters in July, 1962. Although the NDFRS may duplicate to a certain extent the NORAD reports, the Army service was accepted by this command because it would be a source of information in the event NORAD communications were disrupted by enemy action. Also, because the NDFRS consists of over 200 reporting posts, it may have information of random nuclear explosions in Canada before the NORAD system. The two ADC installations not assigned to NORAD - Stations St Hubert and Cold Lake - have a Meteorological-Nuclear Defence Team as a primary source of fallout information. They also would have the NDFRS as a second source.

3 Therefore, there appears to be no need for an additional fallout warning system for ADC installations as described in your referenced letters. Indeed, a third system likely would cause confusion; this was the intent of our referenced letter.

4 Nevertheless, because communications likely would be uncertain during a nuclear war, the use by ADC installations of the Meteorological-Nuclear Defence Teams established across Canada should not be precluded completely. However, they should be used only on a contingent basis in the event of disruption of both NORAD and NDFRS communications. In this case, the onus would be on the ADC installation without a fallout-prediction capability to contact, if possible, the nearest RCAF station having this capability, even though this station is in a different command. Also, depending on its geographical location, an ADC installation may find it more expedient to contact the nearest Navy or Army establishment with this capability instead of an RCAF station.

REFERENCED LETTER PLACED ON

S969-108.....TD.5176

000093

RCAF G-32J

800M-12-53 (7880)

⑦
DNDO
Agree with ADC
type short a
letter for my sig
17.10.62

FORN
2373
17/10
2
18/10

Agree. This is not the
comm
2000
no third system
has been proposed

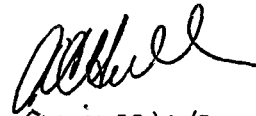
No!

COPS

SECRET

2

5 It is recommended that the fallout warning procedure described in your referenced letters not apply to ADC installations, but that they use the Meteorological-Nuclear Defence Teams on RCAF Stations, or the establishment of other services, on a contingent basis.



(AC Hull)A/C
for AOC ADC

MAIN FILE No. S. S969-108 T.D. No. 2278

DEPARTMENT OF NATIONAL DEFENCE

SECRET

TEMPORARY DOCKET

AIR FORCE

3 Oct 62.

REFERRED	REMARKS	DATE OF PASS	INITIALS	DATE OF P.A.	INITIALS	DATE OF S.F.	CENTRAL REGISTRY	INSPECTED IN C.R. BY
<i>Cops.</i>	WITH PAPERS CR-OCT 5	1962	<i>Bmc</i>					
<i>Paul-14-4</i>		9/10	<i>ml</i>	28/2/63	<i>dl</i>			①

000095

T.D. No. 2278

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2. Secretariats or File Rooms must inform Central Registry by C.R. Pass Slip when a file is passed from hand to hand from one Branch Secretariat to another.
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SECRET

SECRET

Our file ref. S969-100 (CSD)



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Ottawa Ont
3 Oct 62

Ref Our S969-100 (CSD) 14 Jun 62
Your S969-108 (Cops) 25 Sep 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa Ontario


Referred to	C.O.P.S.
DATE	5 1962
File No.	S969-108
Chg'd to	Davis
	TD 2169
	1/10/62

Nuclear Fallout Advice for RCAF Stations
Not having a Meteorological-Nuclear Defence Team

1 The problem of providing Air Materiel Command Units with the information pertaining to Nuclear Detonations was studied and forwarded to AFHQ in our a/n letter along with recommendations for the method of passing this information to these units.

2 This CHQ notes the changes in the formations that are to supply the a/n information to AMC Units and concurs with Appendices "A" and "B" of your a/n letter.

fallout


(GGW Lewis) G/C
for AOC AMC

REFERENCED LETTER PLACED ON

S969-108 TD 2169

AND PASSED TO Cops

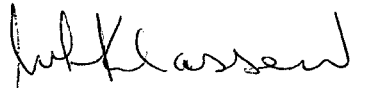
FORN
320

Note to COps

1 COps letter of 22 May 62 requested commands to advise as to which of their units, lacking a meteorological - nuclear defence team, would require to be provided with nuclear fallout advice following a nuclear attack.

2 Based on the replies received, plans have been developed in which fallout advice is to be provided to these units on a regional basis by an adjacent station which has a fallout prediction capability.

3 The letters below, outlining the general arrangements, have been coordinated with DNDO. They indicate to the commands the stations that would be required to participate in the plan and request command concurrence with the proposed arrangements.


(WC Klassen) W/C
DAIRs

25 Sep 62

8969-108(COps)

SECRET

Ottawa, Ontario
25 September 1962

Ref our 8969-108(COps) dated 22 May 62
your 8969-108(CStaffO) dated 22 Jun 62

Air Officer Commanding,
Air Defence Command,
RCAF Stn St Hubert, PQ.

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

- 1 The RCAF commands have indicated their requirements for assistance in the matter of the provision of nuclear fallout advice to their units which do not have a Meteorological-Nuclear Defence team. It is now desired to obtain agreement from the commands for the provision of such advice as may be required.
- 2 It should be noted that station Meteorological-Nuclear Defence teams are responsible for the provision of nuclear fallout advice to all units on their station, including lodger units. Stations should review their NDPs to ensure that adequate arrangements are in existence for the provision of fallout advice to these units.
- 3 This HQ notes and agrees to the need for the ADC Meteorological-Nuclear Defence teams to give priority to the air battle requirements as indicated in Para 2 of your above-referenced letter.
- 4 As MACHQ does not have a forecast office it is felt that your requirements for fallout prediction support to Stn Barrington and Stn Beaverbank could best be met by Maritime Commander Atlantic Hqs. Accordingly, MACHQ has been requested to arrange with the Maritime Commander Atlantic for this support.
- 5 Details of the arrangements for the provision of fallout advice to units which lack Meteorological-Nuclear Defence team support and in which ADC would be concerned are included at Appendices A and B. It is requested that these arrangements be examined and that your comments or concurrence be forwarded to this HQ by 19 Oct 62.

*look
DAIRs*
27/
28
L/Tibbles/bw
DAIRS/54-4
2-6892
Copies to:
COps (2)
DAIRS
DNDO
Orig (2)
File

(LJ Birchall) A/C
for CAS

626/9

SECRET

APPENDIX A
TO: S969-108(COps)
DATED: 25 Sep 62

ADC STATIONS PROVIDING FALLOUT ADVICE TO UNITS
NOT HAVING A FALLOUT PREDICTION CAPABILITY

STATION PROVIDING ADVICE	UNIT TO WHICH ADVICE IS PROVIDED	SERVICE REQUIRED	REMARKS
Uplands	AFHQ	Unit Prediction and additional support as required	
	Foymont Edgar	Unit Prediction Unit Prediction	
St Hubert	11 Wg(Aux) Montreal	Unit Prediction	Deploys to Three Rivers
	Stn St Jean	Unit Prediction	
	11 TSU Montreal	Unit Prediction	
	Stn St Sylvestre	Unit Prediction	
	Stn Lac St Denis	Unit Prediction	
	Stn Parent	Unit Prediction	
	Stn Moosonee	Unit Prediction	
	Stn La Macaza	Unit Prediction	
Bagotville	4014 MU(Aux) Quebec	Unit Prediction	
	Stn Mont Apica	Unit Prediction	
	Stn Chibougamau	Unit Prediction	
Chatham	5 SD Moncton	Unit Prediction	
	Stn Sydney	Unit Prediction	
	Stn St Margarets	Unit Prediction	
	Stn Moisie	Unit Prediction	
Goose (ADS)	Stn Gander	Unit Prediction	
North Bay	Stn Senneterre	Unit Prediction	
	Stn Falconbridge	Unit Prediction	
	Stn Ramore	Unit Prediction	

SECRET

APPENDIX B

TO: 8969-108(COps)

DATED: 25 Sep 62

ADC STATIONS TO WHICH FALLOUT ADVICE

IS PROVIDED BY OFF STATION UNITS

ADC STATIONS RECEIVING ADVICE	UNIT PROVIDING ADVICE	SERVICE REQUIRED	REMARKS
Beaverbank	Maritime Commander Atlantic Hqs	Unit Prediction	
Barrington	Maritime Commander Atlantic Hqs	Unit Prediction	
Pagma	Sault Ste Marie ADS *	Unit Prediction	
Armstrong	Duluth ADS *	Unit Prediction	
Sioux Lookout	Duluth ADS *	Unit Prediction	
Beausejour	Grand Forks ADS *	Unit Prediction	
Gypsumville	Grand Forks ADS *	Unit Prediction	Activated Sep 63
Dana	Minot ADS *	Unit Prediction	Activated Mar 63
Yorkton	Minot ADS *	Unit Prediction	Activated Aug 63
Alsask	Great Falls ADS *	Unit Prediction	Activated May 63
Penhold	Great Falls ADS *	Unit Prediction	Activated Mar 63
Saskatoon Mtn	Spokane ADS *		
Kamloops	Spokane ADS *		
Baldy Hughes	Seattle ADS *	Unit Prediction	
Puntzi Mtn	Seattle ADS *	Unit Prediction	
Holberg	Stn Comox	Unit Prediction	

* Service provided in accordance with NORAD procedures.

8969-108(COps)

SECRET

Ottawa, Ontario
25 September 1962

Ref our 8969-108(COps) dated 22 May 62
your A170 dated 26 Jun 62

Air Officer Commanding,
Maritime Air Command,
5217 South Street,
Halifax, N.S.

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

- 1 The RCAF commands have indicated their requirements for assistance in the matter of the provision of nuclear fallout advice to their units which do not have a Meteorological-Nuclear Defence team. It is now desired to obtain agreement from the commands for the provision of such advice as may be required.
- 2 It should be noted that station Meteorological-Nuclear Defence teams are responsible for the provision of nuclear fallout advice to all units on their station, including lodger units. Stations should review their NDPs to ensure that adequate arrangements are in existence for the provision of fallout advice to these units.
- 3 As Stn Torbay has neither a nuclear defence specialist nor professional meteorological staff, arrangements will be required for the provision of fallout advice to this unit until such time as its Meteorological-Nuclear Defence team is operational. In addition ADC has raised a requirement for fallout prediction support to Stn Beaverbank and Stn Barrington. It is felt that the Maritime Commander Atlantic Hqs would be in the best position to meet these requirements. Accordingly, it is requested that you request the Maritime Commander Atlantic to assume the responsibility for passing unit type predictions to Stn Torbay, until such time as the Torbay Meteorological-Nuclear Defence team is operational and to Stn Beaverbank and Stn Barrington.
- 4 Details of the arrangements for the provision of fallout advice to units which lack Meteorological-Nuclear Defence team support and in which MAC would be concerned are included at Appendices A, B and C. It is requested that your comments or concurrence with these plans and the details of the arrangements made with the Maritime Commander Atlantic be forwarded to this Hq by 19 Oct 62.

Des
ICTibbles/bw

DAIR5/S4-4

2-6892

Copies to:

COps (2)

DAIR5

DNDO

Orig (2)

File

(LJ Birchall) A/C
for CAS

SECRET

APPENDIX A
TO: 3969-108(COps)
DATE: 25 Sep 62

MAC STATIONS PROVIDING FALLOUT ADVICE TO
UNITS NOT HAVING A FALLOUT PREDICTION CAPABILITY

STATION PROVIDING ADVICE	UNIT TO WHICH ADVICE IS PROVIDED	SERVICE PROVIDED	REMARKS
COMOX	Stn Vancouver 19 Wg(Aux) Vancouver Stn Holberg	Unit Prediction Unit Prediction Unit Prediction	Deploys to Cassidy

SECRET

APPENDIX B
TO: 3969-103(COps)
DATED: 25 Sep 62

MAC STATIONS TO WHICH FALLOUT ADVICE
IS PROVIDED BY OFF-STATION UNITS

MAC STATION RECEIVING ADVICE	UNIT PROVIDING ADVICE	ADVICE PROVIDED	REMARKS
Torbay	Maritime Commander Atlantic Headquarters	Unit Prediction	Until Torbay Met - ND Team is operational

SECRET

APPENDIX C

TO: 8969-108(COps)

DATED: 25 Sep 62

NCAF STATIONS FOR WHICH MARITIME COMMANDER ATLANTIC

IS TO BE REQUESTED TO PROVIDE FALLOUT ADVICE

NCAF STATION	SERVICE REQUIRED	REMARKS
Stn Torbay	Unit Prediction	Until Torbay Met-Nuclear Defence team is operational
Stn Beaverbank	Unit Prediction	
Stn Barrington	Unit Prediction	

3969-108(COps)

Ottawa, Ontario
25 September 1962

Ref our 3969-108(COps) dated 22 May 62
your 3963-100-7(CStaffO) dated 18 Jun 62

Air Officer Commanding,
Training Command,
RCAF Stn Winnipeg,
Westwin, Manitoba.

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

1 The RCAF commands have indicated their requirements for assistance in the matter of the provision of nuclear fallout advice to their units which do not have a Meteorological-Nuclear Defence team. It is now desired to obtain agreement from the commands for the provision of such advice as may be required.

2 It should be noted that station Meteorological-Nuclear Defence teams are responsible for the provision of nuclear fallout advice to all units on their station, including lodger units. Stations should review their MNTs to ensure that adequate arrangements are in existence for the provision of fallout advice to these units.

3 It is to be noted that CJATC Rivers does not have a Nuclear Defence officer. Accordingly, it is suggested that the TC SOND participate with the Rivers Senior Meteorological Officer in the preparation of advice on the fallout threat to this station.

4 It is felt that advice in the form of unit fallout predictions would meet the minimum requirements of Stns Clinton, Camp Borden and St Jean. This would be in keeping with the service to be provided other similar units.

5 Details of the arrangements for the provision of fallout advice to units which lack Meteorological-Nuclear Defence team support and in which TC would be concerned are included at Appendices A and B. It is requested that these arrangements be examined and that your comments or concurrence be forwarded to this HQ by 19 Oct 62.

[Handwritten signature]
LJ Tibbles/bw
DAirS/34-4
1-6892
Copies to:
COps (2)
DAirS
BNDO
Orig (2)
File

(LJ Birchall) A/C
for CAS

SECRET

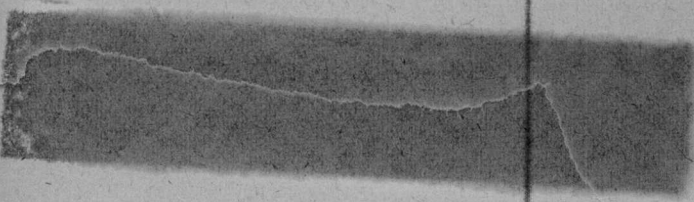
APPENDIX A

TO: 3969-108(COps)

DATED: 25 Sep 62

TC STATIONS PROVIDING FALLOUT ADVICE TO UNITS

NOT HAVING A FALLOUT PREDICTION CAPABILITY

STATION PROVIDING ADVICE	UNIT TO WHICH ADVICE IS PROVIDED	SERVICE REQUIRED	REMARKS
Centralia	Stn Clinton	Unit Prediction	Unit deployed to Camp Borden
	Stn Hamilton	Unit Prediction	
	16 Wg(Aux) Hamilton	Unit Prediction	
	4004 MU(Aux) London	Unit Prediction	
Moose Jaw	23 Wg(Aux) Saskatoon	Unit Prediction	
Penhold	30 Wg(Aux) Calgary	Unit Prediction	Deploys to Stn Penhold
	Stn Lincoln Park <i>Calgary</i>	Unit Prediction	
Winnipeg	17 Wg(Aux) Winnipeg	Unit Prediction	Unit deployed to Gimli
			

SECRET

APPENDIX B

TO: 5969-108(GOms)

DATED: 25 Sep 62

TC STATIONS TO WHICH FALLOUT ADVICE IS

PROVIDED BY OFF STATION UNITS

TC STATIONS RECEIVING ADVICE	UNIT PROVIDING ADVICE	SERVICE PROVIDED	REMARKS
Camp Borden	Stn Trenton	Unit Prediction	Until Camp Borden has its own prediction capability
St Jean	Stn St Hubert	Unit Prediction	
ETCHQ	Stn Rivers	As required	Assisted by ETCHQ SOND

8969-108(COps)

SECRET

Ottawa, Ontario
25 September 1962

Ref our 8969-108(COps) dated 22 May 62
your 8096-103(A/MOC) dated 6 Jun 62

Air Officer Commanding,
Air Transport Command,
RCAF Stn Trenton, Ontario.

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

- 1 The RCAF commands have indicated their requirements for assistance in the matter of the provision of nuclear fallout advice to their units which do not have a Meteorological-Nuclear Defence team. It is now desired to obtain agreement from the commands for the provision of such advice as may be required.
- 2 It should be noted that station Meteorological-Nuclear Defence teams are responsible for the provision of nuclear fallout advice to all units on their station, including lodger units. Stations should review their EDPs to ensure that adequate arrangements are in existence for the provision of fallout advice to these units.
- 3 As your command has a large number of lodger units on stations of other commands it would also be appropriate at this time for these units to review their local station EDPs to ensure that the arrangements are adequate for their fallout notification requirements.
- 4 In view of the importance of meteorological factors in fallout prediction, Stn Downsview, which does not have meteorological officers assigned to it, will require support from some other station. Accordingly, it is suggested that Stn Trenton be given the responsibility to back-up and assist Stn Downsview in this regard as required.
- 5 It is to be noted that the TC Emergency Headquarters is to be at Rivers. Therefore, when the Training Command contingent, which includes a Nuclear Defence officer, is in position, Rivers will have a Meteorological-Nuclear Defence team capability.
- 6 Details of the arrangements for the provision of fallout advice to units which lack Meteorological-Nuclear Defence team support and in which ATC would be concerned are included at Appendices A and B. It is requested that these arrangements be examined and that your comments or concurrence be forwarded to this HQ by 19 Oct 62.

10/11/62
DAirS/S4-4
2-892
Copies to:
COps (2)
DAirS
DNDO
Orig (2)
File

(LJ Birchall) A/C
for CAS

SECRET

APPENDIX A

TO: 3769-108(COps)

DATED: 25 SEP 62

ATC STATIONS PROVIDING FALLOUT ADVICE

TO UNITS NOT HAVING A FALLOUT PREDICTION CAPABILITY

STATION PROVIDING ADVICE	UNIT TO WHICH ADVICE IS PROVIDED	SERVICE REQUIRED	REMARKS
Trenton	Stn Downsview	Unit Prediction	Via Stn Downsview Until Stn Camp Borden Met-ND team is operational
	12 TSU Weston	Unit Prediction	
	Stn Camp Borden	Unit Prediction	
Nanao	18 Wg(Aux) Edmonton	Unit Prediction	Until deployed to Penhold
	75D Lancaster Park	Unit Prediction	
	Stn Whitehorse	Unit Prediction	

SECRET

APPENDIX B

TO: 3969-108(COps)

DATED: 25 Sep 62

ATC UNITS TO WHICH FALLOUT

ADVICE IS PROVIDED BY OFF STATION UNITS

ATC UNIT RECEIVING ADVICE	UNIT PROVIDING ADVICE	SERVICE REQUIRED	REMARKS
23 Wg(Aux) Saskatoon	Moose Jaw	Unit Prediction	
30 Wg(Aux) Calgary	Stn Penhold	Unit Prediction	Deploys to Penhold
18 Wg(Aux) Edmonton	Stn Namaso	Unit Prediction	Until deployed to Penhold
4014 MU(Aux) Quebec	Stn Bagotville	Unit Prediction	
11 Wg(Aux) Montreal	Stn St Hubert	Unit Prediction	Deploys to Three Rivers
Stn Hamilton	Stn Centralia	Unit Prediction	
16 Wg(Aux) Hamilton	Stn Centralia	Unit Prediction	Via Stn Hamilton till deployed to Camp Borden
17 Wg(Aux) Winnipeg	Stn Winnipeg	Unit Prediction	Until deployed to Gimli
Stn Vancouver	Stn Comox	Unit Prediction	
19 Wg(Aux) Vancouver	Stn Comox	Unit Prediction	Deploys to Cassidy BC

8969-108(COps)

SECRET

Ottawa, Ontario
25 September 1962

Ref our 8969-108(COps) dated 22 May 62
your 8969-100 CSD dated 14 Jun 62

Air Officer Commanding,
Air Materiel Command,
RCAF Stn Rockcliffe,
Ottawa, Ontario.

Nuclear Fallout Advice for RCAF Stations
Not Having a Meteorological-Nuclear Defence Team

1. The RCAF commands have indicated their requirements for assistance in the matter of the provision of nuclear fallout advice to their units which do not have a Meteorological-Nuclear Defence team. It is now desired to obtain agreement from the commands for the provision of such advice as may be required.
2. It should be noted that station Meteorological-Nuclear Defence teams are responsible for the provision of nuclear fallout advice to all units on their station, including lodger units. Stations should review their MDPs to ensure that adequate arrangements are in existence for the provision of fallout advice to these units.
3. As your command has a large number of lodger units on stations of other commands it would also be appropriate at this time for these units to review their local station MDPs to ensure that the arrangements are adequate for their fallout notification requirements.
4. Details of the arrangements for the provision of fallout advice to units which lack Meteorological-Nuclear Defence team support and in which ANO would be concerned are included at Appendices A and B. It is requested that these arrangements be examined and that your concurrence or comments be forwarded to this HQs by 19 Oct 62.

LG Tibbles/bw
DAIR5/S4-4
2-6892
Copies to:
COps (2)
DAIR5
DND0
Orig (2)
File

(LJ Birchall) A/C
for CAS

SECRET

APPENDIX A

TO: 8969-108(COps)

DATED: 25 SEP 62

APC STATIONS PROVIDING FALLOUT ADVICE TO UNITS

NOT HAVING A FALLOUT PREDICTION CAPABILITY

STATION PROVIDING ADVICE	UNIT TO WHICH ADVICE IS PROVIDED	SERVICE REQUIRED	REMARKS
Rockcliffe	NDMC Ottawa	Unit Prediction	

SECRET

APPENDIX B

TO: SC69-108(CO's)

DATED: 25 SEP 62

AMC UNITS TO WHICH FALLOUT ADVICE

IS PROVIDED BY OFF-STATION UNITS

AMC UNIT RECEIVING ADVICE	UNIT PROVIDING ADVICE	SERVICE REQUIRED	REMARKS
5 SD Moncton	Stn Chatham	Unit Prediction	
11 TSO Montreal	Stn St Hubert	Unit Prediction	
1 SD Downsview	Trenton	Unit Prediction	
12 TSO Weston	Trenton	Unit Prediction	Via Downsview
Stn ^{Calgary} Amherst Park	Stn Fenhold	Unit Prediction	
7 SD Lancaster Park	Namoo	Unit Prediction	

SECRET

S922-102(DNDO).

S969-108

OTTAWA Ont
26 Jun 62

AOC AMC
AOC ADC
AOC ATC
AOC MAC
AOC TC

Probability of Fallout Distribution
in Canada - Hypothetical Attack

1 Attached hereto for information is a copy of
HCS 2426 (DSO & P7) 23 August 1961 Attack Pattern for
Fallout Assessment 1962-67, together with one set of
maps giving the probable distribution of gamma doses from
fallout over Canada following attack on the United States
and 16 Canadian target cities.

2 In relating the hypothetical attack pattern
to the enclosed maps it is to be noted that the fallout
contribution from Canadian military targets has not been
shown. The location of fallout contours is not however
significantly affected by those targets. It is also
important to note that these maps must be used together
and not separately, otherwise the information contained
in them is liable to be misinterpreted.

A. H. BLAKE
WING COMMANDER

EL McMullen

S/L EL McMullen/MP
2-8228

Copies for:

File

Chron

Circ

SCR

(AH Blake) W/C
for CAS

REFERENCED LETTER PLACED ON

NR
AND PASSED TO *gfk*

305/13

AFHQ
COMM CENTRE

JUN 3 08 18 '62

DND O

RR 121935Z

FM CANAIRTRAIN

TO CANAIRHED

BT

R E S T R I C T E D ND61 12 JUN

FOR DND O PD MAY THIS HQ BE PROVIDED WITH THE CANADIAN ARMY'S ATTACK
PATTERN ASSESSMENT 62-67 AND ASSOCIATED RADIATION CONTOUR MAPS
WHICH CMM IT IS UNDERSTOOD CMM WERE PUBLISHED IN JANUARY 62 PD
THE ONLY DATA AND ASSOCIATED MAPS PRESENTLY HELD AT THIS CHQ ARE
THOSE ISSUED BY DND O BEARING THE REF DMO AND P3A 17 MAR 59

BT

12/19422 UNCLASSIFIED REPLY OR REFERENCE PERMITTED

RESTRICTED

JAN 10 1968

8922-106
8969-108

~~SECRET~~

IN REPLY PLEASE QUOTE

2176 No S969-108 (CStaff0)



CANADA

Department of National Defence

Royal Canadian Air Force

Referred to *C.O.P.S.*

JUN 25 1962

File No *S969-108*

Chg'd to *Davis*

St. Robert Que 22/6/62

22 JUN 1962

Ref S969-108 (C0ps) d/22 May 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Advice on Nuclear Defence Information - RCAF Units

1 This command agrees, in principle, to the guide lines outlined at para 1(a), (b) and (c) of the above referenced letter as a basis for the development of RCAF policy on this subject. Any such policy, however, as far as it pertains to ADC, should consider and cater to the requirements of air defence operations and the economical use of operational communications.

2 The conduct of air defence operations requires the presentation to the air battle commander of information concerning nuclear detonations likely to affect his operations. This includes information concerning the nuclear detonation itself, its time, size, type, and location, the forecast of fallout resulting therefrom, confirmation of the fallout forecast through radiation intensity measurements, and any information concerning damage or casualty to facilities, communications and personnel necessary to the conduct of the air battle. The presentation of this information is required as soon as possible following the event to permit the dispersion or deployment of aircraft (some of which may be in flight at the time) away from the fallout area if possible, or to permit the continuation of operations under fallout conditions with the implementation of radiation control measures. The battle commander must also be aware at all times of any factors which will limit his operational capability or effectiveness.

3 As a result of the air defence requirement, CINCNORAD has promulgated (in NORADM 55-1) detailed reporting procedures for NUDET, RADMON (Radiation Intensity) and battle damage information. The air defence system through its radars, aircraft, ground to air and ground to ground communications, is a valuable source of information concerning nuclear detonations, particularly those resulting from the interception of the weapons carrier without destroying the weapons transported by the carrier. Any information gathered by this system is passed through NORAD channels, from unit to sector to Region to CINC NORAD. It has also been recommended that the NDFRS be provided with this information at Sector and Region level.

4 As a result of the NORAD organization and the direction of the information flow, the ideal locations for nuclear defence - meteorological teams would be at Air Defence Sector and Region HQ, and at major flying stations. The teams at Sector and Region HQ would collect, correlate and interpret any information originating within their geographical area and present it to the air battle

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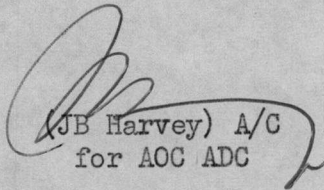
2


commander and any other agencies requiring it including the provision of warning from sectors to their units. Flying station teams are required as a back up to sectors and regions and to assist in the conduct of air operations from their bases under fallout conditions as well as, in the case of meteorological personnel, to continue to provide the weather data necessary to flying operations.

5 The NORAD communications and reporting system provides for the passage of Nuclear Detonation information between adjacent NORAD formations. The transfer points are from Sector to Sector and Region to Region. The communications system also provides for alternate routing of information from units to sectors in event of breakdown of normal communications.

6 While it is recognized that the development by AFHQ of a policy on the presentation of nuclear detonation information to RCAF units must include the RCAF as a whole, it is submitted that ADC must be considered as a special entity. Whereas the bulk of the RCAF and the Canadian Army will be employed, during the nuclear phase of war, on passive defence tasks, ADC must continue to function in its active air defence role under all foreseen circumstances. It is recommended therefore that consideration be given to ADC's role under NORAD in the development of an RCAF Nuclear Detonation Information Reporting System. In particular, it is recommended that duplication of reporting by or to ADC units be avoided at all costs, in order to prevent confusion in the conduct of air operations which could well result from the reaction to such duplication.

7 In reply to para 2 of your above referenced letter, a list of ADC units requiring meteorological - nuclear defence assistance is attached. Included are recommendations for the location and responsibilities of current and future nuclear defence - meteorological teams.


(JB Harvey) A/C
for AOC ADC


cc: MNR HQ St Hubert

*Purpose was not to develop an
RCAF NDIRS but rather to
provide fallout advice to RCAF units
which do not have a capability of
preparing this for themselves.*

000120

Appendix "A" to
S968-108 (CStaff0)
dated

UNITS WITHIN ADC REQUIRING NUCLEAR
DEFENCE ADVICE AND ASSISTANCE

Unit	ADC Stns Which Can Assume Responsibility	Other Type of Service	Communications	Recommendations and/or Remarks
Gander ✓	Goose ADS	Unit prediction	Ops Telephone	No NDef personnel at Gander
Sydney ✓	Chatham	"	"	Bangor ADS Responsibility
Beaverbank				See Appendix "B"
Barrington				"
St Margarets	Chatham	"	"	Bangor ADS Responsibility
Fredericton	"	"	"	Phasing out 1 Sep 62
Moisie	"	"	"	Bangor ADS Responsibility
Mont Apica	Bagotville	"	"	Ottawa ADS Responsibility
St Sylvestre	St Hubert	"	"	Bangor ADS Responsibility
Lac St Denis	"	"	"	Ottawa- Bangor ADS
Montreal ADS	"	Area prediction	"	phasing out 1 Sep 62
Parent	"	Unit prediction	"	Ottawa ADS responsibility
Senneterre	North Bay	"	"	"
Falconbridge	"	"	"	"
Foymount	Uplands	"	"	"
Edgar	"	"	"	Syracuse ADS Responsibility
Ottawa ADS	"	Area prediction	"	Moving to North Bay 1963
Moosonee	St Hubert	Unit prediction	"	Ottawa ADS Responsibility
Chibougamau	Bagotville	"	"	Operational date Aug 62
La Macaza	St Hubert	"	"	" Sep 62
Ramore	North Bay	"	"	Ottawa ADS Responsibility
Pagwa				See Appendix "B"
Armstrong				"

Unit	ADC Stns Which Can Assume Responsibility	Other Type of Service	Communications	Recommendations and/or Remarks
Sioux Lookout				See Appendix "B"
Beausejour				"
Gypsumville				"
Dana				"
Alsask				"
Yorkton				"
Penhold				"
Saskatoon Mtn				"
Kamloops				"
Baldy Hughes				"
Puntzi Mountain				"
Holberg				"

Appendix "B" to
S969-108(CStaff0)
dated

UNITS WITHIN ADC REQUIRING NUCLEAR DEFENCE
ADVICE AND ASSISTANCE FROM UNITS WITHIN OTHER COMMANDS

Unit	Suggested Unit for Provision of Service	Type of Service	Communications	Recommendations and/or Remarks
Beaverbank	MACHQ	Unit Prediction	Admin Telephone	Bangor ADS Responsibility
Barrington	"	"	Admin & Ops Telephone via Beaverbank	<i>Barto</i> "AOS"
Pagwa	Sault Ste Marie ADS	"	Ops Telephone	Currently being provided
Armstrong	Duluth ADS	"	"	"
Sioux Lookout	"	"	"	"
Beausejour	Grand Forks ADS	"	"	"
Gypsumville	"	"	"	Activated Sep 63
Dana	Minot ADS	"	"	" Mar 63
Yorkton	"	"	"	" Aug 63
Alsask	Great Falls ADS	"	"	" May 63
Penhold	"	"	"	" Mar 63
Saskatoon Mtn	Spokane ADS	"	"	Currently being provided
Kamloops	"	"	"	"
Baldy Hughes	Seattle ADS	"	"	"
Puntzi Mtn	"	"	"	"
Holberg	Comox	"	"	Seattle ADS Responsibility



ACTION REQUEST

TO Hand / 14-4 DATE 27/6/62
LOCATION

FROM Caps / Lee RE FILE NO.
FOR:

<input type="checkbox"/>	ACTION
<input type="checkbox"/>	APPROVAL
<input type="checkbox"/>	COMMENTS
<input type="checkbox"/>	DRAFT REPLY
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<input type="checkbox"/>	INVESTIGATE AND REPORT
<input type="checkbox"/>	INVESTIGATION
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<input type="checkbox"/>	REPLY, PLEASE
<input type="checkbox"/>	SEE ME, PLEASE
<input type="checkbox"/>	SIGNATURE
<input type="checkbox"/>	TRANSLATION
<input type="checkbox"/>	YOUR REQUEST
<input type="checkbox"/>

PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

Caps has not seen.

Induray

000125

CAB011

AFHQ
COMM CENTRE

JUN 26 19 06 '62

RR RFEPPZ

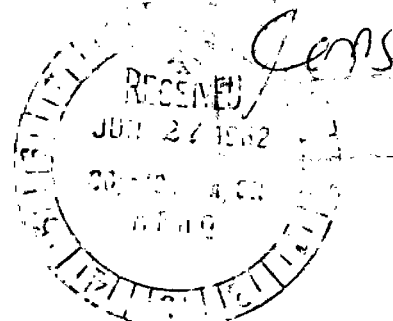
DE RFEAXQ 20/26

R 261830Z

FM CANAIRLANT

TO CANAIRTEL

BT

22/27
~~SECRET~~

SECRET A170 26 JUN

YOUR SS69-108(COPS) 22 MAY PD AT THE MOMENT TORDAY IS THE ONLY
STATION IN THIS COMMAND WHICH DOES NOT POSSESS THE CAPABILITY REQUIRED
YOUR 2A PD WHEN APPROPRIATE NUCLEAR DEFENCE SPECIALIST IS PROVIDED
TORDAY CAN MEET THIS REQUIREMENT

BT

26/1844Z

NO UNCLASSIFIED REPLY OR REFERENCE

~~SECRET~~



ACTION REQUEST

TO D.AIRS. DATE 19 June 62
LOCATION _____
FROM Cops Coord. RE FILE NO. _____
FOR: _____

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PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

*For only ~~note~~ necessary
entire place*

Cops has not seen.

000127

No. S963-100-7(CStaff0)



Department of National Defence

Royal Canadian Air Force

Winnipeg Man

18 Jun 62

2170

Ref Your S969-108(COps) 22 May 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Referred to.....	C.C.P.S.
JUN 19 1962	
File No.....	S969-108
Chg'd to.....	Davis

Nuclear Detonation Information - Advice
RCAF Stations Not Having Meteorological Nuclear Defence Teams

22 May 62

1 The proposed plan outlined in your referenced letter to provide advice on the assessment of nuclear detonation information received on units not having a Meteorological Nuclear Defence Team (RCAF EDP Para 4(c) refers) will be of considerable assistance to Training Command in carrying out the TC role in the event of an emergency.

2 To assist in further development of the plan, the following information is provided, as requested in para 2 of your referenced letter:

- (a) Three TC stations namely Clinton, Camp Borden, and St Jean do not have the capability to organize a Meteorological-Nuclear Defence Team. Although they have either an Air Services/Nuclear Defence Officer or a unit appointed Nuclear Defence Officer, they do not, however, have an established Meteorological Officer and, therefore, will require advice on the assessment of nuclear detonation information.
- (b) To assist these units, it is suggested that the responsibility for providing advice should be as follows:

<u>For</u>	<u>From</u>
(i) Clinton	Centralia (TC)
(ii) Camp Borden	Trenton (ATC)
(iii) St Jean	St Hubert (ADC)

- (c) The type of assistance required would be in the form of information on both unit and area fallout prediction as outlined in Appendix A to your referenced letter.
- (d) The most appropriate means of communications for passing the advice on Nuclear detonation information would be by teletype and/or direct telephone if possible. In that both St Jean and St Hubert are in a target area (Montreal), communications between those two units would require further study.

3 It would be appreciated if this CHQ could be provided with progress reports on the proposed plan.

FORN
533
3 19/6

[Signature]
for (JA Verner) A/C
for AOC TC

MAIN FILE No. S- S969-108 T.D. No. 2139



ACTION REQUEST

TO DAIRS/54 DATE 19 June 62
LOCATION _____

FROM Cops Coord. RE FILE NO. _____
FOR: _____

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<input type="checkbox"/>	INVESTIGATE AND REPORT	<input type="checkbox"/>	SEE ME, PLEASE
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<input type="checkbox"/>	MORE DETAILS	<input type="checkbox"/>	YOUR REQUEST
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PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

*For any necessary
action please.*

Cops has not seen

000130

SECRET

S969-100(CSD)

Our file ref.....



CANADA

DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Ottawa Ontario

14 Jun 62

2109

Ref Your S969-108(COps) 22 May 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4, Ont.

Advice on Nuclear Detonation Information for RCAF
Stations Not Having Meteorological - Nuclear Defence Teams

1 All Air Materiel Command Stations and Units with the exception of Station Rockcliffe lack the capability of establishing a meteorological-nuclear defence team and will require assessment advice on nuclear detonations information as noted in para 2 (a) of your above noted letter.

2 Units for which Station Rockcliffe can assume specific responsibility are:

- (a) RCAF Station Rockcliffe,
- (b) AMCHQ/AU,
- (c) RCAF Materiel Laboratories,
- (d) NDMC Ottawa,
- (e) 3SD Rockcliffe.

3 Air Materiel Command units which can best be served by units of other commands and the stations and units that could provide this service are:

- (a) 5SD Moncton by Station Chatham,
- (b) 11TSU Montreal by Station St Hubert,

~~SECRET~~

- 2 -

- (c) 6RD Trenton by Station Trenton,
- (d) 1SD Downsview by Station Downsview,
- (e) 12TSU Weston by Station Downsview,
- (f) Station Lincoln Park by Station Penhold
(or Calgary Municipal Airport),
- (g) 7SD Lancaster Park by Station Namao.

4 It is considered that the Unit Fallout Prediction report would satisfy the requirements of the above noted units and that the normal RCAF teletype facilities should be utilized to pass this information.


(SG Cowan) G/C
for AOC AMC



ACTION REQUEST

TO DA/RS/54 DATE 11 June 62
LOCATION _____

FROM Cops Hood. RE FILE NO. _____
FOR: _____

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PREPARE MEMO TO:.....

REPLY FOR SIGNATURE OF:.....

REMARKS.....

For necessary action please.

Cops has not seen.

000134

SECRET

Our file ref. S096-103(D/AOC)



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Trenton Ont
6 Jun 62

2159

Ref your S969-108(COps) 22 May 62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4, Ontario

RECEIVED
JUN 8 1962
FAL S969-108
Ch'd w. Davis
27/5/62

Advice on Nuclear Detonation Information for RCAF
Stations Not Having Meteorological-Nuclear Defence Teams

1 A survey has been carried out to determine the capability of ATC Units to provide meteorological-nuclear defence teams to assess the hazard from nuclear detonations and radioactive fallout.

2 Formations which lack the capability to establish a meteorological-nuclear defence team but which would require assessment advice on nuclear detonation information are:

- (a) Station Vancouver
- (b) 19 Wing (Aux) - Vancouver
- (c) Station Whitehorse
- (d) Station Hamilton
- (e) 16 Wing (Aux) - Hamilton
- (f) 408 Squadron - Rockcliffe
- (g) 412 Squadron - Uplands
- (h) 4007 MU (Aux) - Ottawa
- (j) 426 Squadron - St Hubert
- (k) 11 Wing (Aux) - Montreal
- (l) 14 Wing (Aux) - Toronto
- (m) 4009 MU (Aux) - Halifax
- (n) 17 Wing (Aux) - Winnipeg
- (o) 23 Wing (Aux) - Saskatoon
- (p) 18 Wing (Aux) - Edmonton
- (q) 30 Wing (Aux) - Calgary
- (r) 4014 MU (Aux) - Quebec
- (s) 4004 MU (Aux) - London
- (t) Cassidy - British Columbia and Three Rivers - Quebec, deployment bases for ATC Aircraft.

3 Formations listed in para 2 for which the responsibility can be assumed for providing nuclear detonation information by specified ATC units are:

- (a) 14 Wing (Aux), Toronto - by Station Downsview
- (b) 18 Wing (Aux), Edmonton - by Station Namao.

4 Formations listed in para 2 which, by virtue of their proximity to a station of another Command, could best be provided with nuclear detonation information by that station are:

- (a) Station Vancouver - by Station Comox, MAC
- (b) 19 Wing (Aux), Vancouver - by Station Comox, MAC
- (c) Station Hamilton - by Station Centralia, TC
- (d) 16 Wing (Aux), Hamilton - by Station Centralia, TC
- (e) 4004 MU (Aux), London - by Station Centralia, TC

- (f) 408 Squadron, Rockcliffe - by Station Rockcliffe, AMC
- (g) 412 Squadron, Uplands - by Station Uplands, ADC
- (h) 4007 MU (Aux), Ottawa - by Station Uplands, ADC
- ~~(j) 426 Squadron, St Hubert - by Station St Hubert, ADC~~
- (k) 11 Wing (Aux), Montreal - by Station St Hubert, ADC
- (l) 4009 MU (Aux), Halifax - by MACHQ
- (m) 17 Wing (Aux), Winnipeg - by Station Winnipeg, TC
- (n) 23 Wing (Aux), Saskatoon - by Station Saskatoon, TC
- (o) 30 Wing (Aux), Calgary - by Station Penhold, TC
- (p) 4014 MU (Aux), Quebec - by Station Bagotville, ADC

5 Formations listed in para 2 which do not have an RCAF Station in close proximity to provide nuclear detonation information are:

- (a) Station Whitehorse - Yukon Territory
- (b) Cassidy - British Columbia
- (c) Three Rivers - Quebec

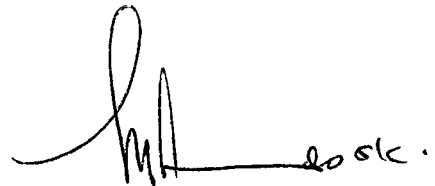
6 The type of service which would normally meet the requirements of each of the various formations listed in para 2 is:

- (a) Unit Fallout Prediction

7 The most appropriate means of communications to be used for passing the advice on nuclear detonation information to each of the formations listed in para 2 are:

- (a) Telephone
- (b) Radio
- (c) Teletype

8 Station Downsview, Unit Fort Churchill and CJATC Rivers do not have a meteorological-nuclear defence team. However, it is felt that the RCAF meteorological officers at Churchill and Rivers can fulfill the requirements and the Nuclear Defence Officer at Downsview can provide the required advice and information.

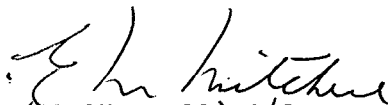


(GJJ Edwards) G/C
for AOC ATC

NOTE TO COPS

1 The purpose of the letter below, for your signature, is to provide the benefit of a meteorological-nuclear defence team assessment on nuclear detonation information to those stations which do not have this capability locally. As one of the governing factors in this regard is the location of the RCAF meteorological offices, the Meteorological Branch of this Directorate has prepared this letter in consultation with DNDO.

2 DNDO concurs fully in this letter as indicated in his Min (2) to the draft at Flag 1.



(EM Mitchell) G/C

DAirS

2-6179

000137

SECRET
3969-108(COps)

Ottawa, Ontario
22 May 1962

Air Officer Commanding,
Air Defence Command,
RCAF Stn St Hubert, PQ.

Advice on Nuclear Detonation Information for RCAF
Stations Not Having Meteorological-Nuclear Defence Teams

1 Amendment action now being taken with respect to the RCAF EDP, Para 4(c), "Nuclear Detonation Information" provides that all information received at RCAF stations relative to nuclear detonations and radioactive fallout will be assessed by the station meteorological-nuclear defence team to determine the hazard to local RCAF operations. This team capability already exists at most RCAF stations. For those stations where it does not exist, it would appear practicable for the specialized assessment to be carried out by the nearest RCAF station having a meteorological-nuclear defence team. It is proposed to develop plans in this regard within the following broad guide lines:

- (1)
- (a) The allocation of responsibility should be made primarily on an area rather than a Command basis, as disruption of communications is to be expected following a nuclear attack;
 - (b) Information to be passed to adjacent formations should be restricted to the minimum that will meet their requirements. Types of service which could be provided are described in Appendix "A"; and
 - (c) It is presumed that a meteorological-nuclear defence team will be functioning at each location where a meteorological section is to be established on a simple alert (ref the "Interim DND Emergency Plan for Meteorological Services" distributed under cover of our 3096-118-7(COps) dated 15 Mar 62). However, as the emergency conditions may impose some delay in the arrival of the meteorological personnel at these locations and as these stations may not be provided with meteorological personnel for peacetime exercises, the plan should contain provision for them to receive support as necessary from other locations pending the attainment of the local capability in this regard.

2 To assist this headquarters in the development of these plans it is requested that advice on the following items be listed and forwarded to reach this headquarters by 22 Jun 62:

- (a) Formations under your Command which lack the capability to establish a meteorological-nuclear defence team but which would require assessment advice on nuclear detonation information;

② DND O

For your info.

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- 2 -

SECRET

- (b) Those formations listed in (a) for which the responsibility can be assumed by specific stations under your Command;
- (c) Those formations listed in (a) which, by virtue of their proximity to a station of another Command, could best be served by that station;
- (d) The type of service which would normally meet the requirements of each of the various formations listed in (a); and
- (e) The most appropriate means of communications to be used for passing the advice on nuclear detonation information to each of the formations listed in (a).

3 For your information, Appendix "B" contains clarification of the use which RCAF stations would make of the NUDETS, FALLWARNIS and FALLREPS which would be issued by the National Survival Nuclear Detonation and Fallout Reporting System.

Original signed by
W. WEISER C/C

(LJ Birchall) A/C
for CAS

Similar letters to:

AOC ATC
AOC AMC
AOC MAC
AOC TC

Mr LGT/bw
DAIR/S4-4
2-6892

Copies to:

Cops
DAIRs
Orig
Circ
File

APPENDIX "A"
TO: 5969-108(COps)
DATED: 22 MAY 1962

FALLOUT INFORMATION TO OFF-STATION FORMATIONS

1 Fallout information may be provided to off-station formations in either of the following forms:

- (a) Unit Fallout Prediction. The minimum information required at a unit for planning operations under fallout conditions would include the following in plain language;
 - (i) whether the unit is expected to be in the danger sector,
 - (ii) the time at which fallout is expected to begin and at which it should reach peak intensity,
 - (iii) qualitative advice as to the probable intensity of radiation,
 - (iv) amended information on the above items as available,
- (b) Area Fallout Prediction. At some formations or in some situations a broader view of conditions over the area may be required. In such case information needed to draw the danger sector would be provided. The advice to the formation would include the following in plain language;
 - (i) location of ground zero,
 - (ii) bearings of outside effective wind lines, *shut*
 - (iii) cloud radius,
 - (iv) qualitative advice on intensity of radiation, and
 - (v) amended information on any of the above items as available.

2 It is to be noted that provision is required for an amendment service to update the preliminary fallout warnings as new data is received on the burst or cloud parameters, on the weather parameters and on radiation intensities. Therefore, stations responsible for providing amendment advice on nuclear detonation information to adjacent formations will be required to maintain a watch on the various conditions over the area in which the formations are located.

RESTRICTED

APPENDIX "B"

TO: 5962-108(COps)

DATED: 22 MAY 1962

RCAF UTILIZATION OF INFORMATION RECEIVED FROM
THE NATIONAL SURVIVAL NUCLEAR DETONATION AND
FALLOUT REPORTING SYSTEM

1 The Canadian Army, in connection with its National Survival role, has been made responsible for determining the location of nuclear detonations in Canada and for advising the public on predicted and actual radioactive fallout conditions. To carry out this commitment it has set up a Nuclear Detonation and Fallout Reporting System.

2 Following a nuclear attack, the National Survival Federal or Provincial Warning Centres will pass via RCAF communications units to RCAF stations the following:

- (a) reports of nuclear detonations (NUDETS);
- (b) radioactive fallout warnings (FALLWARNS); and
- (c) radioactive fallout reports (FALLREPS).

3 NUDETS are expected to be received within ten minutes after the burst. They will include the following:

- (a) location of ground zero;
- (b) yield of weapon in kilotons;
- (c) height of burst; and
- (d) time of burst.

4 The information in the NUDET will be used as required at RCAF stations for the prediction and assessment of radioactive fallout.

5 FALLWARNS are forecasts of the area in which fallout may occur. Unless the particular nuclear and meteorological parameters on which the forecast was based were underestimated, this forecast area will be larger than the actual fallout area.

6 FALLWARN messages received at RCAF stations will be reviewed by the meteorological-nuclear defence team and used as required in the assessment of the fallout hazard. The RCAF has not, however, adopted the FALLWARNS as the primary source of predicted fallout information for the following reasons:

- (a) The RCAF station, with its meteorological section already functioning, is likely to have access to later and more precise meteorological data than that on which the FALLWARN was based. The meteorological section is able to apply this data directly in fallout prediction relative to local RCAF operations. In the case of the National Survival Warning Centre (the source of the FALLWARNS) no meteorological staff will be available until after an appropriate readiness or alert state has been declared, and it is therefore quite likely that the FALLWARNS available following a surprise attack would not reflect full consideration of the latest meteorological information;

- 2 -

RESTRICTED

- (b) The emphasis in the FALLWARN is directed toward the Army's National Survival role. It provides the Army Commander with information on the broad area in which he would be required to monitor the radiation hazard insofar as it may be significant to unprotected personnel proceeding on foot into or through the damaged area. The RCAF Commander, however, is directly concerned with the probability of fallout affecting a relatively small area, namely, his base. Furthermore, as he may have to continue flying operations in spite of a high level of radioactivity on his base, he may require advice on much higher levels of radioactivity than are provided for in the FALLWARN message; and
- (c) Following a nuclear attack, it is quite possible that the RCAF station would receive no advice from the National Survival warning centres because of the disruption of communications.

7 FALLREPS are reports of radioactive fallout. Reports will be made at fallout reporting posts across Canada on:

- (a) the time of beginning of fallout;
- (b) the current radiation intensity;
- (c) the peak intensity; and
- (d) the return to a safe level of radioactivity.

8 FALLREPS and the radiation intensity reports for airfields which are to be made available over the meteorological teletype networks in Canada and the United States are to be correlated with the fallout prediction and used as required in the assessment of the fallout hazard.

RESTRICTED

969-8 (SASO)

DEPARTMENT OF NATIONAL DEFENCE

Royal Canadian Air Force

St Hubert Que

Commanding Officer

RCAF Station St Hubert Que
RCAF Station North Bay Ont
RCAF Station Chatham NB
RCAF Station Uplands Ont
RCAF Station Cold Lake Alta
RCAF Station Bagotville Que
RCAF Station La Macaza Que
RCAF Station Mont Apica Que
RCAF Station Lac St Denis Que
RCAF Station Foymount Ont
RCAF Station Edgar Ont
RCAF Station St Margarets NB

RCAF Station Parent Que
RCAF Station Senneterre Que
RCAF Station Falconbridge Ont
RCAF Station Ramore Ont
RCAF Station Beausejour Man
RCAF Station Beaverbank NS
RCAF Station Holberg BC
RCAF Station Gander Nfld
RCAF Station Moisie Que
RCAF Station Sydney NS
RCAF Station Barrington NS
RCAF Station Kamloops BC

① Fallout Prediction -
Fallout Wind Forecasts

1 The attached paper on Fallout Wind Forecasts has been prepared by the meteorological staff at this headquarters for the guidance of officers charged with the responsibility for fallout prediction.

2 This information supplements that contained in RCAF Pamphlet 99, Chapter 2 and Appendix "E", and supersedes our earlier letter S963-102 (SASO) dated 25 Jul 60.

R. Ashman
(RA Ashman) G/C
for AOC ADC

Att

→ c.c. AFHQ/DNDO

T13 2

*DNDO
Dtd 598-108 npr
ASRall
54-1
25 Jul*

② DAIR S-4

Do you wish to make any
comment on the information/statements (para 7)
contained herein.

M. K. Loh
DNDO
5-8 22 8

000143

RESTRICTED

APPENDIX "A" to
969-3 (SASO)
Dated

FALLOUT PREDICTION

FALLOUT WIND FORECASTS

1 The FU2WG and FU2UL are forecast winds for possible target cities in southern Canada and northern USA. They are relayed, as appropriate, to all RCAF weather offices in Canada and to all Radar Units which have drops on the weather teletype circuits. They will be available at about 0200Z (valid from 0300Z to 1500Z) and 1400Z (valid from 1500Z to 0300Z).

2 The circuits concerned and the scheduled times of relays are:

	<u>CIRCUIT</u>	<u>TIMES</u>
(a) FU2WG	DOT 102	0144Z 1341Z
	103	0152 1341
	104	0138 1338
	109	0200 1400
	113	0138 1338
	114	0150 1348
	254	0148 1347
	DND 1295	0202 1400
(b) FU2UL	DOT 107	0159 1356
	109	0200 1356
	110	0200 1356
	130	0157 1357
	131	0157 1357
	133	0157 1357
	DND 1295	0200 1357

In addition, similar forecasts for Sudbury, Val d'Or, Parent and Bagotville, under the heading FU2HU, are transmitted on DND circuit 1295 at 0155 and 1355Z.

3 These forecasts provide the forecast mean wind for each 6,000 foot layer of the atmosphere from the surface to 54,000 feet. In addition, once daily, the 0200Z FU2UL includes the actual wind at 80,000 feet. This wind is assumed, in the absence of forecast data, to represent the mean wind for the layer 54,000 feet to 90,000 feet and to be valid for the following 24-hour period.

4 The wind message consists of six-figure groups in the symbolic form HHddFF, where:

HH - the height of the top of the layer, in thousands of feet, for which data are given,

dd - the direction from which the wind is blowing, in tens of degrees true, and

FF - wind speed in knots.

To indicate wind speeds in the range 100 to 199 knots, the convention of adding 50 to the direction is used (e.g. 307825 would be: Winds at 30,000 feet from 280 degrees true at a speed of 125 kts). To indicate speeds of 200 to 299 and 300 to 399 kts, a group 00200 or 00300 is added after the group to which it refers.

RESTRICTED

APPENDIX "A" to
969-8 (SASO)
Dated

2

5 These winds may be used directly in preparing fallout plots as outlined in Appendix "E" to RCAF Pamphlet 99, "Operations and Survival Under Nuclear Fallout", except that it should be assumed that the fallout particles fall at a rate of 6,000 feet per hour instead of 10,000 feet per hour. This will result in a slightly larger plot but will not affect the directions of the effective wind lines. The effective wind speeds and the isochrones of arrival and ending of fallout can be arrived at in a similar manner to that in which they were determined using the 10,000 foot layer winds.

6 The fallout forecast winds may be used in meeting the requirements for practice fallout winds at the various units. It should be emphasized, however, that being forecasts of winds over a specific location, they will not normally reflect variations downwind from that point. Fallout prediction activities should therefore be co-ordinated with RCAF Met officers wherever possible.

7 It is understood from AFHQ that meteorological staffs at that headquarters are at the moment developing a plan for a co-ordinated effort in fallout prediction involving RCAF Meteorological Offices and adjacent RCAF units. It is envisaged that each Met Office will eventually be responsible for providing fallout wind forecasts, and perhaps plots (or at least assistance in preparing plots), for designated RCAF units in its geographic area which have no met offices of their own. Further details will be provided as soon as they are available.

10 May 62

Prepared by ADCHQ/SOMet

S E C R E T

⁹
S968-108(COps)

AOC ADC
AOC ATC
AOC AMC
AOC MAC
AOC TC

①

Advice on Nuclear Detonation Information for RCAF
Stations Not Having Meteorological-Nuclear Defence Teams

1 Amendment action now being taken with respect to the RCAF EDP, Para 4(c), "Nuclear Detonation Information" provides that all information received at RCAF stations relative to nuclear detonations and radioactive fallout will be assessed by the station meteorological - nuclear defence team to determine the hazard to local RCAF operations. This team capability already exists at most RCAF stations. For those stations where it does not exist, it would appear practicable for the specialized assessment to be carried out by the nearest RCAF station having a meteorological-nuclear defence team. It is proposed to develop plans in this regard within the following broad guide lines:

- (a) The allocation of responsibility should be made primarily on an area rather than a Command basis, as disruption of communications is to be expected following a nuclear attack;
- (b) Information to be passed to adjacent formations should be restricted to the minimum that will meet their requirements. Types of service which could be provided are described at Appendix "A"; and
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② D Air S

This programme
will meet a need
at Stns having no
met/Nde/ Team -
The participation for
this team is well
defined at App B
paras 6(a) (b) & (c)
we may have communications problems. DND agrees with the paper.

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- 2 -

S E C R E T

provided with meteorological personnel for peacetime exercises, the plan should contain provision for them to receive support as necessary from other locations pending the attainment of the local capability in this regard.

2 To assist this headquarters in the development of these plans it is requested that advice on the following items be listed and forwarded to reach this headquarters by 22 Jun 62:

- (a) Formations under your Command which lack the capability to establish a meteorological-nuclear defence team but which would require assessment advice on nuclear detonation information;
- (b) Those formations listed in (a) for which the responsibility can be assumed by specific stations under your Command;
- (c) Those formations listed in (a) which, by virtue of their proximity to a station of another Command, could best be served by that station; ~~and~~
- (d) The type of service which would normally meet the requirements of each of the various formations listed in (a); *and*

3 For your information, Appendix "B" contains clarification of the use which RCAF stations would make of the NUDETS, FALLWARNS and FALLREPS which would be issued by the National Survival Nuclear Detonation and Fallout Reporting System.

(LJ Birchall) A/C
for CAS

APPENDIX "A"
TO: S968-108(COps)
DATED:

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 - (ii) bearings of outside effective wind lines,
 - (iii) cloud radius,
 - (iv) qualitative advice on intensity of radiation, and
 - (v) amended information on any of the above items as available.

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- 2 -

APPENDIX "A"

providing amendment advice on nuclear detonation information to adjacent formations will be required to maintain a watch on the various conditions over the area in which the formations are located.

RESTRICTED

APPENDIX "B"

TO: S968-108(COps)

DATED:

RCAF UTILIZATION OF INFORMATION RECEIVED FROM
THE NATIONAL SURVIVAL NUCLEAR DETONATION AND
FALLOUT REPORTING SYSTEM

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- (c) radioactive fallout reports (FALLREPS).

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RESTRICTED

- 2 -

APPENDIX "B"

for the following reasons:

- (a) The RCAF station, with its meteorological section already functioning, is likely to have access to later and more precise meteorological data than that on which the FALLWARN was based. The meteorological section is able to apply this data directly in fallout prediction relative to local RCAF operations. In the case of the National Survival Warning Centre (the source of the FALLWARNS) no meteorological staff will be available until after an appropriate readiness or alert state has been declared, and it is therefore quite likely that the FALLWARNS available following a surprise attack would not reflect full consideration of the latest meteorological information,
- (b) The emphasis in the FALLWARN is directed toward the Army's National Survival role. It provides the Army Commander with information on the broad area in which he would be required to monitor the radiation hazard in so far as it may be significant to unprotected personnel proceeding on foot into or through the damaged area. The RCAF Commander, however, is directly concerned with the probability of fallout affecting a relatively small area, namely, his base. Furthermore, as he may have to continue flying operations in spite of a high level of radioactivity on his base, he may require advice on much higher levels of radioactivity than are provided for in the FALLWARN message ~~as the National Survival fallout prediction~~
~~subject~~; and
- (c) Following a nuclear attack, it is quite possible that the RCAF station would receive no advice from the National Survival warning centres because of the disruption of communications.

RESTRICTED

- 3 -

APPENDIX "B"

7 FALLREPS are reports of radioactive fallout. Reports will be made at fallout reporting posts across Canada on:

- (a) the time of beginning of fallout;
- (b) the current radiation intensity;
- (c) the peak intensity; and
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8 FALLREPS and the radiation intensity reports for airfields which are to be made available over the meteorological teletype networks in Canada and the United States are to be correlated with the fallout prediction and used as required in the assessment of the fallout hazard.

CONFIDENTIAL

(S969-108) (DND0)

(S969-108) (DND0)

SCR PA.

Ottawa Ont
27 Apr 62

Ref your 969-8 (SOOP) 10 Apr 62

Air Officer Commanding
Air Defence Command
RCAF Stn St Hubert
PQ

Fallout Prediction

1 As is always the case when information is passed second or third hand and possibly loosely interpreted at varying stages along the way, there is some distortion of facts as represented in your above quoted letter. Of course faults are not always on one side and in order to sort out this knotty problem discussion was held today between the Commandant of the JABC School and DND0.

2 While your HQ sees no requirement for ADC Units to be familiar with any prediction system other than the RCAF system, this HQ considers that there might be a need for interpretation by ADC staffs of NDFRS, Fallrep and Fallwarn messages that will be transmitted through Sector and other control HQs and that the correct interpretation of these messages might materially assist in substantiating our own predictions. It would also appear logical that we should attempt to broaden our knowledge on any subject and fallout prediction should be no exception to the basic premise.

3 Agreement was reached today with the Commandant of the JABC School that the school would adopt the following course of action for the courses as indicated:

NBC 3. All RCAF officers will receive instruction on both the RCAF and National Survival systems of Fallout Prediction and will be examined on the RCAF system only.


NBC 5 & 6. All RCAF personnel will receive instruction on the RCAF system only and will be examined on this system. They will be told of the existence of other systems.

NBC 7. All RCAF NCOs will be instructed on both the National Survival system and the RCAF system and will be examined in the RCAF system.

- 2 -

CONFIDENTIAL

4 Agreement was also reached concerning the system of shelter evaluation that should be taught to RCAF students attending the school and it was agreed that on those courses where shelter evaluation is taught, the RCAF system as shown in Pamphlet 99 will be the system which will be emphasized to all RCAF Students.


(AH Blake) W/G
for CAS

cc: Commandant JABC School

MEMORANDUM

13 Apr 62

DGT/GT 3

Fallout Prediction

- 1 The attached letter from Air Defence Command is self explanatory. Is it your wish as Chairman of the NBCTSC that we place this item before a future meeting of that committee, or, would you prefer to raise the matter direct with the Commandant of the JABCS? If you consider the latter course of action to be more appropriate, do you wish DNDO to carry the ball?
- 2 Fallout Prediction was discussed at the 8th meeting of the NBCTSC serial No 20 of the minutes of that meeting refer. It will be seen that the RCAF stand was, that the RCAF system contained in Pam 99 should be taught to those courses where-on there was a predominance of RCAF personnel. It could be that this is where the system falls down. What we really need is for all RCAF students to receive this instruction regardless of the numbers of RCAF trainees under instruction.
- 3 This may well require RCAF students to receive this instruction after normal duty hours. This would be agreed to by DNDO provided there is no objection from the school.
- 4 Additionally, it has become apparent that following the 11th meeting of NBCTSC, serial No 4 refers, the JABC School is teaching the Army Works System of Shelter evaluation at the exclusion of the system contained in Pam 99. While the RCAF has no objection to RCAF personnel becoming familiar with the Army system, the RCAF considers that as the system contained in Pam 99 has been in use for a considerable period of time and is supported by a number of special films on this subject and furthermore the system meets the RCAF requirements for shelter evaluation, then the system as demonstrated in Pam 99 should continue to be taught by the JABC School to RCAF students.

AK Blake
(AH Blake) W/C
DNDO
2-8228

Attch.

② DNDO

I do not know of any change to the arrangements regarding Fallout Prediction; therefore, suggest you raise this point at next meeting.
As for Shelter evaluation, it is my understanding that your officers agreed, in the interest of having one system that the Army system would be used as long as it was basically the same as that used by the federal CD authorities. If this is incorrect suggest it be a further item for discussion at next meeting. For your info the Army is chairman of the 000155

24/4

19 Apr 62
GT3
104D 27864

000155

IN REPLY TO QUOTE
No 969-8 (SOOP)



CANADA

Department of National Defence

Royal Canadian Air Force

1132

St Hubert Que
10 Apr 62

Ref Your 1066P-7, 11 Jan 62
NDO 57, 4 Apr 62

Referred to DND
1066P-7
DND
3/4/62

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Fallout Prediction

- 1 RCAF Pamphlet 99 provides all the guidance necessary to ADC units on the method of fallout prediction to be used. Although Pamphlet 176 is of interest to nuclear defence and meteorological officers for purposes of comparison, it is suggested that, to avoid possible confusion, wider distribution should be discouraged. This headquarters sees no requirement for ADC units to be familiar with either the Army method of prediction or any other system.
- 2 Although your referenced message indicated that RCAF students on all courses at the JABC School, Camp Borden receive instruction on the RCAF prediction method, a recheck with students on recent courses NBC 3, NBC 5 and NBC 7 has reaffirmed that this is not correct. Furthermore, instructors at the School have been quoted as stating that Pamphlet 99 has been superseded by Pamphlet 176 and is no longer current, and that the RCAF has adopted, or is about to adopt, the Army prediction method.
- 3 While it is appreciated that these statements may have been expressed as personal opinions, the fact remains that RCAF personnel have been leaving the JABC School under the impression that they are to use the prediction method as taught at the School (i.e. Army system) and have attempted to introduce it upon return to their units in place of the approved RCAF method.
- 4 It is therefore requested that action be taken by your headquarters to clarify the situation and ensure that RCAF personnel attending courses NBC 3, 5, 5A, 6, 6A and 7 do receive instruction on all applicable aspects of Pamphlet 99, including the RCAF method of fallout prediction.
- 5 Your confirmation will be awaited before any further nominations are made from this Command for the courses concerned.

DeKoning
(SA Rollag) Lt Col
for ADC ADC

T.D. No. 0182

DEPARTMENT OF NATIONAL DEFENCE

CONFIDENTIAL

TEMPORARY DOCKET

23 June 60

[illegible]

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.

S969-108(DIDO)

Ottawa Ont
14 Jul 60

Ref your S963-110(SOND) dated 23 Jun 60

Air Officer Commanding
1 Air Division RCAF
CAPO 5052
Canadian Armed Forces Europe

Nuclear Defence Operations
Estimates of Radiation Intensities from Fallout

- 1 It is felt that you recognize the inaccuracies which are inherent in any system of prediction which attempts to define intensities within a fallout pattern. The sensitive wind-dependence of the fallout distribution mechanism and the degree to which wind and other meteorological conditions affect these fallout parameters cannot be over-emphasized. In fact the curves presented in TM23-200 can only be considered reliable within a plus or minus factor of 50%.
- 2 We have been able to obtain some intelligence from the Director of Scientific Intelligence DRB which reveals that Soviet Thermonuclear Weapons are very dirty, that is to say they contain a high percentage of fissile material. It is estimated that about 70% of the total yield of these weapons is due to fission reactions. Although this percentage may be on the high side of the true value it is considered that it is within the reliability limits of the curves you refer to in TM23-200 and that it should provide a safe value for planning purposes.
- 3 As you are aware there are as many systems of predicting fallout as there are National Military Services none of which attempts to accurately predict intensities within a fallout pattern. Studies held at this HQ in readiness for the Tripartite Toxicological Conference have produced nothing new except for a proposal by the Canadian Army to adopt the US Army System which attempts to define only two areas within the fallout pattern for purposes of work times. These areas are defined as emergency risk and moderate risk areas and indicate the area within which all exposed personnel will receive 100r or more in 4 hours and 20r up to 100r in 6 hours respectively. The RCAF has not yet fully subscribed to the system but advocates as always, the use of as much information that can be provided to the operators and complete coordination between the Lt Officers and the Nuclear Defence Officers.

A. H. BLAKE
JOINT CHIEF OF STAFF

(A H Blake)W/C
for CAS

W/CAHBlake/sb
DNDO
(6-8228)
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DRBTS 1600-7
OUR FILE REF. DSI Ref: C-358

DEPARTMENT OF NATIONAL DEFENCE
DEFENCE RESEARCH BOARD

MEMORANDUM

Ottawa, Ontario
11 July, 1960.

DNDO

Ref: Min 2, S963-110 (SOND) dated 23 June 60.

1. An investigation of all available intelligence re data on Soviet Thermonuclear Weapons has revealed that these weapons are very "dirty" (i.e.) contain a high percentage of fissile material.
2. It is estimated that about 70% of the total yield of these weapons is due to fission reactions. Although this percentage may be on the high side of the true value, it is considered that it is within the reliability limits of the referenced curves of TM 23-200 and that it should provide a safe value for planning purposes.

(R.A. Lemieux) F/L
for Director, Scientific Intelligence.

cm
13/7

DEPARTMENT OF NATIONAL DEFENCE

MINUTE SHEET

Referred to

REMARKS

To be signed in full showing Appointment, Telephone Number & Date

DRB/DSI

The request for fusion/fusion
notes was discussed briefly with
F/L Lemieux of your staff. He advised.

(a) The answer would have a
higher classification than the query

(b) There are more factors, such
as yield that enter the problem

(c) He would investigate whether
the desired information is available.

May this request be followed up,
please, and an appropriate reply
be passed to DNDO for onward
transmission to 1 Air Division

G. M. Ewan S/L
A12-4

CONFIDENTIAL

Our file ref. **S963-110 (SOND)**



DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

Metz Moselle France

23 Jun 60

0187

Chief of Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4, Ontario

Attn: DNDO

Referred to	DND
DATE	1960
File	8969-108
Subject	DAIRS
	15/6/59

①

Nuclear Defence Operations
Estimation of Radiation Intensities from Fallout

1 An estimation of radiation intensities resulting from thermonuclear detonations can be obtained from Figures 4-14 through 4-18 of TM23-200, Capabilities of Atomic Weapons, provided the fission/fusion ratio of the weapon is known. This information is of vital interest to bases within this command. From this information a base may be able to predict its future operational capability. Therefore, knowing the fission/fusion ratio of U.S.S.R. thermonuclear weapons is essential for accurate prediction.

2 If the fission/fusion ratio is known an elliptical pattern based on Fig 4-14 to 4-18 of TM23-200 can be superimposed on the fallout plot centred on the maximum intensity line. The contours of this pattern can be converted from H+1 intensities to those which will prevail at the estimated time of arrival of the fallout at a unit. This method will provide the most accurate radiation intensity prediction.

3 It is requested that intelligence source be contacted to provide the probable or exact fission/fusion ratio of U.S.S.R. thermonuclear weapons.

②

DAI

Ref para 3. It is understood that
OSIP can provide us with an approximation
of the fission/fusion fraction. Will you please
investigate the feasibility of this information being obtained
and relayed to the RCAF Division
for ACC 1 Air Division RCAF
(FA Wingert) S/L
68228

SECRET

Our file ref. S096-101 (CStaff00ps)
C810-120 (CStaff00ps)



CANADA

DEPARTMENT OF NATIONAL DEFENCE

ROYAL CANADIAN AIR FORCE

TRENTON Ont

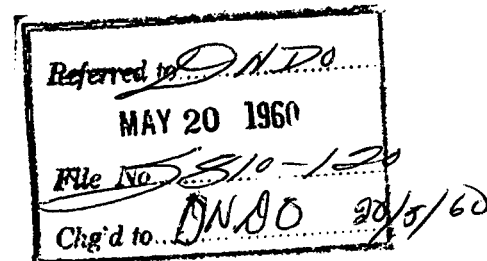
19 May 60

Ref Para 3 of your C810-120(DNDO) 26 Apr 60
and Para 20(b) of our C810-120(STrgSO) 12 Apr 60

0145

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ont

Planning - Policy
Fallout Forecast Plan



1 The attached plan for the provision of fallout forecasts for RCAF units in TC in Eastern Ontario was suggested by TCHQ.

2 The SOMet ATCHQ concurs with the basic concepts outlined in this plan.

3 It is further suggested that the service provided by the ATCHQ forecast unit be extended to all RCAF units in Eastern Ontario with the exception of ADC units and those in the Ottawa complex. ATC units in this category are Stn Downsview and Stn Hamilton.

4 A similar forecast unit is suggested for the Winnipeg/Rivers area. This unit would then provide Nudet reports and back-up in the case of communications failure to ATC units in Western Canada. Such units include Stn Namao, CJATC Rivers and RCAF Unit Fort Churchill.

② DAIRS-S4

Passed for comment
Att ple
[Signature]

(GJJ Edwards) G/C
for AOC ATC

NA.
mm

COPY

IN REPLY PLEASE QUOTE

No

SECRET

963-100-4(CStaff0)



CANADA

Department of National Defence

Royal Canadian Air Force

Trenton Ontario
4 Sep 59

Ref Your S963-108 (VCAS) 23 Jun 59

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ontario

Prediction of Radiological Fallout

1 Following is an interim plan to become effective with the move of TCHQ to Winnipeg with respect to the provision of fallout forecasts for RCAF units in TC having no meteorological officer staff.

2 Training Command will have 10 units in this category. These are:

- (a) RCAF Staff College
- (b) RCAF Station Aylmer
- (c) RCAF Station Camp Borden
- (d) RCAF Station Clinton
- (e) RCAF Station St Johns
- ~~(f) RCAF Station Calgary~~
- (g) 17 Wing (Aux) Winnipeg
- (h) 18 Wing (Aux) Edmonton
- (j) 23 Wing (Aux) Saskatoon
- (k) 30 Wing (Aux) Calgary

John Cooper CPlms

3 It is agreed that fallout forecasts should be provided by designated RCAF meteorological sections and it is further advocated that the most reliable service will usually be provided by a forecast office in the immediate geographical area of the station concerned. It is also contended that a forecast office should be organized at the Command HQ to provide fallout forecasts and weather forecasts for Command operations and to provide backup for field forecast offices in the event of a local meteorological communications failure.

4 With this general theme in mind it is suggested that:

- (a) In the event of an emergency, the staff and facilities of the Trenton meteorological complex consisting of the ATCHQ SOMet, the Stn Trenton Meteorological Section and the School of Meteorology be organized as one unit to provide a 24 hour operational weather office, issuing flight and fallout forecasts for ATC operations - further, that this office become sufficiently operational during Readiness State One that fallout forecasts will be available immediately on receipt of the first Nudet report.
- (b) ATCHQ be assigned the responsibility for providing Nudet reports, accompanied or followed immediately by a fallout forecast, relative to the particular burst, for all Eastern TC units other than Station St Johns.
- (c) ADCHQ be assigned the responsibility for issuing Nudet reports and fallout forecasts for Station St Johns.

- (d) Station Centralia Meteorological Section, on receipt of Nudet reports and the related initial fallout forecast from ATCHQ, be organized to maintain a continuous revision of fallout forecasts for Stations Clinton, Aylmer and Camp Borden.
- (e) No provision for fallout forecasts be made for RCAF Staff College since that unit is evacuating.
- (f) The ATCHQ forecast office provide a back-up for the Centralia forecast office should that unit have a meteorological communications failure.

5 The above plan would require that ATCHQ be placed on W/T circuit TCFl.

6 There is some question as to whether fallout forecasts for Stn Camp Borden should be provided by the Station Centralia Meteorological Section or by the ATCHQ forecast office. In addition, the question of the source of fallout information for the Canadian Army at Camp Borden poses a problem. If the Army is providing for fallout information at Camp Borden, perhaps the RCAF Station should receive its information from the same source.

7 Since the evacuation of TCHQ from Station Winnipeg to Station Rivers is involved in the West, the details of the plan for western stations will follow after further coordination with western units from Winnipeg. At present, it is envisaged that the initial Nudet report to all western TC units (and possibly certain units from other Commands in the same geographical area) would be issued by TCHQ Winnipeg, prior to evacuation to Rivers. Successive Nudet reports, until TCHQ is reformed at Rivers, would be provided by the provisional HQ at Stn Moose Jaw. Fallout forecasts would be provided by the nearest RCAF forecast office, which would be located in the same city, except in the case of Calgary. The Station Penhold forecast office can provide this service to Calgary units if fallout information is not available from the civil office in that city.

8 Following up the basic concept advanced in para 3 above, and bearing in mind the role of the Canadian Army and associated Civil Defence authorities, it is advocated that the RCAF plan should be no more than an interim arrangement providing for the immediate operational requirements of the RCAF. It is advocated that, ultimately, the whole problem of fallout forecasting should be organized on a national basis, to provide basic forecasts for all consumers, utilizing the full professional forecasting capability of civil and military forecast offices. The co-ordination of the fallout forecasting program by a single national source would undoubtedly enhance the service to be provided by RCAF forecast offices in meeting the requirements for specialized fallout and weather forecasts for vital air operations.

(Original signed by
E.R. Johnston)

for (JB Harvey) A/C
for AOC, TC

MAIN FILE No. 5969-108

T.D. No. 0117P

TEMPORARY DOCKET
DEPARTMENT OF NATIONAL DEFENCE
ROYAL CANADIAN AIR FORCE

[illegible]

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.
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 hrs. B.F. Docket.
6. T.D's. to be passed, P.A 'd, B.F'd, etc. in the same manner as main files.

DEPARTMENT OF NATIONAL DEFENCE

MINUTE SHEET S969-108 TD 0117P(DAIRS)

Referred to

REMARKS

To be signed in full showing Appointment, Telephone Number & Date

Min (2)

DNEDPO

1 Thank you for drawing our attention to the pertinent paragraphs of the ATC Nuclear Defence Quarterly Report for Jan-Mar 60.

2 Whether or not ATCHQ should organize a forecast office to provide fallout prediction for all RCAF offices in eastern Canada will require further consideration. It is to be noted that:

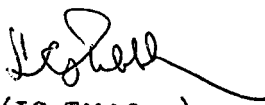
- (a) This is, in general, in keeping with the plans which are being developed for support to units not having Meteorological Officer staff and
- (b) AOsC will continue to have an active interest in their operational units on a command basis rather than on a regional basis.

③

Seen by DND Staff - P/A
5 May 60.

John
DND/ND
(2-5349)

29 Apr 60


(LG Tibbles)
DAIRS/S4-4
6-6892

CONFIDENTIAL
S969-108 0117P (DNEDPO)

MEMORANDUM

26 Apr 60

DAirS/S4-4

Fallout Prediction

1 The following paragraphs are extracted from the Air Transport Command, Nuclear Defence Quarterly Report for Jan - Mar 60 and forwarded for your information and whatever action you deem necessary, if any:

"20(b) Fallout Prediction - Whether or not ATCHQ should organize a Forecast Office to provide fallout prediction for all RCAF units in Eastern Ontario (TCHQ's 963-100-4(CStaffO) dated 04 Sep 59 refers).

"21 Fallout prediction - FIU exercises at this CHQ (see Para 50) have brought out the fact that Met staffs use the FCD method, and not the RCAF method (now detailed in Pamphlet 99). The FCD method makes no provision for precipitation effects; the RCAF method does not distinguish between areas of significant and (relatively) insignificant fallout, nor does it place any limit on the downwind extent of the hazard. It is understood that your Met staff are working on this problem and are in close touch with DRB (which collaborated in the preparation of the FCD method). If Met and nuclear-defence personnel are, in the words of Pamphlet 99, to "work closely together, combining each other's specialist knowledge and experience", it is essential that they use a common method of prediction; in the meantime, and to prevent confusion and duplication of work, this CHQ uses the FCD method in its exercises.

"50 Fallout Prediction - To provide both the Meteorological staff of Station Trenton and ATCHQ/SOND with practical training in the operation of a Command Fallout Intelligence Unit, fallout prediction exercises are held every two weeks. From an arbitrary selection of nuclear detonations, yields and times selected at random by SOND, the Met staff produce a fallout-prediction plot which is then forwarded to SOND. A report is prepared and circulated covering the predicted threat to all RCAF units in the zones of interest, and including predicted times for the start and cessation of fallout, expected intensities, dose-rates and dosages to exposed personnel and (where applicable) damage expectancy from direct effects. Although the basic aim in these exercises is to train the Met staff and SOND, circulation of the exercise-reports provides interested personnel with an indication of the possible threat in a nuclear war and of the advice and information which would then be available from the FIU. "

2 With reference to para 20(b) quoted above, this office is informing ATC to make this the subject of separate correspondence in order that it may be actioned properly.

(A H Blake) W/C

DNEDPO

(6-8228)

000168

②
OFFICE OF VICE CHIEF OF THE AIR STAFF

TO

C. O. / J. A. S.

DATE

14 Sep

☐

Note and return

☐

For your retention

☒

Take appropriate action

☐

Copy passed to.....

☐

For your comments by.....

☐

For your information

☐

Prepare reply for.....Signature

☐

Prepare and sign reply.

☐

VCAS has/has not seen.

③ 54
Action please

John Mitchell
15 Sep
D. A. S.
S 866

(A. B. C. Johnson) S/L
VCAS/EA
2-4338

000169

~~SECRET~~

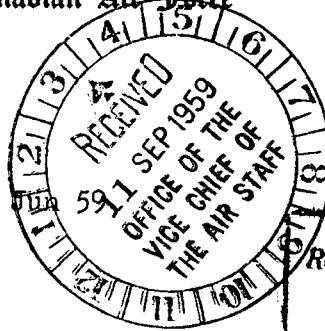
IN REPLY PLEASE QUOTE

No. 963-100-4(CStaff0)



Department of National Defence

Royal Canadian Air Force



Trenton Ontario
4 Sep 59

Ref Your S963-108(VCAS) 23

Chief of the Air Staff
Air Force Headquarters
Department of National Defence
Ottawa 4 Ontario

Referred to *VCAS*
1008
File # *969-108*
Chg'd to.....

Prediction of Radiological Fallout

1 Following is an interim plan to become effective with the move of TCHQ to Winnipeg with respect to the provision of fallout forecasts for RCAF units in TC having no meteorological officer staff.

2 Training Command will have 10 units in this category.
These are:

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- (c) RCAF Station Camp Borden
- (d) RCAF Station Clinton
- (e) RCAF Station St Johns
- (f) RCAF Station Calgary
- (g) 17 Wing (Aux) Winnipeg
- (h) 18 Wing (Aux) Edmonton
- (j) 23 Wing (Aux) Saskatoon
- (k) 30 Wing (Aux) Calgary

3 It is agreed that fallout forecasts should be provided by designated RCAF meteorological sections and it is further advocated that the most reliable service will usually be provided by a forecast office in the immediate geographical area of the station concerned. It is also contended that a forecast office should be organized at the Command HQ to provide fallout forecasts and weather forecasts for Command operations and to provide backup for field forecast offices in the event of a local meteorological communications failure.

4 With this general theme in mind it is suggested that:

- (a) In the event of an emergency, the staff and facilities of the Trenton meteorological complex consisting of the ATCHQ SOMet, the Stn Trenton Meteorological Section and the School of Meteorology be organized as one unit to provide a 24 hour operational weather office, issuing flight and fallout forecasts for ATC operations - further, that this office become sufficiently operational during Readiness State One that fallout forecasts will be available immediately on receipt of the first Nudet report.
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- (c) ADCHQ be assigned the responsibility for issuing Nudet reports and fallout forecasts for Station St Johns.

422 B

- 2 -

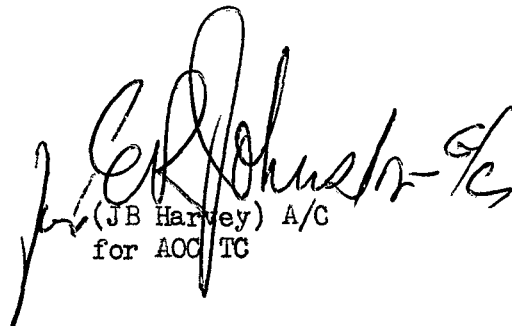
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- (e) No provision for fallout forecasts be made for RCAF Staff College since that unit is evacuating.
- (f) The ATCHQ forecast office provide a back-up for the Centralia forecast office should that unit have a meteorological communications failure.

5 The above plan would require that ATCHQ be placed on W/T circuit TCF1.

6 There is some question as to whether fallout forecasts for Stn Camp Borden should be provided by the Station Centralia Meteorological Section or by the ATCHQ forecast office. In addition, the question of the source of fallout information for the Canadian Army at Camp Borden poses a problem. If the Army is providing for fallout information at Camp Borden, perhaps the RCAF Station should receive its information from the same source.

7 Since the evacuation of TCHQ from Station Winnipeg to Station Rivers is involved in the West, the details of the plan for western stations will follow after further co-ordination with western units from Winnipeg. At present, it is envisaged that the initial Nudet report to all Western TC units (and possibly certain units from other Commands in the same geographical area) would be issued by TCHQ Winnipeg, prior to evacuation to Rivers. Successive Nudet reports, until TCHQ is reformed at Rivers, would be provided by the provisional HQ at Stn Moose Jaw. Fallout forecasts would be provided by the nearest RCAF forecast office, which would be located in the same city, except in the case of Calgary. The Station Penhold forecast office can provide this service to Calgary units if fallout information is not available from the civil office in that city.

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(JB Harvey) A/C
for AOC TC

Cops

Letter at fly for your signature is in reply to ADC letter at Flag 1 below. This reply has been coordinated with DNDO who has initialled the file copy below in concurrence.

S969-108
28 Aug 59

W. H. Hucker
for (EM Mitchell) G/C
DAirS
6-6179

000172

Ottawa Ontario
28 Aug 59

Ref: 5963-102(SASO), 4 Aug 59

Air Officer Commanding
Air Defence Command RCAF
RCAF Station St Hubert
PQ

Prediction of Radioactive Fallout

- 1 Your proposal to provide units of the AC&W system with wind forecasts in increments of 10,000 feet up to 60,000 feet for use in predicting fallout danger sectors would appear to be satisfactory, at least as an interim procedure. Although it does not allow for the effect of precipitation on fallout, it is presumed that the forecast offices concerned (St Hubert, Chatham and Comox) would maintain a watch against the possibility of such additional effects and would provide appropriate warnings in this regard to the units in their respective areas of responsibility.
- 2 It is doubted that the provision of this service on a once per week basis in peacetime, particularly during the initial phases of the programme, would be adequate to accomplish the aim of thorough familiarization of the AC&W personnel with the preparation and use of the plots. It is suggested that consideration be given to more frequent service wherever possible in this regard during the first few months of the peacetime programme.
- 3 The suggestion in your para 3 that facsimile would provide a very suitable method of transmitting the fallout wind forecasts and similar data from central locations is well made. In fact the problem of support to be provided by the Meteorological Branch, DOW, for fallout prediction programmes is under consideration at NDHQ (in the Sub-Cte on Met Services for Defence), but is unlikely to be solved for some time yet, due partly to the uncertainty of some of the user agencies regarding their actual requirements for such support.
- 4 In the meantime, by virtue of its weather facsimile circuit from St Hubert to the units of 1 and 3 Sectors, ADC has the capability to experiment in the transmission of fallout wind forecasts, plots of anticipated fallout danger sectors, and other related data in pictorial form by facsimile. It is strongly recommended that a vigorous pilot project be developed in this regard from St Hubert to the AC and W units in 1 and 3 Sectors. The experience gained in such a programme could be a major contribution to determining the most effective methods of meeting the combined national requirements for fallout prediction services.

SIGNED BY M. LIPTON
(M Lipton) A/C
for CAS

HW TUCKER/FH
66892

Copies to:

COps/Sec
DAirS/Sec
Orig
Circ
1 extra
file

1000
SIGNALS OFFICE

AUG 13 20 42 59

QAB009

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TO ZEN/CANAVHED

INFO RFEPFZ/CANAIRHED

BT

// C O N F I D E N T I A L //

CONFIDENTIAL SUGGESTED REQUIREMENT FOR PROPOSED TELETYPE CIRCUIT

ST MARGARETS ADCO AND INTERIM MHQ IS NOT SUPPORTED X THIS CIRCUIT CANNOT
BE JUSTIFIED WITH FINANCIAL IMPLICATIONS NOTING DND 158B NOW

TERMINATED IN THIS HQ X CONSIDER TYPE OF INFORMATION NOTED NSS 1280-68

(STAFF) DATED 9 JAN 59 CAN BE EXCHANGED ON EXISTING CIRCUIT

BT

13/1912Z

TOD 13/2030Z

REFERENCED LETTER PLACED ON

.....~~8463-108~~.....TD. 9015

AND PASSED TO.....~~COPE~~.....

CONFIDENTIAL

PARAPHRASE NOT REQUIRED

OFFICE OF VICE CHIEF OF THE AIR STAFF

TO ⁽²⁾
COPS

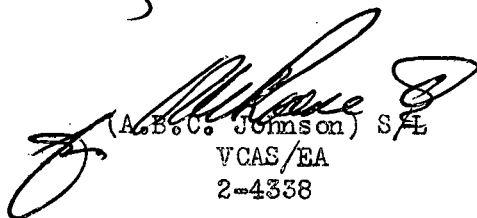
DATE 10 Aug 59

- ☐ Note and return
- ☐ For your retention
- ☒ Take appropriate action
- ☐ Copy passed to.....
- ☐ For your comments by.....
- ☐ For your information and amendment
- ☐ Prepare reply for.....Signature by.....
- ☐ Prepare and sign reply by.....

Reference correspondence placed on File.....

Vol.....TD.....

(VCAS has not seen)


(A.B.C. Johnson) S/L
VCAS/EA
2-4338

11/1/59 3356.

000175



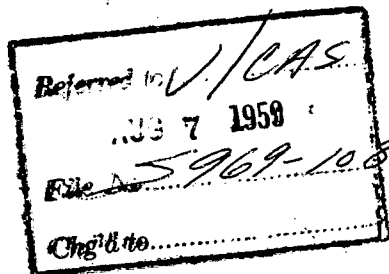
Department of National Defence

Royal Canadian Air Force

St Hubert Que
4 Aug 59

Ref Your S963-108 (VCAS) D/23 Jun 59

Chief of the Air Staff
Air Force Headquarters
Ottawa Ont



Prediction of Radiological Fallout

1 In view of the importance of meteorological information in the prediction of radioactive fallout, it is planned that those units within Air Defence Command (i.e., units of the AC&W system) not having meteorological officer staff will be provided with area wind forecasts in increments of 10,000 feet up to 60,000 feet. From these, an appropriate plot will be constructed at each unit for use in predicting the fallout danger sector of any nuclear explosion. It is envisaged that the units will plot the winds and construct the diagrams on a transparency, using a scale that corresponds to the geo-ref charts in use, so that the diagram may be placed, as required, to depict possible fallout danger sectors. In this regard, instruction in the method of constructing and the use of fallout plots will be included in a proposed ground defence course at Stn St Hubert during September, 1959, for selected personnel from each AC&W unit.

2 Wind forecasts will be prepared for specified areas within each sector, and it is planned that the responsibilities will be divided as follows:

- (a) Stn St Hubert AFO - AC&W units in 1 and 3 Sectors
- (b) Stn Chatham AFO - " " in 2 Sector
- (c) Stn Comox AFO - " " in 5 Air Div

It is proposed that this service be provided once per week, under normal conditions, in order that the AC&W personnel may become thoroughly familiar with the preparation and use of the plots. On other days, the controllers could derive some benefit from processing the ordinary high level flight wind forecasts that are received twice per day.

3 The facsimile would provide a very suitable method of transmitting these, and similar data, in pictorial form, and would reduce duplication of work to a minimum. It is therefore recommended that the possibility of having the necessary fallout wind forecasts prepared at some central agency, such as the proposed High Level Forecasting Centre, and disseminated by facsimile in a readily usable form, be investigated.

③ DAF S/S-4
We are prepared to discuss para 3 of min ① with you at your convenience.
J. J. Farolan
Major USAF
NDO-3
68228.

[Signature]
(E M Reyno) A/C
for AOC A/C

FLAG
No. 1

② DND
Pls Investigate in conjunction with Dand.
M. Lipton
Cops.
11 Aug 59

335E
RCAF G-32J
260M-10-55 (A8992)

MAIN FILE No.

T.D. No

TEMPORARY DOCKET

AIR FORCE

000177



Department of National Defence

IN REPLY PLEASE QUOTE

No 5963-108(VCAS)

Ottawa Ontario
23 Jun 59

AOC AIT
AOC ADC
AOC ASC
AOC IAC
AOC 1 Air Div
AOC EU
~~AOC TAC~~

(1)

Prediction of Radiological Fallout

- 1 The problem of providing RCAF units with a defence against radiological fallout is centred around the ability to predict and verify the location and extent of the hazardous area. Vital air operations must not be compromised because of a lack of knowledge of this phenomenon.
- 2 The attached paper represents the latest RCAF thinking on fallout prediction. It is evident that a major influence on the fallout event is the meteorological conditions which exist. Information on other influences, such as the total energy yield, fission-fusion fraction, and height of burst, may not be immediately available to the fallout forecaster.
- 3 In view of the importance of meteorological information in the prediction of radioactive fallout, as well as in the conduct of air operations, it is obvious that the meteorological officers at RCAF stations have vital roles in support of the continuance of essential air operations and the protection of unit personnel throughout periods of fallout hazard. To ensure maximum use of the meteorological facilities, the Senior Meteorological Officer must be included in unit emergency defence planning activities.
- 4 Meteorological officers in conjunction with Ground Defence officers, where available, will be responsible for providing Commanding Officers with fallout forecasts. Units, both during exercises and actual hostilities, will take fallout forecasts into consideration in the planning of air operations. ORT and EDP exercises will include tests of station meteorological facilities, where available.
- 5 For units not having meteorological officer staff, fallout forecasts will, in general, be provided by designated RCAF meteorological sections. Command HQs are to draft plans in this regard for coordination with this HQ. As AMC does not have a Staff Officer Meteorology, the AFHQ Meteorological Adviser will work directly with AMCHQ on this matter.
- 6 Copies of the attached paper, "Fallout Prediction - RCAF", are being forwarded under separate cover to Command HQs, attention Staff Officers Meteorology, for distribution to all units concerned.

HV TUCKER/PH
66892
Conden to:
VCAS/Sec
Cops/Sec
DAIR/Sec
Orig
Circ
File

(2)
DEDO
To note that letter
was dispatched on
23 Jun 59. A copy of
my letter to the
Command SMO is
attached at per
your info.
39 Jul 59

for M. Smith A/V/M
for CAS
(3) Noted by DADO
Staff - P/A.
6 July 59. Selomish
0601600 2-2
000178 1
(2)

S963-108TD9132P

File Ref

R C A F

MINUTE SHEET

Min (2)

COps (thru DGDO) *19/6*

1 The stencilled letter for VCAS signature at fly has been prepared jointly by DGDO and this Directorate to provide Commands with a policy statement on the matter of radiological fallout prediction at RCAF stations. It stresses the requirement for a fully coordinated effort between Met Officers and Ground Defence Officers in Unit fallout prediction programmes. Particular emphasis is placed on the role of the Met Officer in this regard, in view of several indications that some Units have been slow in appreciating this point.

2 A copy of the paper "Fallout Prediction - RCAF" to be attached to this policy letter is contained below on file.

3 May the stencil be forwarded to VCAS for signature, and then returned to this Directorate for duplication, and attachment of copies of the above noted paper on fallout prediction.

EM Mitchell
(EM Mitchell) G/C
DAirS
6-6179

19 Jun 59

5574.

000179

963-8(DAIRS/DGDO)

1 May 59

FALLOUT PREDICTION - RCAF

Introduction

1 Radioactive fallout may be one of the major effects of nuclear explosions. Therefore, in the event of a nuclear attack, commanders at all levels will require advice regarding the fallout threat. It will be the Ground Defence Officer and the Meteorological Officer, working together, who will have to provide this advice. The former will bring to bear considerations concerning the explosion itself (yield, height of burst, etc) and concerning radiation intensities both local and distant. The latter will introduce considerations concerning the meteorological factors, such as wind and rain.

2 Fallout prediction can be tackled in a number of ways. These differ greatly in the complexity of their computations and in the completeness of their answers. However, an important consideration in the selection of fallout prediction methods for the RCAF is the degree to which pertinent information will be available in regards to wartime nuclear explosions. Some of the more involved prediction methods, which have been developed to meet test requirements, may offer very little advantage over simpler methods when it comes to forecasting fallout from enemy weapons. The reason for this is that the detailed information concerning weapon yield and design, conditions of detonation, etc, which these complex methods are designed to exploit, may not be available.

3 Actually the character of the fallout pattern resulting from a particular nuclear detonation will depend on a whole list of factors, including the following:

- (a) height of burst;
- (b) total energy yield of explosion;
- (c) fission - fusion fraction;
- (d) surface material at "Ground Zero";
- (e) upper winds;
- (f) precipitation;
- (g) surface conditions in fallout area.

It seems likely that in war our information regarding many of these factors would, at best, lack precision. The following is therefore restricted to a simple practical approach to fallout prediction, consistent with and adaptable to the information available.

Effect of Winds on a Falling Particle

4 The resultant wind effect upon a particle falling from a given height to the surface, will be the sum of all the wind effects upon it on the way down. This is illustrated in Figure 1, where the paths of two particles falling through a hypothetical upper wind structure, each having started at the same initial point at 60,000 feet, but one falling twice as fast as the other, are compared. The solid line ABCDEFG represents the path of the slower falling particle, that is AB is the wind effect on this particle in its fall from 60,000 to 50,000 feet; BC is the wind effect on this particle in its fall from 50,000 to 40,000 feet; etc. The dashed line AB'C'D'E'F'G' represents the path of the faster falling particle, that is, AB' is the wind effect on this particle in its fall from 60,000 to 50,000 feet; B'C' is the wind effect on this particle in its fall from 50,000 to 40,000 feet; etc.

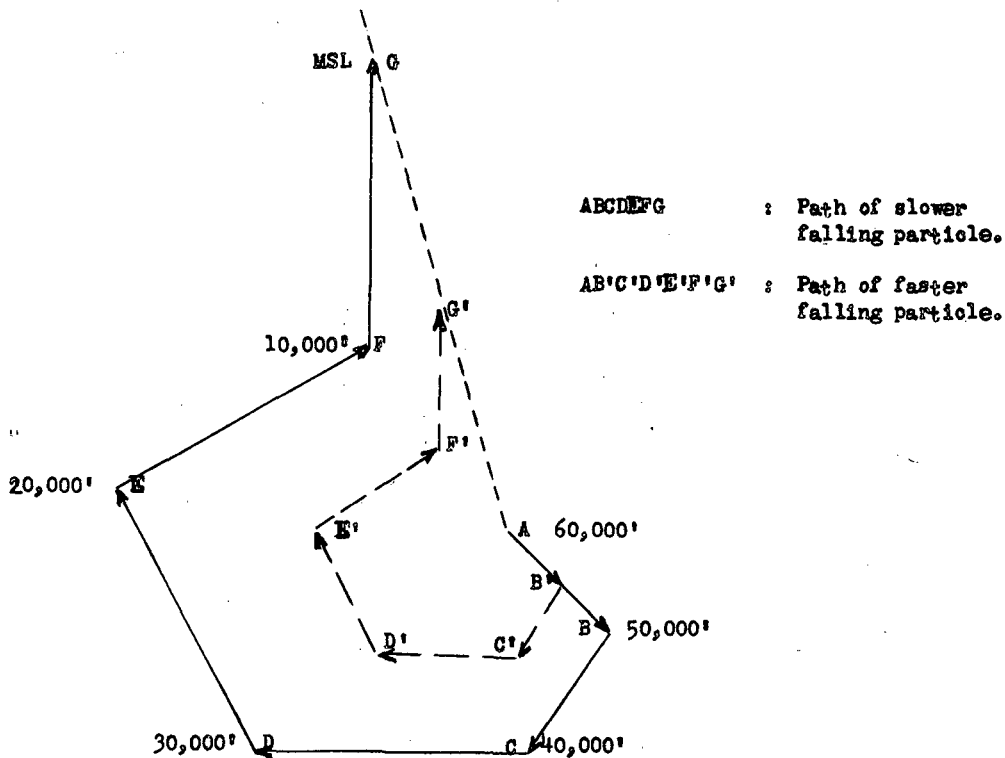


Figure 1: Paths of two particles falling through a hypothetical upper wind structure, each having started at the same initial point at 60,000 feet, but one falling twice as fast as the other.

5 If the winds do not change over the area or during the period of the close-in fallout, then all the particles starting from the same point at a particular altitude will reach the surface along a straight line, the faster falling particles landing at shorter distances, the slower falling particles at longer distances. For example, in the case

shown in Figure 1 all particles starting from 60,000 feet vertically above A reach the surface (in the Figure: 0 feet) along the line AG or AG extended.

The Wind Plot

6 As we are interested in the directions from the explosion in which fallout particles reach the ground, rather than the paths the particles follow on their way down, it is usual to plot the one-hour wind vectors for consecutive equal layers from the surface upwards to the height of the top of the nuclear cloud. Adding the layer winds in this way gives a plot which shows clearly the resultant fallout directions of all particles originating on the vertical through the "ground-zero" of the explosion.

7 By way of illustration, let us assume that the winds on a particular day over a particular location are, by layers, as follows:

0 - 10 thousand feet	180/30	(i.e. from the direction of 180° True at speed 30 knots).
10 - 20 thousand feet	240/30	
20 - 30 " "	150/30	
30 - 40 " "	090/30	
40 - 50 " "	030/15	
50 - 60 " "	310/15	

The wind plot corresponding to these winds is shown in Figure 2. Following the reasoning of the previous section, the fallout direction for particles originating at 60,000 feet is along the radial vector AG in this figure; the fallout direction for particles originating at 50,000 feet is along the radial vector AF; the fallout

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direction for particles originating at 40,000 feet is along the radial vector AE; and so on.

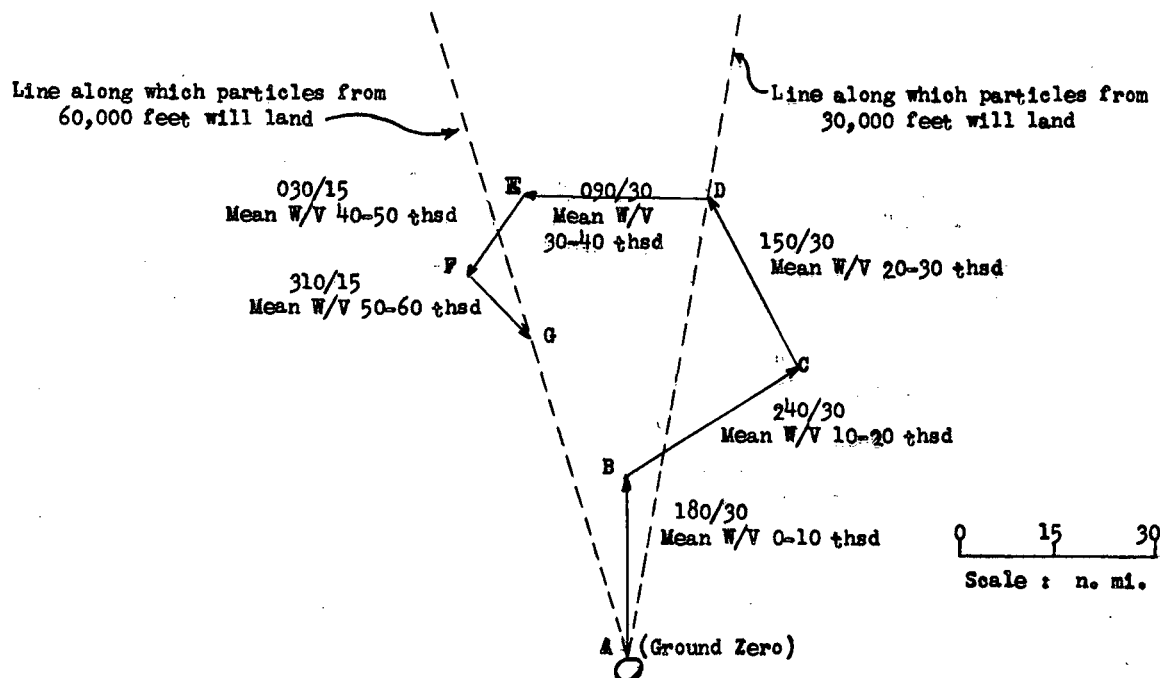


Figure 2: Hypothetical Wind Plot

The Danger Sector

8 Examining Figure 2 we see that the sector defined by the radial vectors AF and AC contains the fallout directions for all particles starting from points on the vertical through A at heights between the surface and 60,000 feet. The sector FAC might be taken as the danger sector. However, since the nuclear cloud is not a line source of particles but, to first approximation, a

cylindrical source of particles, it is usual to augment such a sector as FAC by strips of width equal to the radius of cloud (Figure 3).

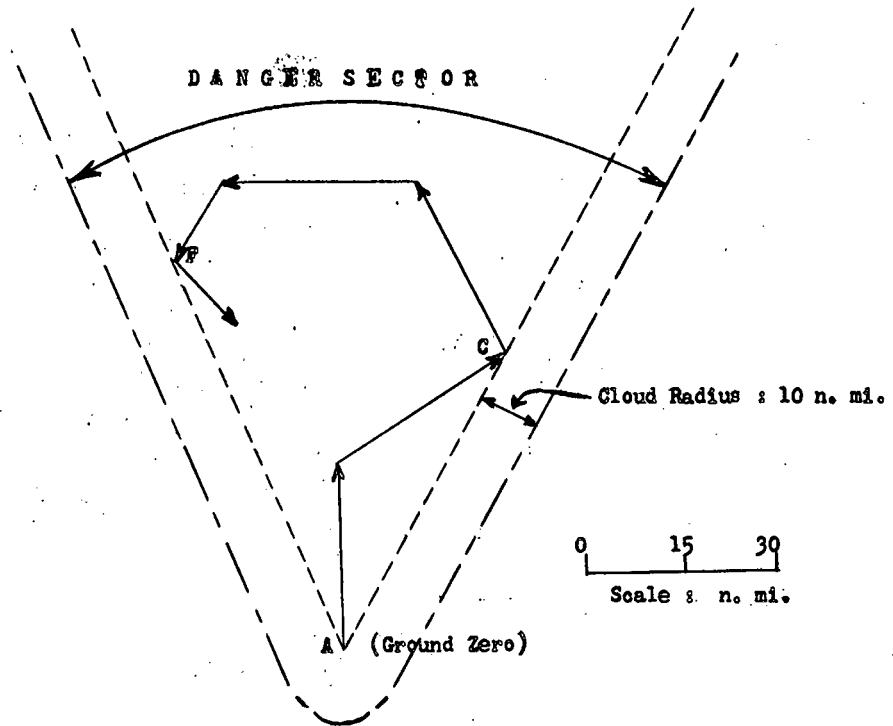


Figure 3: Fallout danger sector in a hypothetical wind situation for a 1MT surface detonation (height of cloud top 60,000 feet, cloud diameter 20 miles).

9 A further refinement, which derives from the idea that most of the radioactive fallout originates in the mushroom-top rather than in the stem of the nuclear cloud, is to restrict the danger sector to the area containing the effective fallout directions

for heights between the base and the top of the mushroom, this area again corrected for cloud width (Figure 4).

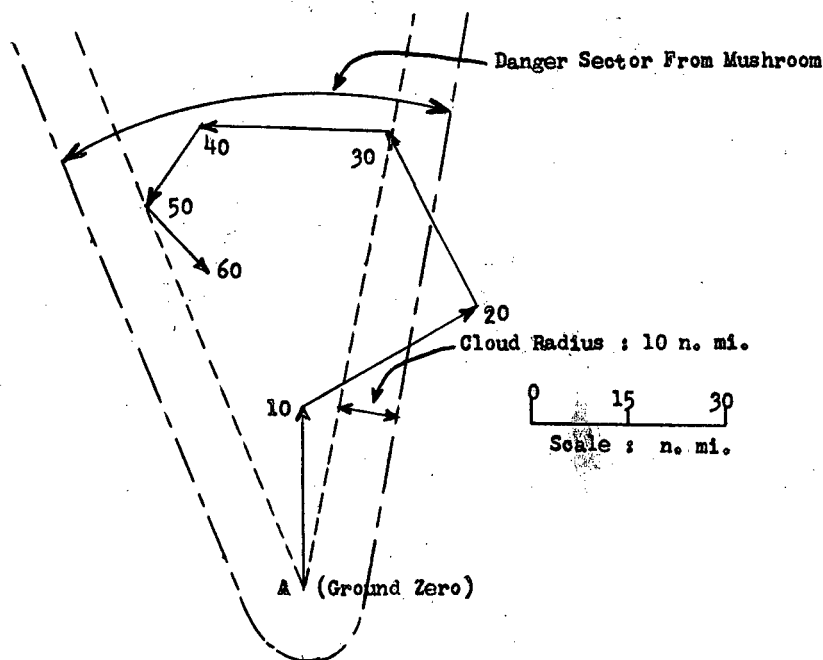


Figure 4: Danger Sector from Cloud Mushroom, the mushroom taken as extending from 30,000 to 60,000 feet.

10 A major shortcoming of the "danger sector" prediction is that it doesn't distinguish between areas of significant fallout and areas of relatively insignificant fallout. In particular it places no limit on the downwind extent of a fallout hazard.

Idealized Patterns

11 The fallout patterns resulting from test explosions have frequently been of a simple cigar shape. This is illustrated in Figure 5,

which represents the fallout pattern from the Bikini multimegaton detonation of 1 Mar 54.

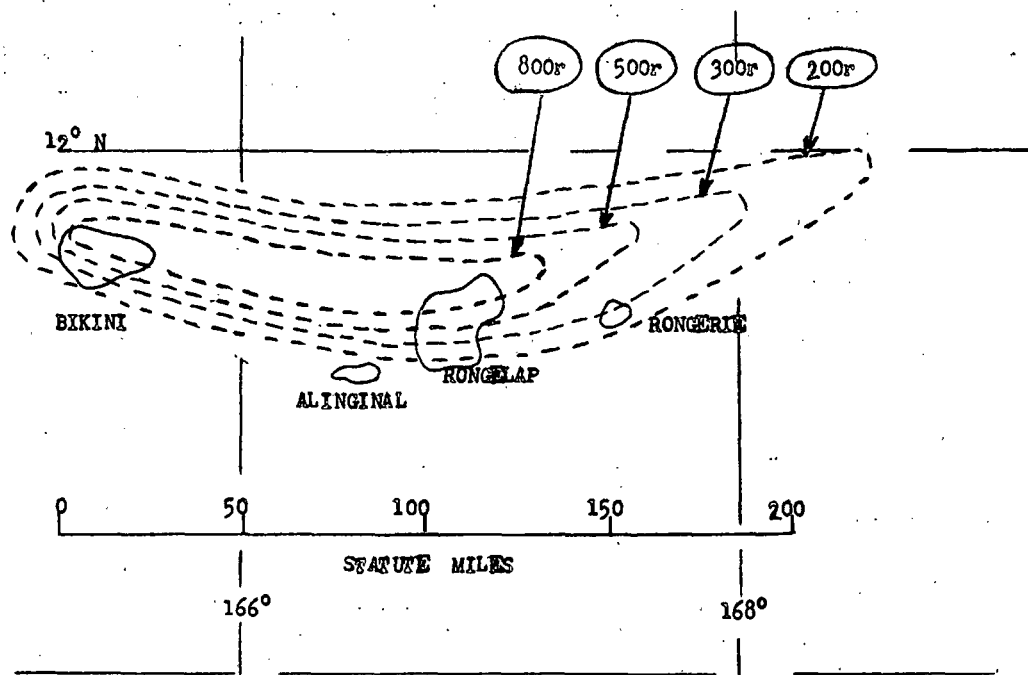


Figure 5: Fallout pattern from Bikini multimegaton detonation 1 Mar 54. Numbers on the isodose lines represent the doses in roentgens that would have been received over 48 hours without shielding.

12 With this fact in mind it has been a temptation to develop forecasting procedures based on the assumption that elliptical fallout patterns will result from surface detonations. The size of the ellipse is chosen to accord with the size of the explosion, the shape (ratio of minor axis to major axis) to accord with the strength of the winds. Alignment of the ellipse is along the direction of the integrated wind from the surface to a height chosen on the basis of the yield. An example of this approach is provided by a Canadian Civil Defence method (See Table I and Figures 6 and 7.)

YIELD	Dimensions of Elliptical Pattern to Represent Maximum Extent of 200r dose in 48 hours (wind 20-50 mph)	Effective Wind for Aligning Pattern
100 KT	(30 miles x 5 miles)	30 thousand
1 MT	(80 " x 15 ")	40 thousand
5 MT	(200 " x 30 ")	50 thousand

Table 1: Idealized patterns for different yields.

For effective winds below the 20-50 mph range a shorter, wider pattern is assumed (e.g. for a 5 MT, the ellipse's axes would be 125 and 40 miles). For effective winds above the 20-50 mph range a longer, narrower pattern is assumed (e.g. for a 5MT, ellipse axes of 300 and 20 miles).

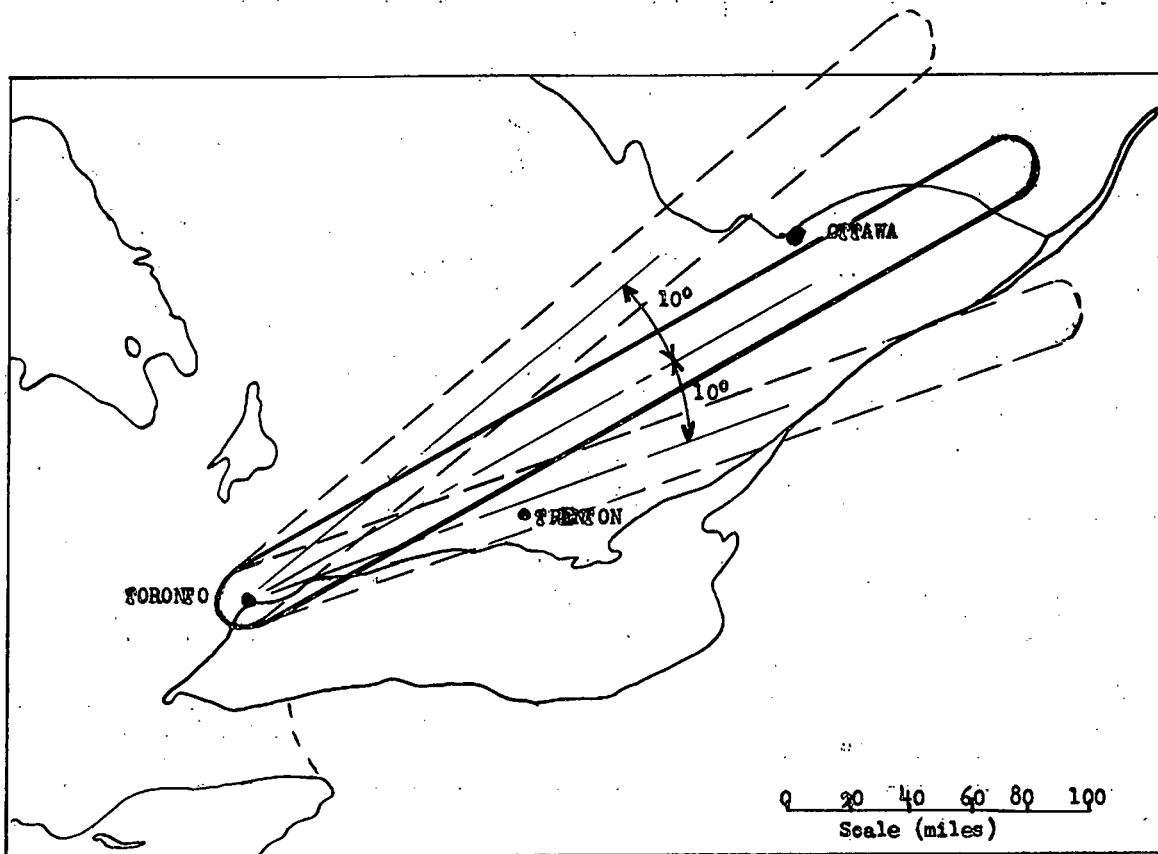


Figure 6: Idealized pattern for 5 MT weapon detonated at Toronto in high wind condition (wind greater than 50 mph). The effect of a 10° change in the alignment wind is indicated.

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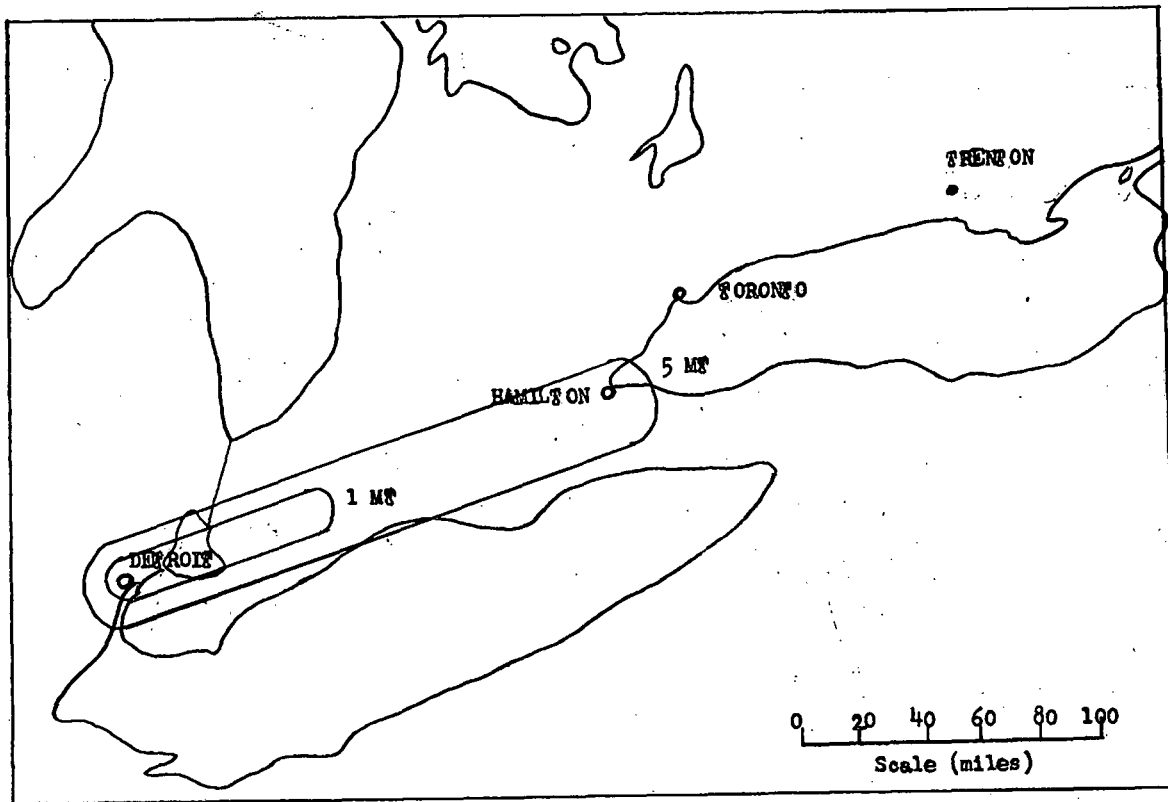


Figure 7: Idealized patterns for two different yields to illustrate how the area of significant fallout varies with yield. A moderately strong effective wind from 250° is assumed. No allowance for wind changes downwind is made.

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13 Idealized patterns are useful for providing ideas of the size of the area which can be affected by explosions of different yields. Also, given the yield and the wind strengths, they can provide an indication of the distances downwind from ground zero to which significant contamination might be expected. If radiation readings were available from locations or surveys downwind from Ground Zero, an idealized pattern might provide early guidance in the drawing of the intensity contours. An important shortcoming of these patterns is that they tend to give a false impression of accuracy. Naturally any differences between the actual values of the factors governing the character of fallout (see para 3 above) from those assumed for the "ideal" case could invalidate the prediction. In particular if the actual effective wind was different from that used to align the predicted pattern or if there were wind changes downstream from Ground Zero, then the prediction would be in error. Figure 6 illustrates the effect that a small directional error in alignment wind would have on the pattern. The curved fallout pattern resulting from the 1 Mar 54 Bikini detonation (Figure 5) illustrates the effect of a change in wind direction downstream. In the case of this detonation the main fallout direction had been predicted to be towards the east northeast. However, a slight change in the upper winds occurred, resulting in fallout debris being carried, initially, just to the south of east, so that it affected neighbouring inhabited atolls.

Sources of Wind Information

14 The wind plot of Figure 2 is shown with winds for each 10 thousand foot layer. A high rawin ascent, if available close to the location and time of the explosion, would provide the necessary information for such a plot. However, such a suitable rawin might not be available and it would be well, therefore, to be prepared to exploit other sources of wind information. Possible alternatives include UF winds, upper air charts, movement of high cloud, and climatology.

15 UF Winds. These are upper air fallout data which are transmitted twice a day by selected RAWIN stations in North America. A UF message gives the directions towards which particles would fall from specified levels, over the rawin station, and the distances from

the station at which those particles would land if they took three hours to fall to earth from the specified levels. The following is an example and interpretation of one of these messages:

UF 113 091220Z
867 11305 21205 41116 61009 /81101

Message Group	Interpretation
UF 113 091220Z	Upper air <u>F</u> allout data collected on teletype circuit <u>113</u> on the <u>9</u> th of the month at <u>1220</u> <u>GMT</u> .
867	Station designator for the Pas, Manitoba.
11305	Particles from <u>10,000</u> feet will fall towards <u>130</u> °, those taking 3 hours to fall landing at a distance of <u>50</u> miles.
21205	Particles from <u>20,000</u> feet will fall towards <u>120</u> °, those taking 3 hours to fall landing at a distance of <u>50</u> miles.
41116	Particles from <u>40,000</u> feet will fall towards <u>110</u> °, those taking 3 hours to fall landing at a distance of <u>160</u> miles.
61009	Particles from <u>60,000</u> feet will fall towards <u>100</u> °, those taking 3 hours to fall landing at a distance of <u>90</u> miles.
/81108	Particles from <u>80,000</u> feet will fall towards <u>110</u> °, those taking 3 hours to fall landing at a distance of 80 miles. (The slant sign at beginning indicates that the data is estimated).

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16 Figure 8 shows a sample plotting of UF data.

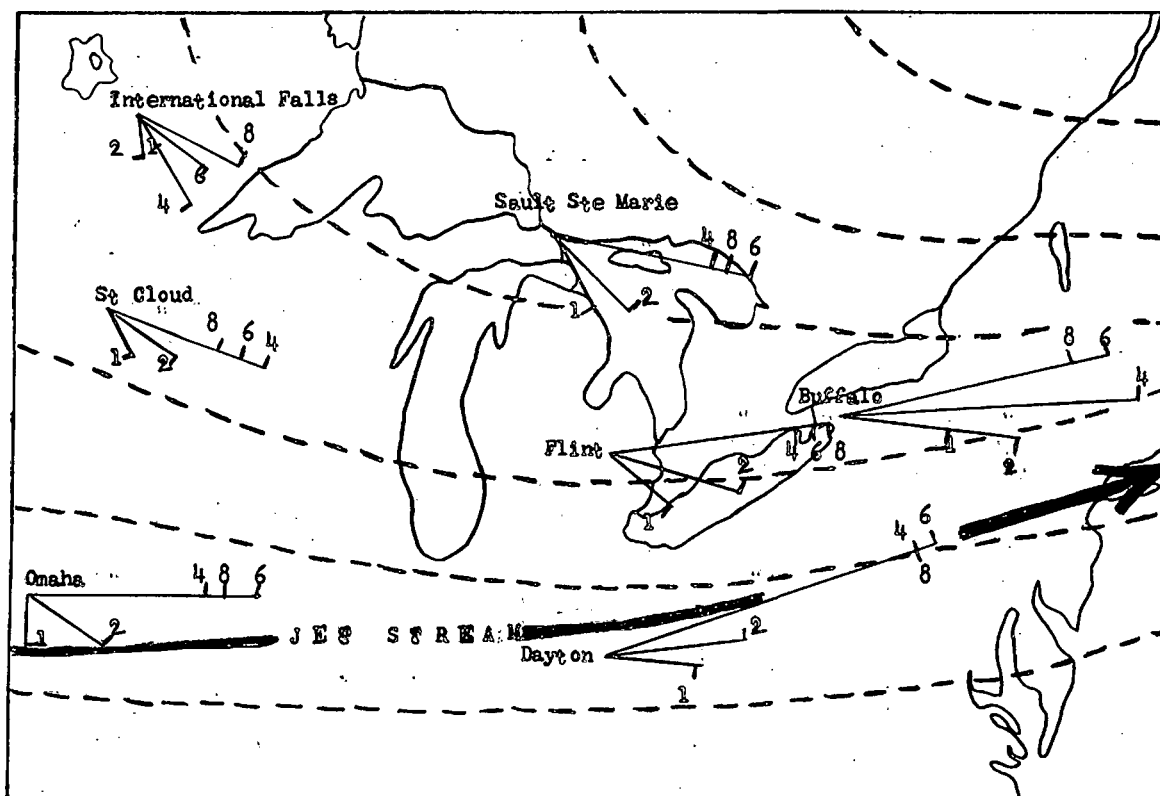


Figure 8: Chart showing plotted Upper Air Fallout Data over the Great Lakes and the northeastern USA 1200Z, 1 Feb 1959. (300 mb flow indicated by dashed lines).

17 The UF winds are derived from actual RAWIN observations and the degree to which they will hold good will depend on the constancy of the winds space-wise and time-wise. Considering UF winds for a given station and for the 40,000 foot level, you can expect the consecutive messages 12 hours apart to show a wind change of more than 10 degrees on about three-quarters of occasions and to show a wind change in 12 hours of more than 20 degrees on about half the occasions. UF winds must therefore be employed with considerable care, especially at some distance downwind and late in the period between messages.

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18 Upper Air Charts. The winds at 5,000, 10,000, 18,000, 30,000 and 38,000 feet can be estimated by Met Officers using the 850, 700, 500, 300 and 200 mb charts available to them over facsimile. These winds can be used to derive a wind plot from the surface up to say 45 thousand, the wind for a particular level being weighted according to the thickness of the layer for which it is to be used as the representative wind. The higher level charts may also be used directly to provide an idea of fallout directions. Figure 8 illustrates how the 300mb contours (dashed lines) frequently parallel the fallout directions for particles starting at high altitudes (e.g. 40, 60 and 80 thousand feet). Even when wind plots are employed, the upper wind air charts are a useful reference because of the indications they provide of bending in fallout patterns due to changes in the directions of wind flow downstream from ground zero. The charts can also be of assistance when interpolating between the UF winds of two rawin stations.

19 Movement of High Cloud. The movement of high cloud will frequently be a good indication of the fallout directions for particles starting at high levels. (See Figure 8 and compare the 40, 60, and 80 thousand foot fallout directions with the 300mb flow lines (contours). High cloud movement (when visible) might be most useful as a check on other information.

20 Climatology. For planning purposes, or occasions when no other information is available, mean upper air charts can be useful. Figure 9 is a chart of the annual vector mean effective winds for the layer 0 to 55,000 feet over Canada. An interesting and important fact to draw from this figure is that on the average, in eastern Canada, fallout could be expected to extend about 100 miles downwind from Ground Zero by H+ 3 hours, and to extend about 200 miles downwind from Ground Zero by H+ 6 hours.

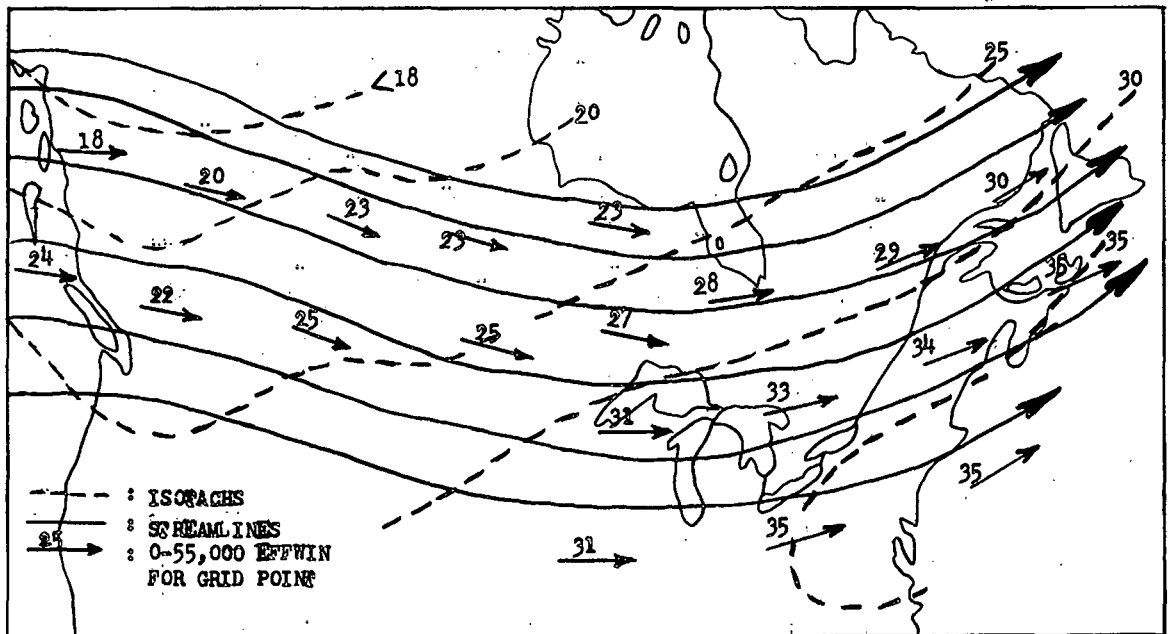


Figure 9: Annual vector mean effective winds 0-55000 feet.

Effect of Precipitation on Fallout.

21 The possibility of precipitation occurring downwind from the detonation point must be taken into account in a fallout prediction. Rain and snow scavenger dust particles, radioactive or otherwise, out of the air. If the trajectories of fallout particles are through precipitating cloud the precipitation will bring the particles to earth immediately below this cloud. This will have the following effects on the final fallout pattern:

- (a) there will be "hot spots" of activity where the "rain-out" or "snow-out" occurs.
- (b) just downwind from the "hot spots" there may be areas of relatively low activity, the fallout particles which might have arrived in these areas having been removed from the air by precipitation at the "hot spots".

- (c) fallout may occur outside the danger sector predicted on the basis of upper winds alone. (See Figure 10).

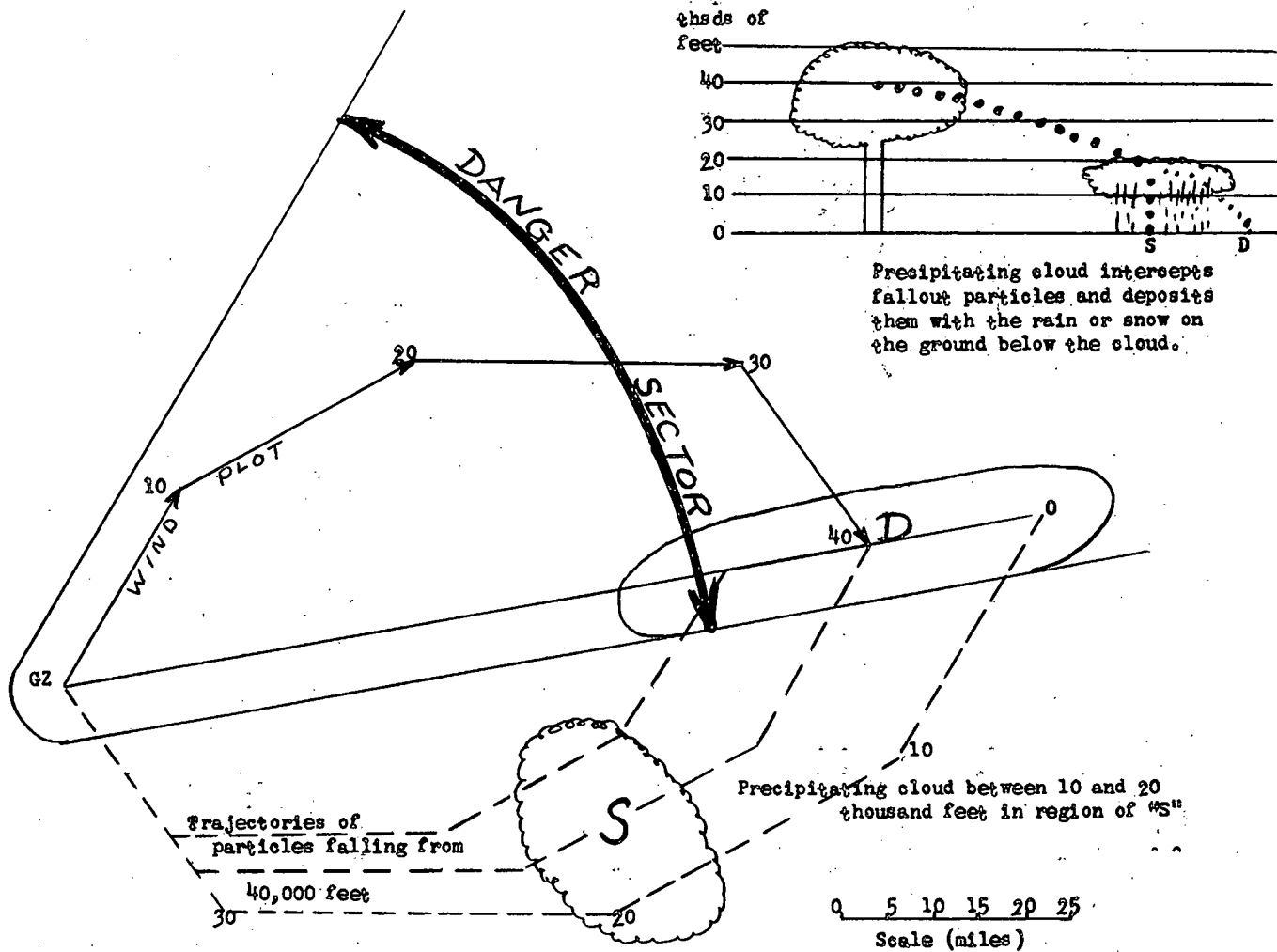


Figure 10: Schematic diagram illustrating how "rain-out" may cause fallout outside the danger sector. Particles, originating at 40,000 feet and descending through the 20-10 thousand foot layer in the neighbourhood of "S" (which is outside the danger sector), find themselves within precipitating cloud. Most of them are caught up by the precipitation (rain drops or snow flakes) and are brought to ground below the cloud. The fallout particles which would otherwise have reached area "D" have come to earth in the neighbourhood of "S", and "D" experiences lower intensities than it otherwise would.

Time - Intensity - Dose Relationships

22 Once it was determined that a developing fallout pattern threatened an RCAF installation the question would arise locally as to when the fallout would start to arrive, when it would end, what the peak intensities would be, what dosages would be incurred. The answers to these questions depend, of course, on the manner in which the fallout pattern develops. Figures 11 and 12 illustrate the calculated development of the fallout pattern from a given explosion under markedly different wind conditions.

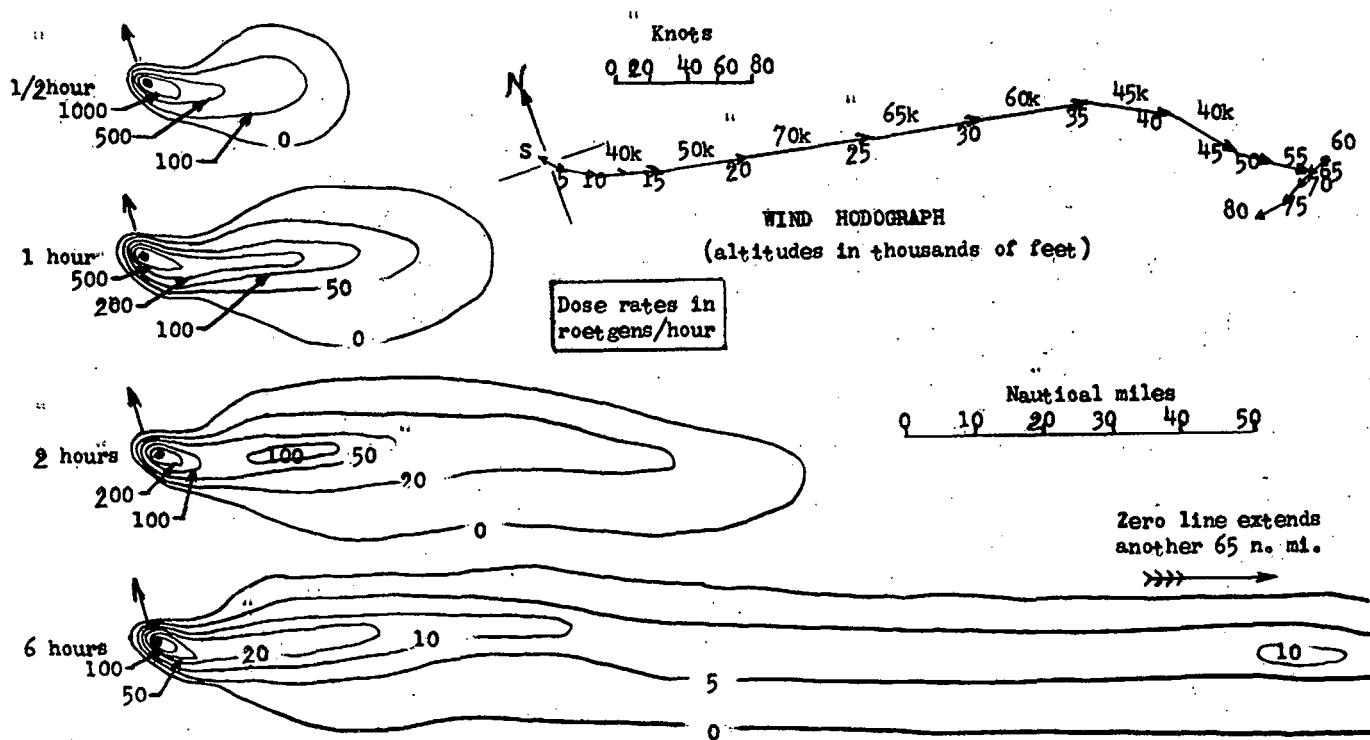


Figure 11: Calculated fallout from a 1 MT surface burst with a two-thirds fission yield under a "high-wind" condition. (Figure is taken from Reference (2), page 116.)

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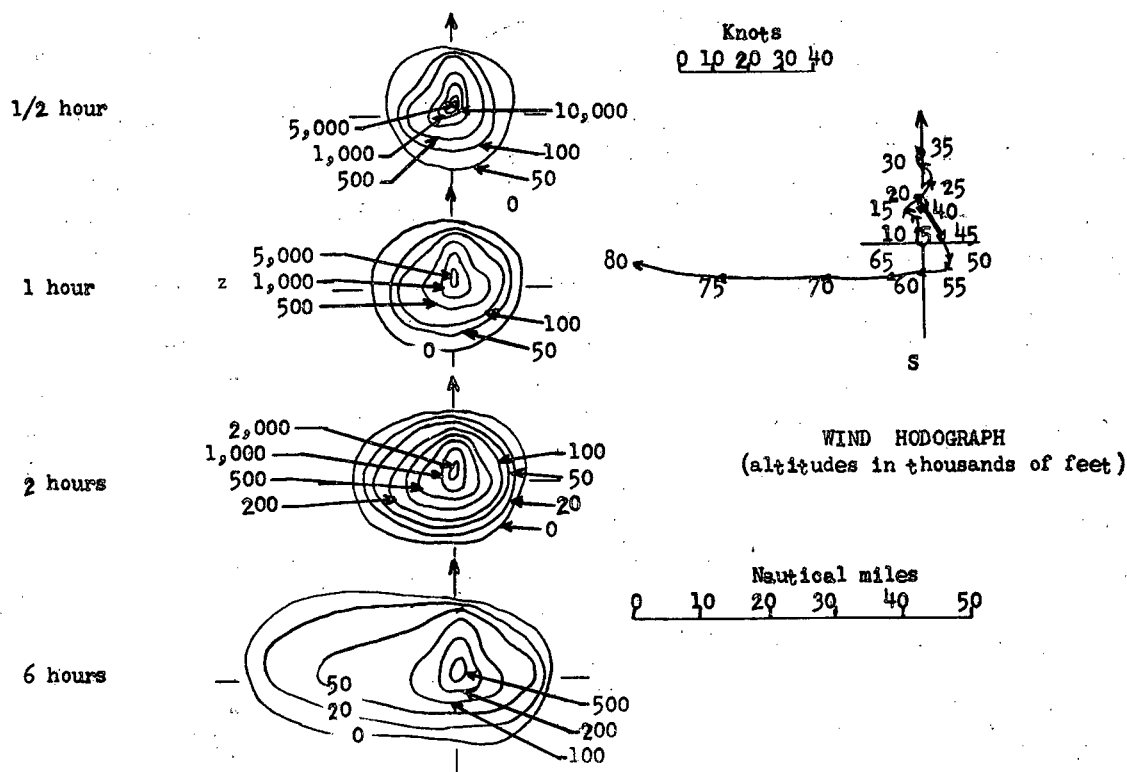


Figure 12: Calculated fallout from 1 MT surface burst with a two-thirds fission yield under a "low wind" condition, (Figure is taken from Reference (2) page 117.

23 In regard to the timing of the fallout, rough answers can be derived from the wind information. However, estimating in advance what intensities and dosages will be experienced is a much more difficult problem since the resulting radiation activity will be a function not only of the winds and other meteorological factors but also of all the non-meteorological factors which affect the character of fallout (see para 3).

24 Time of arrival. From the wind plot, deductions may be drawn regarding the approximate mean time of arrival of fallout particles at locations down wind. Let us consider Figure 13. All particles originating over ground zero at 40,000 ft will fall out along the line AE. Of these, the ones landing at E will arrive 4 hours after they start to fall, that is, 4 hours after the detonation, having been under the influence of the wind in the 40-30 thousand foot layer for 1 hour, the wind of the 30-20 thousand foot layer for 1 hour, the wind of the 20-10 thousand foot layer for 1 hour and the

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wind of the 10-0 thousand foot layer for 1 hour. Another particle starting from the same position at 40,000 feet but falling four times as quickly will be under the influence of each wind for only a quarter of an hour each and will land a quarter of the way along AE, say at J, one hour after it started to fall. Time marks can thus be placed along EA corresponding to the arrival time of particles starting from 40,000 over A. Similarly time marks can be placed along the other radial vectors, AB, AC, etc., of the wind plot. Isochrones can then be drawn joining points of the same fallout arrival times and will indicate the downwind spread of the fallout in the hours following the explosion.

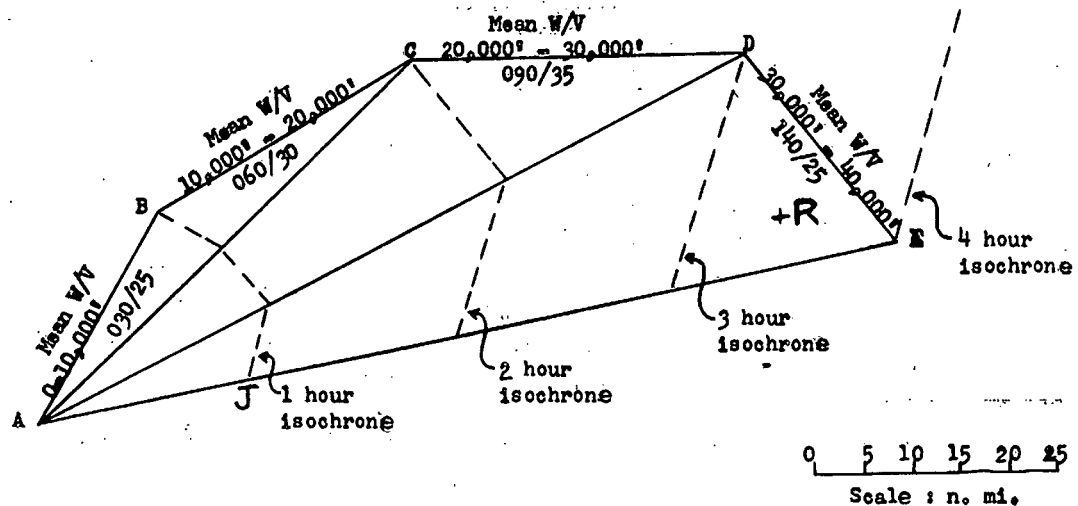


Figure 13: Wind plot with lines of mean time of arrival. (The mean time of arrival of fallout at any point within the danger sector indicated by the wind plot can be estimated by reference to the isochrones. For example, the mean time of arrival of fallout at point R will be between H+3 and H+4 hours.)

25 As a result of the width of the nuclear cloud and the vertical wind shear, the fallout at a point will occur over a time interval bracketing the mean time of arrival. The following example, employing UF wind message information, illustrates this:

Given:

- (a) Detonation occurs at Toronto at H hours.
- (b) The nuclear cloud has a radius of 10 miles.
- (c) The applicable UF wind message is as follows:

BUF 11006 20909 40814 60710 80706

To Find: The approximate period of fallout at Stn Trenton.

Reasoning: Trenton is, say, 90 miles from Ground Zero on a bearing of 070°. It lies in the fallout direction for particles originating in the 60-80 thousand foot layer.

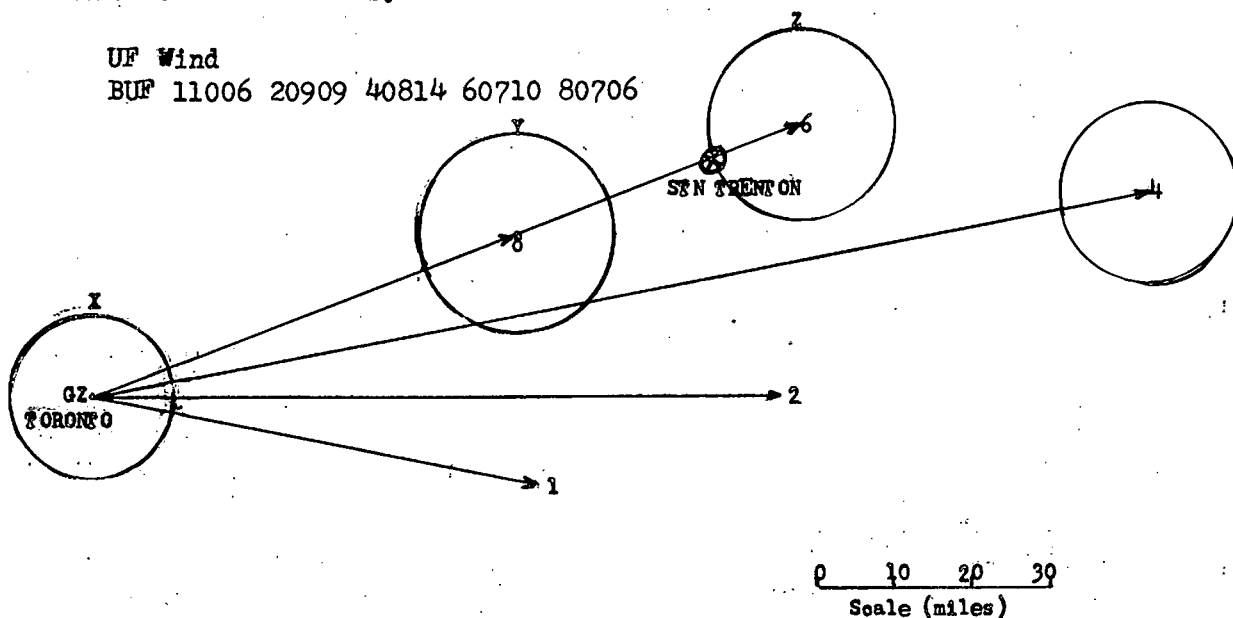
The leading edge of the cloud of 60,000 foot particles will arrive first, and the trailing edge of the cloud of 80,000 foot particles last. (See Figure 14.) The first particles will travel 80 miles at $\frac{100}{3}$ mph; the last particles will travel $\frac{110}{3}$ miles at $\frac{60}{3}$ mph.

Conclusion: The period of fallout at Trenton can be expected to be from about $H+2\frac{1}{2}$ hrs to $H+5\frac{1}{2}$ hours.

A few words of caution are in order concerning the above conclusion. In the first place, if the wind information used was 10% in error in regard to speeds then the timing would be out correspondingly. In the second place if the 40,000 foot effective wind backed a

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little (say about 10°) the fallout from 40,000 feet would land at Trenton, and travelling at $\frac{140}{5}$ mph, would arrive by about H+1 hour 40 minutes.



Circle X: contains all particles reaching ground at H hours.
 " Y: " " 80,000 foot particles reaching ground at H+3 hours.
 " Z: " " 60,000 " " reaching ground at H+3 hours.

Figure 14: Employment of UF data to calculate approximate period of fallout at a point down wind from a nuclear detonation. In example, fallout would be expected to occur at Trenton from the time when the first of the 60,000 foot particles arrived until the time when the last of the 80,000 foot particles arrived, i.e. between about H+2½ hours and H+5½ hours.

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26 The Intensity-Time Curve. If radiation intensity is plotted against time on graph paper the resulting line joining the points is called an intensity-time curve. A recording dose-rate meter will provide such a graph automatically. However, if such equipment is not available, the Ground Defence Officer can construct the curve himself by plotting the local intensity measurements against the times of observation.

27 The rate of rise of radiation intensity at a station subjected to fallout would depend on:

- (a) the character of the nuclear detonation. (See para 3.)
- (b) the meteorological conditions.
- (c) the station's location in the fallout field - that is upon the time required for fallout to arrive and upon the distance of the station from the centre line of the fallout pattern.

28 Before the arrival of fallout the radiation intensity would be zero. As soon as fallout particles began to reach the station the intensity would start to build-up. It would increase to a peak sometime in the period during which the fallout was occurring, starting to decrease when the decay rate exceeded the rate of increase of intensity due to the arrival of additional fallout particles. It is likely that the fallout would gradually diminish, rather than cease abruptly. Its exact cessation time might be hard to detect from the intensity time curve which rounds over smoothly into a pure decay curve.

29 The build-up of dose-rate is not constant with time. Rather it is found that the log dose-rate increases nearly linearly with the log time, giving a straight line approximately when loglog paper is employed for plotting the intensity against time. Figures 15 and 16 illustrate a hypothetical intensity-time curve as plotted on loglog paper and as plotted on linear graph paper.

30 Dose Determination. The dose received in intervals of time after the start of fallout at a station can be determined by the following methods:

- (a) by employing dose-meter readings.
- (b) by graphing intensity measurements against time on linear graph paper and measuring the areas under the curve corresponding to the desired intervals of time. (See Figure 16).

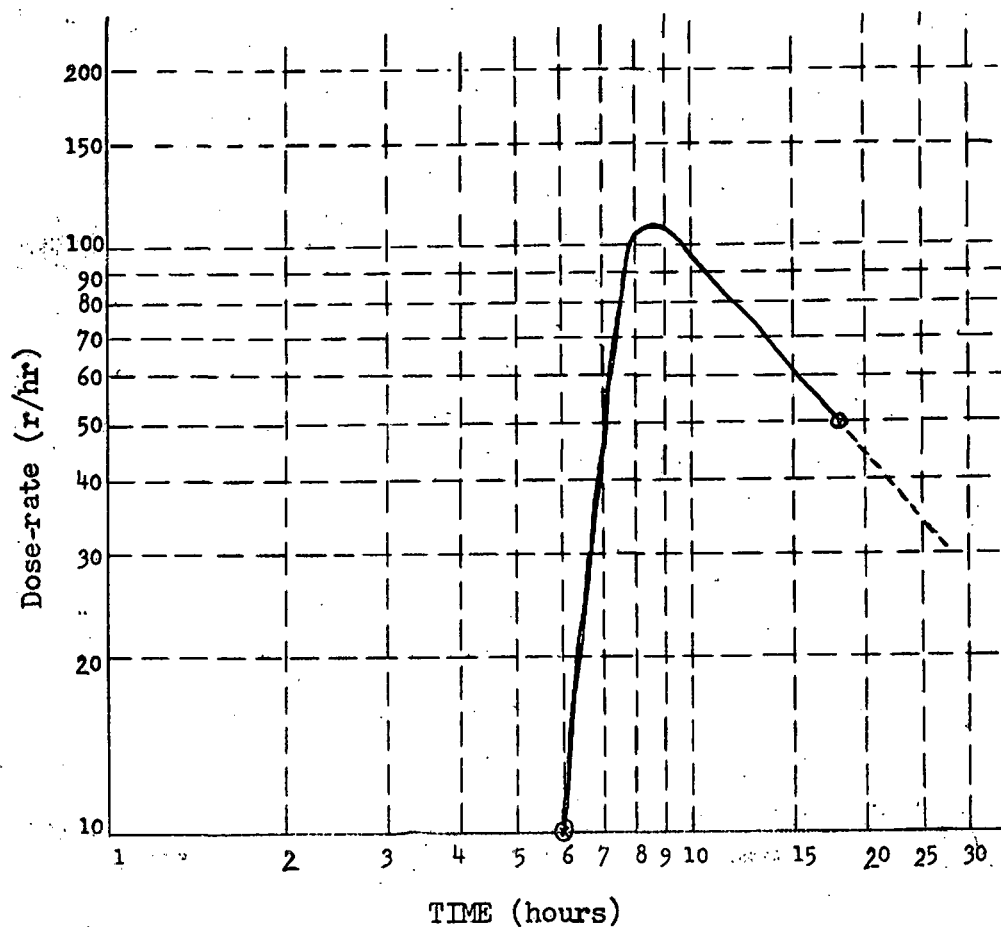


Figure 15: Hypothetical Intensity - time curve plotted on log log paper.

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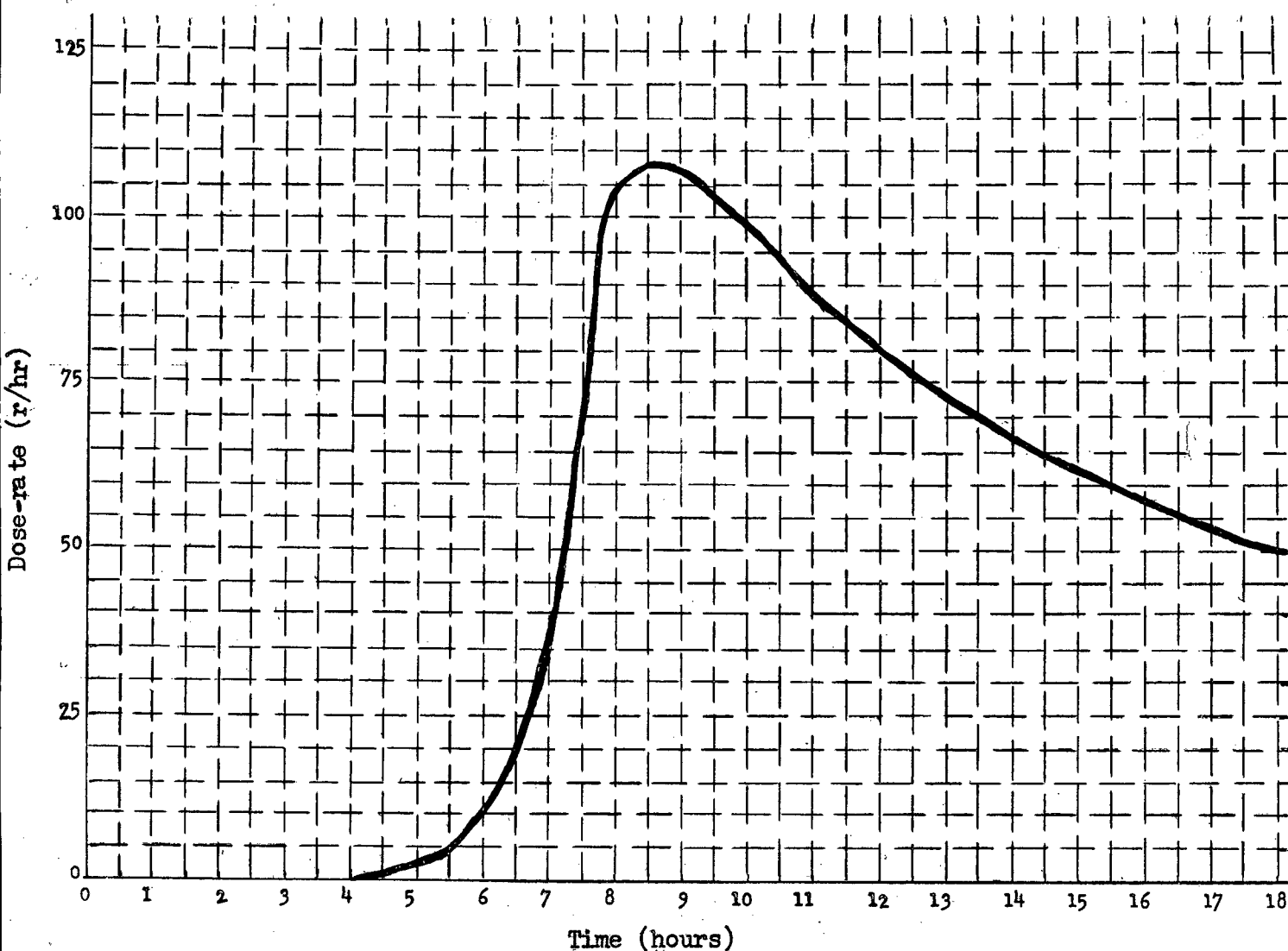


Figure 16: Intensity-time curve plotted on linear graph paper.

Dosage calculation from area under curve

One square equals 2.5r

Dose received between H+4 and H+8.6 hours; equals approx 160r

Dose received between H+4 and H+18 hours; equals approx 860r

31 The measured intensity for a time when fallout is complete can be used in conjunction with the $t^{-1.2}$ function to calculate intensities at later times and the accumulated dosage in between. This procedure is not applicable, however, before fallout is complete, and is particularly inapplicable for the intensity build-up period. Further, the $t^{-1.2}$ function can only provide an approximate idea of the decay of activity since surface winds, rain or snow, and decontamination activities can act to modify the picture. Therefore, for the first day or so after the occurrence of fallout, if the intensities are high, the determination of accumulated dose is best based upon the graph of intensity readings or upon dosimeter measurements.

Non-meteorological Information Applicable to Prediction

32 If it becomes necessary to make an assessment of a fallout situation it will be necessary to know the location of burst and the time of burst. If only this information and wind data are available, little more can be expected of the fallout prediction than an idea of the danger sector. For more precise prediction, additional information is essential, for example:

- (a) conditions of burst (eg height, underlying surface, etc.).
- (b) dimensions of nuclear cloud (eg height of top and of base of mushroom, diameters of stem and mushroom). This information would be useful when calculating the danger sector. Also, as it provides an indication of the yield, it would be useful in the selection of the appropriate idealized pattern.
- (c) radiation intensity and dosage reports downwind from detonation. Early reports would be useful for confirming or modifying the fallout prediction. They would provide for early delineation of the actual radiation situation. Further, the radiation experience of stations receiving early fallout might be extrapolated to stations further downwind, with appropriate adjustments for the greater distances from Ground Zero, later times of arrival, different

positions relative to the centre of the pattern, changes in the winds, precipitation, etc.

- (d) intelligence regarding enemy weapons (yields, fission fractions, conditions of detonation, etc.). gleaned from earlier detonations.
- (e) any available information concerning the fallout patterns from previous detonations including areas affected by significant dosages, peak intensities, appearance of fallout particles, etc.).

Limitations and Uses of Fallout Prediction

33 The simple danger sector, based as it is upon winds over a point at a particular time, will hold good only to the extent that the actual winds affecting the falling particles are the same as the winds which were employed in the wind plot. It provides no information as to the intensities of radiation within the fallout area. The idealized pattern method provides an idea of the area which will be affected by particular intensities of radiation but this will only be valid to the extent that the yield, detonation conditions, winds, etc., approach the criteria on which the "ideal" pattern is based. With both methods, subjective adjustment of the prediction is required to take into account changes in the winds after the detonation time and downstream from the explosion. Actual radiation intensity data obtained from fixed instruments or from ground or air monitoring is essential for determining the actual fallout pattern.

34 Nevertheless, despite limitations, fallout predictions can serve a number of useful purposes, for example they provide:

- (a) in peacetime
 - (i) a conception of the possible extent of the fallout danger (sectors, areas, distances downwind, intensities).
 - (ii) a more thorough understanding of fallout by showing the effects of the different factors on the resulting pattern;
 - (iii) an indication of the relative vulnerability of stations, in the event of a detonation at a particular target;

(b) in wartime,

- (i) an indication of the likely direction of fallout from a given detonation, thereby reducing the area which otherwise might have to be monitored;
- (ii) information as to the relative fallout hazard to different stations.

Conclusion

35 Fallout predictions can be expected to provide only rough guidance in nuclear war. The values of the factors which together determine the character of fallout will be, for the most part, unknown, the meteorological information likely being the easiest to come by. Moreover, quite small changes in the winds could well spell the difference between an air base a few hours downwind receiving either lethal concentrations of radioactive fallout or no fallout at all.

36 The appraisal of a fallout threat should not be allowed to rest on a mere mechanical calculation of a danger sector or idealized pattern. Instead, if nuclear detonations occur, then all available resources of information, knowledge and judgment should be brought to bear on the fallout problem in order to obtain a well considered and full appreciation of the situation. The preliminary prediction should be modified on the basis of the information on the upper air maps, the occurrence of precipitation, the movement of weather systems, and so on, and should be revised as new information becomes available by way of NUDET reports, radiation intensity reports, pilot reports, GCI information, etc.

37 It is essential that Ground Defence Officers and Meteorological Officers work closely together, combining each other's specialist knowledge and experience, in order to obtain an appreciation of a developing fallout threat which is the best possible in the light of the available information regarding the detonation and the meteorological conditions.

References

- 1 The Effects of Nuclear Weapons, edited by Samuel Glasstone, prepared by the United States Department of Defence, United States Atomic Energy Commission, June 1957.
- 2 The Nature of Radioactive Fallout and its Effects on Man, Hearings before the Special Sub-Committee on Radiation of the Joint Committee on Atomic Energy, Congress of the United States, 85th Congress, 1957.
- 3 Some Effects of Ionizing Radiation on Human Beings, edited by Cronkite E.P., Bond V.P., and Dunham C.L., United States Atomic Energy Commission, July 1956.

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TO ALL COMMANDS & 1 AIR DIV

Prediction of Radiological Fallout

1 The problem of providing RCAF units with a defence against radiological fallout is ~~centered~~ ^{centred} around the ability to predict and verify the location and extent of the hazardous area. Vital air operations must not be compromised because of a lack of knowledge of this phenomenon.

2 The attached paper represents the latest RCAF thinking on fallout prediction. It is evident that a major influence on the fallout event is the meteorological conditions which exist. Information on other influences, such as the total energy yield, fission-fusion fraction, and height of burst, may not be immediately available to the fallout forecaster.

3 In view of the importance of meteorological information in the prediction of radioactive fallout, as well as in the conduct of air operations, it is obvious that the meteorological officers at RCAF stations have vital roles in support of the continuance of essential air operations and the protection of unit personnel throughout periods of fallout hazard. To ensure maximum use of the meteorological facilities, the Senior Meteorological Officer must be included in unit emergency defence planning activities.

4 Meteorological officers in conjunction with Ground Defence officers, where available, will be responsible for providing Commanding Officers with fallout forecasts. Units, both during exercises and actual hostilities, will take fallout forecasts into consideration in the planning of air operations. ORT and EDP exercises will include tests of station meteorological facilities, where available.

5 For units not having meteorological officer staff, fallout forecasts will, in general, be provided by designated RCAF meteorological ~~sections~~ ^{sections}. ~~offices~~ Command HQs are to draft plans in this regard for coordination with this HQ. As AMC does not have a Staff Officer Meteorology, the AFHQ Meteorological Adviser will work directly with AMCHQ on this matter.

2

6

³
Copies
~~A supply~~ of the attached paper, "Fallout Prediction - RCAF",
^{are}
~~is~~ being forwarded under separate cover to Command HQs, attention
Staff Officers Meteorology, for distribution to all units concerned.

(DM Smith) A/V/M
for CAS

\$963-108(DGDO)(TD9132P)

MEMORANDUM

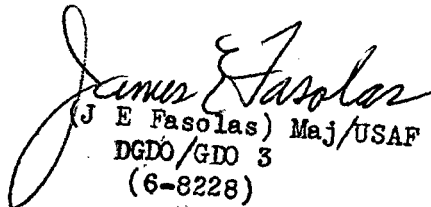
11 May 59

DAirS

(Attention: Mr Tucker(S-4))

Prediction of Radiological Fallout

1 The attached draft is forwarded for your comments/
deletions/changes etc.


(J E Fasolas) Maj/USAF
DGDO/GDO 3
(6-8228)

Attach

SECRET

S963-108(VCAS)

11 May 59

TO ALL COMMANDS & 1 Air Div.

Prediction of Radiological Fallout

1 The problem of providing RCAF units with a defence against radiological fallout is centered around the ability to predict and verify the location and extent of the hazardous area. Vital air operations must not be ~~compromised~~ ^{compromised} because of a lack of knowledge of this phenomenon.

2 The attached paper represents the latest RCAF thinking on fallout prediction. It is evident that ~~the~~ ^a major influence

on the fallout event is the meteorological conditions which exist.

Information on *total energy* *fission fusion fission, and height*
Other influences, such as the ~~fission~~ yield, ~~location~~ ^{location and type of} burst, may not be immediately available to the ~~prediction~~ ^{fallout} forecaster.

Leave for para 3 del attached sheet
3 In the past full advantage has not been made of the meteorological facilities available on many RCAF stations - not only in the prediction of fallout, but in emergency defence planning, deployment plans and other operations requiring meteorological advice and assistance. In order to make maximum use of these facilities the services of the meteorological officers on RCAF units should be called upon in all applicable aspects of RCAF operations.

4 Meteorological officers in conjunction with Ground Defence officers, where available, will be responsible for providing Commanding Officers with fallout ~~prognostications~~ ^{forecasts}. Unit ~~operations~~ ^{take} both during exercises and actual hostilities, will ~~consider~~ ^{take} fallout ~~predictions~~ ^{forecasts} into ~~the~~ ^{consideration in} the planning of air ~~defence~~ operations. ORT and EDP exercises will include ~~meteorological services~~ ^{tests of station facilities} where available.

Leave for para 5 del attached sheet
5 Units not having meteorological facilities will devise alternate means of obtaining fallout prognostications from the nearest RCAF meteorological facility. Meteorological officers should be encouraged to assist these units in devising methods and techniques for passing this information best suited to local conditions.

(D1 Smith)A/V/11

SECRET

! ~~SECRET~~ CR

PIA

please

on S963-108

000212

SECRET

File No: S967-113-1(D/AOC/O)

DEPARTMENT OF NATIONAL DEFENCE

Royal Canadian Air Force

St Hubert Que
23 Apr 59

Chief of the Air Staff
Air Force Headquarters
Ottawa 4 Ont

Calculation of Radioactive Fallout at ADC Bases

1 Air Defence Command is conducting studies of operation of fighter bases under conditions of radioactive fallout, with the two main objectives being

- (a) to relate the level of radioactivity to the type of operation that can be carried out, and
- (b) to compare present and possible alternate bases from the point of view of probability of serious radiation levels from fallout.

2 As a result of a visit to NIHQ to seek information on this subject it was learned that the Directorate of Weapon Development at Army HQ have made a number of calculations of the fallout produced by nuclear explosives over certain likely targets in Canada and the Northern USA. The statistical pattern of high altitude winds is taken into account as well as the decay of radioactivity with time. The results are shown in two ways,

- (a) contours on a map, indicating the number of days per year on which the wind structure would produce a total radiation dose of at least a specified value as a result of a nuclear explosion of specified size over one of the likely targets
- (b) a graph for a particular location in Canada, showing the radiation dose that would be delivered with a specified probability due to nuclear explosions at certain places.

3 Since Army DWD have developed the method of computation, and collected the necessary meteorological data, it is suggested that DWD be approached and requested to make similar calculations for those airfields at which ADC do or might employ fighter aircraft. Alternatively, they might provide the material with which ADC could perform the calculations.

4 A description of the study desired is attached as Appendix "A".

(Signed) (DAR Bradshaw) A/C
for AOC ADC

Encl.

(Min 2) DGDO

1 Referred. Cops has not seen.

30 Apr

(E Carter) F/L
Co-ord
6-6665

J May 59

S E C R E TAppendix "A" to
ADC S967-113-1(D/AOC/O)
dated 23 Apr 59CALCULATION OF RADIOACTIVE FALLOUTAT CERTAIN CANADIAN AIRFIELDS

1 The airfields at which the radiation dose is desired
are given below.

Comox, B.C.	(49.7 N, 124.9 W)
Cold Lake, Alta.	(54.4 N, 110.3 W)
Armstrong, Ont.	(50.3 N, 89.0 W)
Kapuskasing, Ont.	(49.5 N, 82.5 W)
North Bay, Ont.	(46.4 N, 79.4 W)
Val d'Or, Que.	(48.1 N, 77.7 W)
Uplands, Ont.	(45.3 N, 75.6 W)
Casey, Que.	(47.9 N, 74.1 W)
St Hubert, Que.	(45.5 N, 73.4 W)
Bagotville, Que.	(48.4 N, 71.6 W)
Seven Islands, Que.	(50.3 N, 66.2 W)
Chatham, N.B.	(47.0 N, 65.5 W)
Dartmouth, N.S.	(44.6 N, 63.4 W)
Goose Bay, Nfld.	(53.4 N, 60.5 W)
Sydney, N.S.	(56.1 N, 60.1 W)
Harmon, Nfld.	(48.5 N, 58.6 W)

~~SECRET~~Appendix "A" to
ADC S967-113-1(D/AOC/O)
dated 23 Apr 59

2

2

LIST OF TARGETSCanadian Cities

Victoria, B.C.
 Vancouver, B.C.
 Winnipeg, Man.
 Hamilton, Ont.
 Toronto, Ont.
 Ottawa, Ont.
 Montreal, Que.
 Quebec, Que.
 Halifax, N. S.

These are the ones used in
 previous DWD studies, except
 that Edmonton is omitted
 because of the inclusion of
 Namas as a SAC base.

United States Cities

Portland, Ore.
 Seattle, Wash.
 Minneapolis-St Paul
 Milwaukee, Wis.
 Chicago, Ill.
 Cincinnati, O.
 Detroit, Mich.
 Cleveland, O.
 Pittsburg, Pa.
 Buffalo, N.Y.
 Philadelphia, Pa.
 New York, N.Y.
 Boston, Mass.

Chosen by reason of large
 population and proximity to
 the Canadian border -
 approximately the same as
 the DWD list.

Canadian Bases

Namas, Alta. (53.7 N, 113.5 W)
 Cold Lake, Alta. (54.4 N, 110.3 W)
 Churchill, Man. (58.7 N, 94.1 W)
 Frobisher, NWT. (63.7 N, 68.6 W)
 Goose Bay, Nfld. (53.3 N, 60.4 W)
 Harmon, Nfld. (48.5 N, 58.6 W)

SAC bases now or by 1961

United States Bases

Elmendorf, Al. (61.2 N, 149.9 W)
 Eielson, Al. (64.6 N, 147.1 W)
 McChord, Wash. (47.2 N, 122.5 W)
 Larson, Wash. (47.2 N, 119.3 W)
 Fairchild, Wash. (47.6 N, 117.6 W)
 Malmstrom, Mon. (47.5 N, 111.2 W)
 Glasgow, Mon. (48.4 N, 106.5 W)
 Ellsworth, S.D. (44.2 N, 103.1 W)
 Minot, N.D. (48.3 N, 101.3 W)
 Grand Forks, N.D. (47.9 N, 97.1 W)
 R.I. Bong, Wis. (42.6 N, 88.0 W)
 K.I. Sawyer, Mich. (46.4 N, 87.4 W)
 Bunker Hill, Ind. (40.6 N, 86.1 W)
 Kinross, Mich. (46.3 N, 84.5 W)

SAC or missile bases now
 or by 1961, and within 300 nm
 of the Canadian border.

SECRET

Appendix "A" to
ADC S967-113-1(D/AOC/O)
dated 23 Apr 59

3

United States Bases (continued)

Wright-Patterson, O.	(39.8 N, 84.1 W))	
Clinton County, O.	(39.4 N, 83.8 W))	
Wurtsmith, Mich.	(44.5 N, 83.4 W))	
Lockbourne, O.	(39.8 N, 82.9 W))	
Selfridge, Mich.	(42.6 N, 82.8 W))	SAC or missile bases now
Dover, Del.	(39.1 N, 75.5 W))	or by 1961, and within
Griffiss, N.Y.	(43.2 N, 75.4 W))	300 nm of the Canadian
McGuire, N.Y.	(40.0 N, 74.6 W))	border.
Plattsburgh, N.Y.	(44.7 N, 73.5 W))	
Westover, Mass.	(42.2 N, 72.5 W))	
Pease, N.H.	(43.1 N, 70.8 W))	
Otis, Mass.	(41.7 N, 70.5 W))	
Brunswick, Me.	(43.9 N, 69.9 W))	
Dow, Me.	(44.8 N, 68.8 W))	
Presque Isle, Me.	(46.7 N, 68.0 W))	
Loring, Me.	(46.9 N, 67.9 W))	

Representative Points for Nuclear Explosions Resulting from
Destruction of Bombers in Air Battle

(48 N, 85 W)
(49 N, 88 W)
(49 N, 82 W)
(47 N, 78 W)
(49 N, 74 W)

3 A complete description of the assumed parameters are required, e.g.

energy of explosion (fission yield or total yield?)
height of burst assumed
radiation expressed as dose rate or integrated dose
(over what period?)
mathematical model of radiation buildup and decay

4 A contour map would be useful, but the presentation most needed is for the individual bases listed, with the contributions from the individual targets labelled so that it will be possible to determine the effects in case only certain ones of the targets receive bombs.

Confidential

P/A to SCR

P/A on file

S963-108

please

9000217

C O N F I D E N T I A L

ARMY HEADQUARTERS

HQS 5351-1 TD 8205
HQS 2090-4
(DMO&P 3A)

17 Mar 59

CONFIDENTIAL

Residual Nuclear Dosage Maps

1. To assist in various aspects of planning, maps have been prepared to show the probable number of days per year that locations within Canada can expect to receive dosages to infinity from residual nuclear radiation equal to or greater than 4500, 1500, 450 and 150R (Roentgens) from ground burst 5M and 20M (fission yield) nuclear weapons. These maps are identified by the following code to avoid classifying them and thus limit their use:

- | | | | | | |
|----|----------------|----------------------|-------|------|------|
| a. | ASE 75 MAP "A" | - Dosage to infinity | 4500R | from | 5MT |
| b. | "B" | - " " " | 1500R | " | 5MT |
| c. | "C" | - " " " | 450R | " | 5MT |
| d. | "D" | - " " " | 150R | " | 5MT |
| e. | "E" | - " " " | 4500R | " | 20MT |
| f. | "F" | - " " " | 1500R | " | 20MT |
| g. | "G" | - " " " | 450R | " | 20MT |
| h. | "H" | - " " " | 150R | " | 20MT |

The following assumptions have been made:

- The targets are those Canadian cities and contiguous locations in the US, which will probably be subjected to nuclear attack;
- The general area of each target will be hit with a single weapon of the specified yield;
- All targets will be hit simultaneously, or within a very short period of time.

To estimate the probable number of days per year that the fall-out centre line from any one target or target complex may pass over a location, the following was calculated:

- The vertically-averaged wind vectors for the whole year for the specific target areas, and
- The distribution of the vertically-averaged wind vectors around the target.

.. / 2

C O N F I D E N T I A L

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4 14

② *Comp GDO*
Refered
Adm
17 Apr 59
CRS/501
23893
③ *Maps retained*
by GDO - P/A
11/5/59

Jan 11/5/59

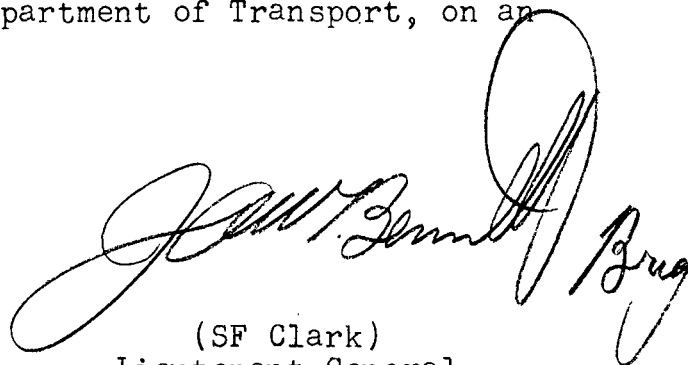
C O N F I D E N T I A L

- 2 -

CONFIDENTIAL

4. The distribution of the fall-out centre line around the target was considered, and isolines enclosing the areas having dosages to infinity, equal to or greater than a given number of days per year, were drawn and expressed as probable days per year. The small circle enclosing the target indicates 100% probability or 365 days per year.

5. These maps are by their nature only suitable for planning purposes. They must not be used to represent fall-out patterns from specific events. Fall-out plots (real or for training purposes) must be prepared from current wind information which is available from the Meteorological Branch, Department of Transport, on an immediate request basis.



(SF Clark)
Lieutenant-General
for Chief of the General Staff

DISTRIBUTION

	Sets of Maps (under separate cover)
HQ Eastern Command	24
HQ Quebec Command	25
HQ Central Command	56
HQ Prairie Command	25
HQ Western Command	12
HQ NWHS	1
HQ Fort Churchill	1
CAJTC	2
JABCS	1
NDC	2
CASC	5
CCOS	1
CNS	2
CAS	2
EMO	2
RCM Police	1
CDRB	1
CJS	1
SA/CGS	1
AG	8
QMG	12
DSD	1
DWD	1
DCD	1
DMT	2

C O N F I D E N T I A L

CONFIDENTIAL

8963-108

MEMORANDUM

26 Jan 59

Ref: CSC 1700-4(JPC), 14 Jan 58

Secretary
Joint Planning Committee

Radioactive Fallout Prediction -
Requirement for Meteorological Support

- 1 On the basis of RCAF planning during the past year for the conduct of operations under radioactive fallout conditions, it is now possible to state RCAF requirements for meteorological information in support of fallout prediction programmes.
- 2 In the event of a nuclear attack upon North America, the RCAF would require advice, at all levels of Command, regarding the radioactive fallout threat to RCAF stations. Operationally, the best possible information in this regard would be required to keep Commanders informed on the fallout danger to units, and the likelihood of having to implement plans for unit operations under fallout conditions and for the deployment of flying squadrons.
- 3 The unit meteorological officers would work with the passive defence officers in the determination of the fallout danger to the unit. Specifically, the meteorological officers would be required to apply all pertinent meteorological information to the reports of nuclear detonations, using their judgment with respect to temporal and spatial changes of upper air flow and the effects of other meteorological factors such as precipitation and frontal movements.
- 4 RCAF forecast offices already have considerable data available to them off the meteorological teletype and facsimile circuits which would assist them in providing service in the above regard. However, in order to provide the best possible service, it would be necessary for this meteorological support to include, in wartime:
 - (a) Four RAWINS per day to at least 80,000 feet from each rawinsonde station in southern Canada and northern United States, this expanded programme (from two ascents per day) to commence with the issue of the first "red" or "yellow" air defence warning.
 - (b) Effective wind data four times per day from each rawinsonde station in southern Canada and northern United States.
- 5 In view of the support which the RCAF may be called upon to provide to Civil Defence, and to facilitate coordination with Civil Defence in regard to questions of evacuation of RCAF dependents, there would be a requirement, in wartime, for the RCAF forecast offices to receive any routine effective wind forecasts (or other processed meteorological information) provided to Civil Defence for fallout prediction purposes.
- 6 To exercise the capability of the RCAF forecast offices with respect to their wartime role as an essential component of the "fallout operations organization" of their respective stations, the following information will be required routinely at these offices in peacetime:
 - (a) Effective wind data from rawinsonde stations in southern Canada and northern United States
 - (b) Any routine effective wind forecasts (or other processed meteorological information) which may be provided to Civil Defence for fallout prediction purposes.

Original signed by
R. J. LANE

(RJ Lane)

Air Commodore,

RCAF Member

Joint Planning Committee

HV TUCKER/FH
66892
Copies to:
CPlansI
DAIRS/Sec
Orig
Circ

000220

~~CONFIDENTIAL~~
S963-108

File Ref

R C A F

MINUTE SHEET

Min (8)

DARS

1 RCAF requirements for meteorological information in support of fallout prediction programmes have become clarified during the past year as a result of the consideration which has been given to the conduct of operations under radioactive fallout conditions.

2 Accordingly, a reply to the Secretary JPC query of 14 Jan 58 on this subject (at Flag 1) has now been prepared, and is attached at fly for CPlans signature.

3 As it is understood that this subject is to be discussed by the JPC Sub-Cte on Met Services for Defence at its 1-59 meeting on 6 Feb 59, it is requested that the reply be forwarded to the Secretary, JPC, by the end of this week, if possible.

Em Mitchell
(EM Mitchell) G/C
DAirS
6-6179

26 Jan 59

~~TOP SECRET~~, ~~SECRET~~, CONF'D, ~~RESUME~~, ~~EXTRACT~~

File Ref: S921-100 (DAPS)

MINUTE SHEET

(5)

TO: DAirS

1 The main interest of DAPS in this matter is in co-ordinating the RCAF operational requirement with the other services rather than in the actual development of the operational requirement. It is considered that someone in Cops sub-division should co-ordinate the development of the requirement.

J.H.C. Lewis
(J.H.C. Lewis) W/C
for DAPS.
(6-7633)

(6)

DGDO *Agree*

1 As we discussed, attached at fly is a draft RCAF reply to the request of the Secretary JPC, dated 14 Jan 58, for a statement of RCAF requirements for meteorological support in the matter of radioactive fallout prediction.

2 Your comments on, and/or concurrence in this draft are requested. As the reply to Secretary JPC is long outstanding, it is desired to have the RCAF reply in his hands before the end of this month.

H.V. Tucker
(HV Tucker)
DAirS/S4
6-6892

14 Jan 59.

7.

DAirS/S4

Concur with draft as is.

H.V. Tucker
DGDO
6 822 8

14/1/59

S926.

S884. 5/50

000222

499

Confidential

S921-100

File Ref

R C A F

MINUTE SHEET

Min (4)

DAPS

1 Mins (1) and (3) have been discussed with DGDO and it is agreed that a clear statement of RCAF operational requirement for radiation fallout prediction service must be developed as a pre-requisite to the planning of supporting Met services. Towards this end, it is suggested that a meeting of representatives of the following Directorates be convened under your chairmanship: DADP, DADO, DTRO, DMO, DGDO, DArME, DMP, DGMS (Air) and DAirS. In view of the fact that DGDO is currently committed to a firm schedule of Command briefings on the subject of radiation fallout, it is further suggested that the first meeting on this problem be called for next Wednesday morning, 26 Feb, if at all possible. (It is understood that DGDO will be absent from this HQ's on TD on 27 and 28 Feb and through all the following week.)

2 A capability for the provision of forecasts of the area of radiation fallout can be developed in the RCAF Met offices provided there is appropriate authorization for such a programme based on a firm operational requirement.

Ed Mitchell
(Ed Mitchell) G/C
DAirS
6-6179

20 Feb 58.

~~CONFIDENTIAL~~

~~CSC-1700-4 (DGDO)~~

Min (3)

~~MEMORANDUM~~

27 Jan 58

DAPS *HL* *Δ Arr S - Mr. Tucker.*

Radioactive Fallout Prediction -
Service Requirements

1 Reference is made to CSC 1700-4 (JPC) attached.

2 In order that fallout prediction is viewed in its right perspective, it is felt that a few basic facts should be reported. The meteorological services cannot be expected to predict anything other than a delineation of the general sectors in which the fallout would be most likely to occur. They cannot be expected to tell, in an emergency where a given dose-rate contour would lie. As this appears to be the extent of the meteorological forecasters ability in an emergency, there is a need to ensure that frequent forecasts are made and readily available to all RCAF Units.

3 To further expand upon the limitation of fallout predictions in war (as opposed to tests where many of the uncertainties of predictions can be removed), one must have a knowledge of the following parameters: wind structure, yield and height of burst, and kind of surface. The yield and height of burst predominately determines the distribution of radioactivity and size of the cloud at time of stabilization, and the gross distribution of radioactivity in the cloud.

4 As the knowledge indicated in para ³/₂ will be in some cases unknown, it follows that the met. forecaster will be at a disadvantage even though he may perform his computations graphically, by analog computer or digital computer.

5 The prediction of fallout is essentially a kind of meteorological prediction, and there is considerable interest in the question of what use can be made of a prediction of the fallout distribution from an atomic burst. At the risk of oversimplification of the case, the following are some of the pertinent factors. Wind observations, now almost invariably made with sounding balloons, give winds which are not entirely representative of the winds which will affect the falling atomic debris. This is because winds change with time and place, and because wind observations, as all meteorologists recognize, are subject to a certain amount of error.

6 Forecast winds, by the same token, are usually even further in error. A number of studies have been made of this subject. For example, a recent study indicates that mean vector errors in 24-hr forecasts range from about 60 per cent of the observed wind at middle altitudes to over 70 per cent of the observed wind at 100 mb.

.....2/

- 2 -

C O N F I D E N T I A L

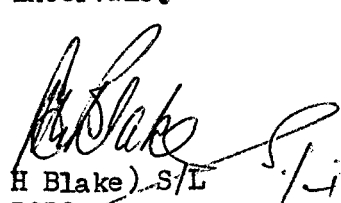
7 It should be fairly evident from the above that there is still a number of questions concerning fallout about which there is still some uncertainty. Any fallout computation, even given perfect information on the wind field, will have a degree of uncertainty on which it is based.

8 With these factors in mind, it appears unlikely that a weather forecaster, even given the computing aids which he would need to compute a fallout pattern, could on short notice and in a time of emergency give a detailed and reliable forecast of the close-in fallout. He could, with a fair degree of assurance, delineate the general sections in which the fallout would be most likely to occur; but he could not tell where a given dose-rate contour would lie. In an emergency situation, the forecaster's problem is further complicated by the fact that he may not have accurate knowledge of the height of burst and fission yield of the weapon.

9 It must be emphasized, however, that the above statement does not necessarily apply to the prediction of the fallout from a test device, where many of the uncertainties mentioned can be removed. It is possible, by the use of a special upper-air sounding network, to obtain wind information over a limited area which is considerably more reliable and current than that obtained from the routine upper-air net, and which extends to a greater altitude. Moreover, there is usually no doubt about the yield and burst height of the device during a test. Thus, it is much more likely that an accurate forecast of the fallout pattern can be made under the favorable conditions which exist during a test. Even here, there remains a degree of uncertainty, as witnessed by the fallout which occurred on some inhabited atolls during the 1954 tests in the Pacific - though this might have been forecast if there had been the refined fallout computing-aids which exist today.

10 In consideration of the above, it is suggested that we use fallout prediction information only as a means of determining the probable areas of fallout, for this is as much as we even hope to get. This information is required by all RCAF Units in order that a form of template can be applied to the potential ground zero of a nuclear weapon. From this information rapid calculations can be made which can assist a Commander in determining his future operational plan.

11 The following data is therefore required, winds aloft for every 10,000 ft beginning at 5,000 ft extending as high as possible, as a vector and speed at 6 hourly intervals.


(A H Blake) S/L
DGDO
(6-8228)

Attch:

(THIS DOCUMENT IS THE PROPERTY OF HER MAJESTY'S CANADIAN GOVERNMENT)



IN REPLY PLEASE QUOTE

No. CSC 1700-4 (JPC)

Department of National Defence

CONFIDENTIAL

JOINT STAFF

JOINT PLANNING COMMITTEE

ADDRESS REPLY TO
CHAIRMAN
CHIEFS OF STAFF,
OTTAWA.

14 Jan 58

(1)

Joint Planning Committee

Radioactive Fall-out Prediction - Service Requirements

1. The enclosed letter on the above subject was received from the Secretary, Sub-Committee on Meteorological Services for Defence.
2. I have been directed to request the Service Members to state their requirements in accordance with para 4 of the above-mentioned letter.
3. May these requirements be forwarded to the Secretary, JPC, please.

J. C. Newlands
(J. C. Newlands) Major,
Secretary,

Joint Planning Committee.

JCN/2-4972/mr

DISTRIBUTION

DGPO
ACNS (P)
C Plans I
DNPO
DMO & P
DAPS
DNPO SO(S)
DMO & P (MO-I)
- APS 2-1
External Affairs Rep. (Mr. Tremblay)
DRB Rep. (Dr. Petrie)
CJS
Sec. JPC
JPS (XA)
JPS

③ DGPO
would you please
action through DAPS.
format 5/1
APS 2-1
6-0592
16 Jan 58.

C O P Y

CSC 1700-4 (MET)

CONFIDENTIAL

17 Dec 57

Secretary,
Joint Planning Committee

Radioactive Fall-out Prediction -
Service Requirements

1. A month ago, Civil Defence requested that a number of papers, including one setting forth the meteorological requirements of Civil Defence, be placed before the JPC. The meteorological paper was referred by CJS directly to the JPC Sub-Committee on Meteorological Services for Defence for study of the military implications.
2. The Meteorological Sub-Committee has reviewed this paper. As a result of this review Civil Defence have been asked to coordinate their requirements directly with the civil meteorological authorities in the Department of Transport in order that full account may be taken of their capabilities for providing Civil Defence with service. A working group with Civil Defence, DRB and DOT representation has been set up and its first meeting is being held on 18 Dec. It is anticipated that a revised statement of Civil Defence requirements for meteorological services will be submitted to the JPC in due course, for consideration of the military implications.
3. When this revised statement is received, it is hoped to prepare overall plans for the provision of the special type of meteorological service required for fall-out prediction. To accomplish this, it will be necessary to have, in addition to the Civil Defence statement, a similar one from each of the Services stating the operational requirement for a fall-out prediction system and the related meteorological requirements.
4. It is therefore requested that JPC initiate action to determine Service requirements for a radioactive fall-out ^{prediction} reporting system and the supporting meteorological services that will be required.

sgd. (D. B. Kennedy)
Secretary
Sub-Committee on
Meteorological Services for Defence

DKB/2-3729/jc

MAIN FILE No. S- S-963-108 T.D. No. 9015

DEPARTMENT OF NATIONAL DEFENCE

SECRET

TEMPORARY DOCKET

g/a

T.D. No. 9015

FILE NUMBER S- 963-108

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
<i>Chp</i>			<i>SR</i>						
<i>DGO</i>		<i>16 Jun 59</i>	<i>SR</i>						
<i>Ops</i>	<i>(14)</i>	<i>19 Jun 59</i>	<i>S</i>						
<i>Dmo</i>		<i>26 Jun 59</i>	<i>SR</i>						
<i>DCIO</i>		<i>21/1</i>	<i>SR</i>						
<i>VCAS/EA</i>	<i>(5)</i>	<i>21 Jun 59</i>	<i>SR</i>						
<i>CTel</i>	<i>(6)</i>	<i>22 Jun 59</i>	<i>SR</i>						
<i>DCom</i>	<i>(7)</i>	<i>26/1</i>	<i>SR</i>						
<i>Com 2</i>	<i>Info & PIA</i>	<i>29/1</i>	<i>SR</i>	<i>29 Jan 60</i>	<i>(14)</i>				

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IN REPLY PLEASE QUOTE

NO. **ISS 1280-68**
(STAFF)

Department of National Defence
ROYAL CANADIAN NAVY

Ottawa, 9015

9 January 1959.

NUCLEAR EXPLOSION AND FALL-OUT REPORTING

Reference (a) **MCACIS 11400-36** dated 19 February, 1958.

Consideration is being given to establishing a nuclear explosion and fall-out reporting system in Canada. The proposed organization will be based on the Civil Defence organization and RCAF ADC control centres which will pass information to the Services.

2. Therefore, it is suggested that a requirement will exist for a two way teletype circuit between St. Margaret's ADCC and the interim Maritime Headquarters in the Dockyard to enable nuclear fall-out information to be passed. It is intended that this circuit would also provide for air defence information to be passed. It is considered that this proposal would be an improvement over the present arrangement described in paragraph 5 of the reference, whereby St. Margaret's ADCC passes air defence information to LHQ via RCAF Beaverbank and CANAS.

3. Your comments are requested. Providing your reply supports the suggested requirement, justification for the proposed communication link should be included.

NAVAL SECRETARY.

MARITIME COMMANDER ATLANTIC.

Copy to: **CHIEF OF THE AIR STAFF.**

~~5846-107(DGDO)~~

8963-108

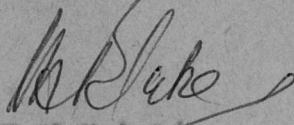
Ottawa Ont
18 Dec 58

Ref App B to 5846-107(DGDO) 12 Nov 58

TO ALL COMMANDS

Fallout Prediction

1 All Commands are advised that this HQ is processing the requirement for a standardized fallout prediction system as a matter of some urgency. It is anticipated that the details of this system will be available early in the new year, and will be included in the new CAP on Atomic Defence when published.


(AH Blake) S/L
for CAS

AHBlake/dp
DGDO
6-8228

Copies to

JABC School
File
Circ
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NUCLEAR, BIOLOGICAL CHEMICAL WARFARE - FALLOUT PREDICTIONS

FOR CROSS REFERENCES SEE INSIDE COVER

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	IN-SPECTED
VEAP	WITH PAPERS CR	AUG 7-1959	Bel						
Cops	referred	10/24/59	RP						
DNDO	Min (2)	11/8	Am						
DAIRS/S-4	Min (3)	12/8	J						
Cops.	Sig	28 Aug	JH	18 Sep	206			SEP 2 1959	
VEAP	WITH PAPERS CR	SEP 11 1959							
Cops	(2)	14 Sep	RP						
DAIRS/54	(3)	14 Sep	RP						
DAIRS/54		25 Nov	JH						
DAIRS/54	returned them	1 Dec	JH						
DAIRS/54	Brought up to date + returned	25-1-61	62	29 Jan	255				
DAIRS/4-4	PER REQUEST CR	MAY 22 1962	62						
Cops	Sig	23 May	RP						
DAIRS/54		13 May	RP	27 May	RP				
DNDO	(2)	29 May	RP	3 July	RP			JUL - 4 1962	
DAIRS	PER REQUEST CR	SEP 25 1962	62						
Cops		25 Sep	RP	26/9	RP			SEP 28 1962	
DAIRS	PER REQUEST CR	OCT 1 1962	62						
Cops	Sig	30 Oct	RP	31 Oct	RP			OCT 31 1962	
Cops	WITH PAPERS CR	NOV 2 1962							
DAIRS.		5 Nov	RP						
SA	- 2 -	5 Nov	RP						
Cops	For sig. please	30 Nov	RP	3 Dec	RP				
DAIRS	my ask	3 Dec	RP						
Cops	For sig. please	5 Dec	RP						
DAIRS		5 Dec	RP						

"B.F." - DO NOT HOLD THIS FILE WHEN

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CROSS REFERENCES

FILE NO.	SUBJECT
	For Red Int Reports see 5922-108