Change No. 1

Headquarters
Department of the Army
United States Marine Corps
United States Navy
United States Air Force
Washington, DC, 30 April 2009

Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance

1. Change Field Manual (FM) 3-11.3/Marine Corps Warfighting Publication (MCWP) 3-37.2A/Navy Tactics, Techniques, and Procedures (NTTP) 3-11.25/Air Force Tactics, Techniques, and Procedures (Interservice) (AFTTP[I]) 3.2.56, dated 2 February 2006, as follows:

Remove old pages:	**Insert new pages:**
i through xiv	i through xiv
III-7 through III-20	III-7 through III-20
D-7 through D-22	D-7 through D-22
E-3 through E-10	E-3 through E-10
E-15 through E-22	E-15 through E-22
E-25 through E-30	E-25 through E-30
E-37 through E-38	E-37 through E-38
E-49 through E-50	E-49 through E-50
E-53 through E-56	E-53 through E-56
F-1 through F-4	F-1 through F-4
F-7 through F-16	F-7 through F-16
F-19 through F-20	F-19 through F-20
F-27 through F-28	F-27 through F-28
G-9 through G-10	G-9 through G-10
G-37 through G-38	G-37 through G-38
G-47 through G-48	G-47 through G-48
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G-87 through G-90	G-87 through G-88
H-5 through H-12	H-5 through H-12
H-15 through H-22	H-15 through H-22
I-3 through I-4	I-3 through I-4
K-1 through K-2	K-1 through K-2
L-15 through L-24	L-15 through L-24
References-3 through References-6	References-3 through References-6

2. The purpose of this change is to implement recent changes that were promulgated with the release of NATO Allied Tactical Publication *(ATP) 45(C), Reporting Nuclear Detonations, Biological and Chemical Attacks, and Predicting and Warning of Associated Hazards and Hazards Areas (Operators Manual),* December 2005 (STANAG 2103)*,* and NATO STANAG 2104, *Friendly Nuclear Strike Warning (STRIKWARN)*, May 2003. This change publication will serve as current doctrine until the expected promulgation of *ATP 45(D)* in the future supports a full revision. Operationally significant/factual corrections to previously published errata are also included in this change publication. It does not, however, update administrative information such as reference publications, glossary terms, and addresses of program participants or Service signatories.

3. A pen-and-ink change should be made wherever the words *line(s) (items)* are currently used in the publication. *Line(s) (items)* should be changed to *set* or *field* depending on the context. For example, change "NBC Report or Message line(s) (items)" to "NBC Report or Message set."

4. A bar (|) marks new or changed material.

5. File this transmittal sheet in the front of the publication.

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.

FM 3-11.3/MCWP 3-37.2/NTTP 3-11.25/AFTTP(I) 3-2.56, C1
30 April 2009

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

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0927206

DISTRIBUTION:
Active Army, Army National Guard, and U.S. Army Reserve: To be distributed in accordance with the initial distribution number 113829, requirements for FM 3-11.3.

By Order of the Secretary of the Air Force

MAX E. KIRSCHBAUM
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Air Force Distribution: F

Marine Corps PCN: 144 00051 01

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PREFACE

1. Scope

This multiservice operations publication provides tactics, techniques, and procedures (TTP) for conducting chemical, biological, radiological, and nuclear (CBRN) avoidance. This document presents comprehensive TTP for passive and active avoidance measures. Users of this manual will be CBRN staff officers, CBRN noncommissioned officers (NCOs), non-CBRN personnel performing collateral duties as an additional duty CBRN officer or NCO, commanders and staff at the tactical through strategic levels, and civilian agencies.

2. Purpose

The purpose of this publication is to provide commanders, staffs, key agencies, and service members with a key reference for planning and conducting CBRN avoidance. It provides the tools for CBRN defense personnel to implement active and passive CBRN avoidance measures and supports the decision-making process. It also serves as a key source document for refining existing training support packages, training center exercises, and service school curricula.

3. Application

This publication is designed for use at the operational and tactical levels, but has implications at the strategic level in the implementation of Standardization Agreement (STANAG) 2103/Allied Tactical Publication 45C (ATP-45C) and NATO STANAG 2104, *Friendly Nuclear Strike Warning (STRIKWARN)*, May 2003. It will support command staff planning in preparing for and conducting CBRN avoidance operations. It also provides guidance to unit leaders and personnel for implementing CBRN avoidance TTP.

4. Implementation Plan

Participating service command offices of primary responsibility (OPRs) will review this publication, validate the information, and reference and incorporate it into service and command manuals, regulations, and curricula as follows:

Army. The United States Army (USA) will incorporate the procedures in this publication in USA training and doctrinal publications as directed by the Commander, United States Army Training and Doctrine Command (TRADOC). Distribution is according to Department of the Army (DA) Form 12-99-R *(Initial Distribution Requirements for Publications).*

Marine Corps. The United States Marine Corps (USMC) will incorporate the procedures in this publication in training and doctrinal publications as directed by the Commanding General (CG), United States (U.S.) Marine Corps Combat Development Command (MCCDC). Distribution is according to the USMC publications distribution system.

Navy. The United States Navy (USN) will incorporate the procedures in this publication in training and doctrinal publications as directed by the Commander, Navy Warfare Development Command (NWDC).

Air Force. The United States Air Force (USAF) will validate and incorporate appropriate procedures according to applicable governing directives. It will develop and implement this and other nuclear, biological, and chemical (NBC) multiservice tactics, techniques, and procedures (MTTP) publications through a series of USAF manuals providing service-specific TTP. Distribution is according to the USAF publication distribution system.

5. User Information

a. The United States Army Chemical School (USACMLS) developed this publication with the joint participation of the approving service commands.

b. We encourage recommended changes for improving this publication. Please reference the specific page and paragraph, and provide a rationale for each recommendation. Send comments and recommendations directly to—

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Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

This publication implements STANAG 2103, Edition 9, *Reporting Nuclear Detonations, Biological and Chemical Attacks, and Predicting and Warning of Associated Hazards and Hazards Areas-Allied Tactical Publication (ATP)45(C*), December 2005, and STANAG 2104, *Friendly Nuclear Strike Warning (STRIKWARN)*, 20 May 2003.

*FM 3-11.3
MCRP 3-37.2A
NTTP 3-11.25
AFTTP(I) 3-2.56

FM 3-11.3 — US Army Training and Doctrine Command, Fort Monroe, Virginia

MCRP 3-37.2A — Marine Corps Combat Development Command, Quantico, Virginia

NTTP 3-11.25 — Navy Warfare Development Command, Newport, Rhode Island

AFTTP(I) 3-2.56 — Headquarters Air Force Doctrine Center, Maxwell Air Force Base, Alabama

2 February 2006

Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance

TABLE OF CONTENTS

*This manual supersedes FM 3-3/FMFM 11-17, 16 November 1992, and FM 3-3-1/FMFM 11-18, 9 September 1994.

NOTE: In some cases, it may be better to provide warning of a contamination by means of general plain language messages rather than by the formats above. See Appendix C for more information on CB MERWARN messages and Appendix G for more information on nuclear MERWARN messages.

c. Strike Warning (STRIKWARN). Friendly forces need to receive advanced warning of a nuclear strike to ensure that they are not placed at unnecessary risk. Such attacks are announced through a STRIKWARN message. This message applies to nuclear strikes that may affect forces operating on land, over land, or at sea. STRIKWARN messages typically use automatic data processing (ADP) messages, but can use alternate means of communication to transmit warnings using the STRIKWARN format. Appendix I of this manual covers STRIKWARN in more detail.

d. MET and Weather Reports. Current MET data is a vital prerequisite for radiological fallout and CB and ROTA downwind hazard prediction. MET data is transmitted as a basic wind report (BWR). The effective downwind report (EDR) and the chemical downwind report (CDR) are prepared at the CBRN control center and are disseminated to all units served by the preparing CBRN control center.

(1) BWR. A BWR is a basic wind message (BWM) or a basic wind forecast (BWF). This message contains the basic MET data to be used for a fallout prediction (see Appendix D). A BWR is an ADP-formatted message used to accommodate the BWM or the BWF when transmitted.

(2) EDR. An EDR is an EDM or an effective downwind forecast (EDF). This message contains information on downwind speed and downwind direction for each of seven preselected nuclear weapon yields (see Appendix I). An EDR is an ADP-formatted message used to accommodate the EDM or the EDF message when transmitted.

(3) CDR. A CDR is a CDM or a chemical downwind forecast (CDF). This message contains basic MET information for predicting a biological aerosol (see Appendix E) and chemical vapor hazard area (see Appendix F). A CDR is an ADP-formatted message used to accommodate the NBC CDM or the NBC CDF message when transmitted.

5. Mandatory Entries in Nuclear, Biological, and Chemical Reports

In order to process and evaluate the CBRN attack data quicker and with more efficiency, ensure that the information is valid and assist in manually inputting the data into the automated systems (each line has mandatory information that must be entered for the NBC message to be properly formatted). Certain rules apply to all lines or messages and are as follows (see Table III-2, page III-8, for information required by line):

a. The field contents are described by one of the following: A = alphabetic, N = numeric, S = special characters (comprised of six characters [.,-()?]), B = blank, and X = any combination of ANBS. Combinations of the codes exist in some fields.

b. The fields must be filled with the number and the type of characters identified, or a dash (-) may be inserted into a field when the information is not available. However, some fields vary in length, which is indicated by giving a range for the number of characters (for example, 1-20X).

c. When a line is repeatable, it is indicated by a preceding asterisk (for example, *=3 indicates that data can be entered up to three times).

d. If a repeatable line is used, then all fields within that line must be used each time that line is repeated.

e. In manual procedures, all information under one set is put into one sentence.

f. In STRIKWARN messages, the units of measurement are default values and are, therefore, excluded from the fields.

g. All directional/angular measurements must be stated in degrees (3N) or mils (4N) (for example, 40 degrees = 040, 18 mils = 0018).

h. Sets or fields are mandatory (M), operationally determined (O), or conditional (C).

Table III-2. Required Information by Line

ALFA **Strike Serial Number**

```
/-    /-      /-      /-      /-      //
|     |       |       |       (O) Grading of message/report, 1-3N
|     |       |       (M) Type of incident*, 1-2A
|     |       (M) Sequence number, 1-10X
|     (M) Code for originator, 1-6X
(M) Nationality, 2A or:
      (M) Area control center code, 2-3AN
```

***N**=Nuclear Attack, **B**=Biological Attack, **C**=Chemical Attack, **RN**=Nuclear ROTA, **RB**=Biological ROTA, **RC**=Chemical ROTA, **RU**=Unidentified ROTA

BRAVO **Location of the Observer and Direction of the Attack or Event**

```
/-  /-      //
|   (M) Direction of Attack or Event from Observer and Unit of Measurement*
|   , 6-7AN Location of Observer, one of the following:
(M) Geographic Place Name, 1-30 X, or (M) Geographic Position, LAT/LONG, Seconds, 15AN, or
(M) Geographic Position, UTM 10-Meter, 13AN, or
(M) Geographic Position, LAT/LONG, Minutes, 11AN, or
(M) Geographic Position, UTM 100-Meter, 11AN
```

***DGM**=Degrees/Magnetic North, **DGT**=Degrees/True North, **DGG**=Degrees/GN, **MLM**=Mils/Magnetic North, **MLT**=Mils/True North, **MLG**=Mils/GN

CHARLIE **DTG of Report or Observation and End of Event**

```
/-  /-      //
|   (O) DTG Event ended in Zulu Time, Month, and Year, 14AN
(M) DTG of Report or Observation in Zulu Time, Month, and Year, 14AN
```

DELTA **DTG of Attack or Detonation and Attack End**

```
/-  /-      //
|     (O) DTG Attack ended in Zulu Time, Month, and Year, 14AN
(M) DTG of Attack or Detonation in Zulu Time, Month, and Year, 14AN
```

FOXTROT **Location of Attack or Event**

```
/-*  /-      // (* = 6)
|     (M) Location Qualifier (AA=Actual, EE=Estimated), 2A
Attack or Event Location, one of the following:
(M) Geographic Place Name, 1-30X, or
(M) Geographic Position, LAT/LONG, Seconds, 15AN, or
(M) Geographic Position, UTM 100-Meter, 13AN, or
(M) Geographic Position, LAT/LONG, Minutes, 11AN, or
(M) Geographic Position, UTM 10-Meter, 11AN
```

Explanation of Repeatable Field

Line FOXTROT: Fields 1-2 are repeatable to accommodate up to 6 data entries in order to define a line or area attack.

Table III-2. Required Information by Line (Continued)

GOLF **Delivery and Quantity Information**

/- /- /- /- /- //
| | | | (M) Number of Agent Containers, 1-3N, or
| | | | (M) Size of Release*, 3A
| | | (M) Type of Agent Containers**, 3A
| | (M) Number of Delivery Systems, 1-3N
| (M) Type of Delivery***, 3A
(M) Suspected/Observed Event (SUS=Suspected, OBS=Observed), 3A

*__SML__ (Less than 200 Liters or 200 Kilograms), **LRG**, **XLG** (More than 1,500 Liters or Kilograms), **UNK**=Unknown **__BML__=Bomblets, **BOM**=Bomb, **BTL**=Pressurized Gas Bottle, **BUK**=Bunker, **CON**=Generic Storage Container, **DRM**=Nominal 55-gallon Storage Drum, GEN=Generator (Aerosol), **MSL**=Missile, **RCT**=Reactor, **RKT**=Rocket, **SHL**=Shell, **SPR**=Spray (tank), **STK**=Stockpile, **TNK**=Storage Tank, **TOR**=Torpedo, **MNE**=Mine (NBC-filled only), **UNK**=Unknown**, WST**=Waste
***__AIR__=Aircraft, **BOM**=Bomb (delivering bomblets only), **CAN**=Cannon, **MLR**=Multiple-Launched Rocket System, **MSL**=Missile, **MOR**=Mortar, **PLT**=Plant, **RLD**=Railroad Car, **SHP**=Ship, **TPT**=Transport, **UNK**=Unknown

HOTEL **Type of Nuclear Burst**

/- //
(M) Type of Nuclear Burst (AIR, SUBS, SURF, UNK), 3-4A

INDIA **Release Information CB Agent Attacks or ROTA Events**

/- /- /- /-* // (* = 2)
| | | (O) Type of Detection*, 3-5A
| | (O) Type of Persistency**, 1-3A
| (O) Type of Agent (see Table III-3, page III-14), 1-4A or
| (O) Agent Name (see Table III-4, page III-15), 1-4A or
| (O) UN/NA Identification Number (see ERG), 4N
(M) Type of Agent-Release-Height (AIR, SURF, UNK), 3-4A
Explanation of Repeatable fields.
Line INDIA: Field 4 is repeatable to accommodate up to 2 entries in order to provide information on multiple types of detection.
*__OTH__=Other (use GENTEXT to specify), **MPDS**=Manned Point Detection System, **UMPDS**=Unmanned Point Detection System, **MSDS**=Manned Standoff Detection System, **UMSDS**=Unmanned Standoff Detection System, **MSVY**=Manned Survey, **UMSVY**=Unmanned Survey** **P**=Persistent, **NP**=Nonpersistent, **T**=Thickened, **UNK**=Unknown

JULIET **Flash-to-Bang Time in Seconds**

/- //
(M) Flash-to-Bang Time in Seconds, 1-3N

KILO **Crater Description**

/- /- //
| (O) Crater Width and Unit of Measurement*, 2-7AN
(M) Crater Indicator (CRATER=Crater present, NONE=No crater present, UNK=Unknown), 3-6A
***__KM__**=Kilometers, **NM**=Nautical Miles, **FT**=Feet, **KF**=Kilofeet (1,000 feet), **HM**=Hectometres (100 meters),**YD**=Yards, **M**=Meters, **SM**=Statute Miles

LIMA **Nuclear Burst Angular Cloud Width at H+5 Minutes**

/-//
(M) Angular Cloud Width (at H + 5 Min) and Unit of Measurement (DEG or MIL), 6-7 AN

MIKE **Stabilized Cloud Measurement at H+10 Minutes**

/-* /- /- // (* = 2)
| | (M) Cloud Height and Unit of Measurement*, 2-7AN
| (M) Cloud Angle and Unit of Measurement (MIL or DEG), 6-7AN
(M) Cloud Section (TOP or BOT), 3A
Explanation of Repeatable Field
Line MIKE: Fields 1-3 are repeatable to accommodate up to 2 data entries in order to describe the cloud height and/or the cloud angle for cloud top and/or for cloud bottom.
***__KM__**=Kilometers, **NM**=Nautical Miles, **FT**=Feet, **KF**=Kilofeet (1,000 feet), **HM**=Hectometres (100 meters),**YD**=Yards, **M**=Meters, **SM**=Statute Miles

Table III-2. Required Information by Line (Continued)

MIKER **Description and Status of ROTA Event**
/-/- //
| (M) Status of ROTA Event (PUFF=Single Release of a Cloud, CONT=Continuous)
| SPRAY=Spraying) 4-5A
(M) Description of ROTA Event*, 4-6A
***CLOUD**=Visible Cloud, **FIRE**=Burning Fire, **POOL**=Large Quantity of Still Liquid, **LEAK**=Continuous Flow from Damaged Pipe or Container, **SPILL**=Small Quantity of Still Liquid, **LIQUID**=Liquid

NOVEMBER **Estimated Nuclear Yield in Kilotons**
/-//
(M) Estimated Nuclear Yield in Kilotons, 1-6NS

OSCAR **Reference Date Time Group for Estimated Contour Lines**
/-//
(M) Reference Date-Time Group for estimated contour lines in Zulu Time, Month, and Year, 14AN

PAPAA **Predicted Attack/Release and Hazard Area**
/- /- /- /- //
| | | (M) Duration of Hazard in Hazard Area and Unit of Measurement*, 5-8ANS
| | (M) Hazard Area Distance (see Appendix E for CHEM or Appendix F for BIO)
| | and Unit of Measurement** , 2-7AN
| (M) Duration of Hazard in Attack or Release Area and Unit of Measurement*, 5-8ANS
(M) Attack or Release Area Radius and Unit of Measurement** , 2-7AN
***DAY**=Days, **HR**=Hours, **MIN**=Minutes, **SEC**=Seconds, **WK**=Weeks, **MON**=Month
****KM**=Kilometers, **NM**=Nautical Miles, **FT**=Feet, **KF**=Kilofeet (1,000 feet), **HM**=Hectometres (100 meters), **YD**=Yards, **M**=Meters, **SM**=Statute Miles

PAPAB **Detailed Fallout Hazard Prediction Parameters**
/- /- /- /- /- //
| | | | (M) Right Radial Line and Unit of Measurement*, 6-7AN
| | | (M) Left Radial Line and Unit of Measurement*, 6-7AN
| | (M) Cloud Radius and Unit of Measurement, 3-4AN
| (M) Downwind Distance of Zone I and Unit of Measurement, 4-5AN
(M) Effective Wind Speed and Unit of Measurement (MPS=Meters per Second, KPH=Kilometers per Hour, KTS=Knots, MPH=Miles per Hour), 6AN
***DGM**=Degrees/Magnetic North, **DGT**=Degrees/True North, **DGG**=Degrees/GN, **MLM**=Mils/Magnetic North, **MLT**=Mils/True North, **MLG**=Mils/GN

PAPAC **Radar Determined External Contour of Radioactive Cloud**
/-* // (* = 6)
External Contour of Radioactive Cloud, one of the following:
(M) Geographic Position, LAT/LONG, Seconds, 15AN, or
(M) Geographic Position, UTM 10-Meter, 13AN, or
(M) Geographic Position, LAT/LONG, Minutes, 11AN, or
(M) Geographic Position, UTM 100-Meter, 11AN

Explanation of Repeatable Fields
Set PAPAC: Field 1 is repeatable to accommodate up to 6 entries in order to describe the radioactive cloud outline.

PAPAD **Radar Determined Downwind Direction of Radioactive Cloud**
/- //
(M) Downwind Direction of Radioactive Cloud and Unit of Measurement*, 6-7AN

***DGM**=Degrees/Magnetic North, **DGT**=Degrees/True North, **DGG**=Degrees/GN, **MLM**=Mils/Magnetic North, **MLT**=Mils/True North, **MLG**=Mils/GN

Table III-2. Required Information by Line (Continued)

PAPAX Hazard Area Location for Weather Period (**=3)**
/- /-* // (* = 20)
| Hazard Area Location, one of the following:
| (M) Geographic Position, LAT/LONG, Seconds, 15AN, or
| (M) Geographic Position, UTM 10-Meter, 13AN, or
| (M) Geographic Position, LAT/LONG, Minutes, 11AN, or
| (M) Geographic Position, UTM 100-Meter, 11AN
(M) Date-Time Group of Start of Meteorological Period in Zulu Time, Month, and Year, 14AN

PAPAX is repeatable up to 3 times in order to describe three possible hazard areas corresponding to the time periods from the CDM. A hazard area for a following time period will always include the previous hazard area.

Field 2 is repeatable up to 20 times in order to describe the hazard area outline.

NOTE: If the hazard area location has only one position, draw a circle with a radius of the (remaining) hazard area distance from line PAPAA. If the hazard area location has only two positions, these are the extreme ends of a linear attack. For each point, draw a circle with a radius of the (remaining) hazard area distance from line PAPAA and connect the circles by two tangents.

QUEBEC* Location of Reading/Sample/Detection and Type of Sample/Detection (* = 20)
/-/- /- /- //
| | | ((O) Height of Measurement Above Ground Level and Unit of Measurement, 2-7AN
| | (M) Type of Detection*, 3-5A
| (M) Type of Sample**, 1-5A
Location of Reading/Sample/Detection, one of the following:
(M) Geographic Position, LAT/LONG, Seconds, 15AN, or
(M) Geographic Position, UTM 10-Meter, 13AN, or
(M) Geographic Position, LAT/LONG, Minutes, 11AN, or
(M) Geographic Position, UTM 100-Meter, 11AN

QUEBEC is repeatable up to 20 times in order to describe multiple detectors and monitoring or survey points.

***OTH**=Other (use GENTEXT to specify), **MPDS**=Manned Point Detection System, **UMPDS**=Unmanned Point Detection System, **MSDS**=Manned Standoff Detection System, **UMSDS**=Unmanned Standoff Detection System, **MSVY**=Manned Survey, **UMSVY**=Unmanned Survey

****LIQ**=Liquid sample, **VAP**=Vapor, **SOIL**=Soil Sample, **SOLID**= Solid Sample, **VEG**=Vegetation Sample, **WATER**=Water Sample

Table III-2. Required Information by Line (Continued)

ROMEO* **Level of Contamination, Dose Rate Trend, and Decay Rate Trend. (* = 20)**

/-/- /- //
| | (O) Relative Decay Rate (DN=Normal, DF=Fast, DS=Slow), 2A, or
| | (O) Actual Decay Rate, 3-4NS
| (O) Dose Rate Trend*, 4A
(M) Level of Dose Rate/Dosage and Unit of Measurement**4-12ANS, or
(M) Level of Dose and Unit of Measurement***, 4-12ANS, or
(M) Level of Contamination and Unit of Measurement****4-12ANS, or
(M) Miosis*****, 4-5A

Line is repeatable up to 20 times in order to describe multiple detection and monitoring or survey points.

***BACK**=Background, **DECR**=Decreasing, **INCR**=Increasing, **INIT**=Initial, **SAME**=Same, **PEAK**=Peak

****CGH**=Centigray Per Hour, **CSH**=Centisievert Per Hour, **MSH**=Millisievert Per Hour, **USH**=Microsievert Per Hour, **BQS**=Becquerel, **MM3**=Milligram-Minutes Per Cubic Meter

***** CFU**=Colony-Forming Units **, CGY**=Centigray, **CSV**=Centisievert, **MGY**=Milligray , **MSV**=Millisievert, **USV**=Microsievert

*****ACPL**=Agent-Containing Particles per Liter, **BQM2**=Becquerel per Square Meter, **BQM3**=Becquerel per Cubic Meter, **MGM2**=Milligrams per Square Meter, **MGM3**=Milligrams per Cubic Meter, **PPM**=Parts per Million (10^6), **PPB**=Parts per Billion (10^9)

****** **MCTXX**=Eye-Affecting Dosage xx (Miosis) = MCt_1 to MCt_{99}

SIERRA* **DTG of Reading or Initial Detection of Contamination (* = 20)**

/-//
(M) DTG, Contamination Detected in Zulu Time, Month, and Year, 14AN, or
(M) DTG of Reading in Zulu Time, Month, and Year, 14AN

SIERRA is repeatable up to 20 times in order to describe multiple detection and monitoring or survey points.

TANGO* **Terrain/Topography and Vegetation Description (* = 20)**

/- /- //
| (M) Vegetation Description*, 3-5A
(M) Terrain/Topography Description**, 3-6A

TANGO is repeatable up to 20 times in order to describe multiple detection and monitoring or survey points.

***BARE**=Bare, **SCRUB**=Scrubby Vegetation, **WOODS**=Wooded Terrain, **URBAN**=Urban, **UNK**=Unknown

****FLAT**=Flat, **URBAN**=Urban, **HILL**=Hill, **SEA**=Sea, **VALLEY**=Valley, **UNK**=Unknown

WHISKEY **Sensor information**

/- /- /- /- //
| | | (O) Assurance Level of Results, (LOW, MED, HIGH), 3-4A
| | (O) Confirmatory Test (Y or N), 1A
| (M) Nonspecific Potential Harmful Result (POS or NEG), 3A
(M) Generic Alarm Result (POS or NEG), 3A

WHISKEY format is prepared for future use. Procedures on how to use it will follow later.

Table III-2. Required Information by Line (Continued)

XRAYA** **Actual Contour Information (** = 50)**

/- /-* // (*=50)
| Limit Contour Line or Area of Contamination, one of the following:
| (M) Geographic Position, LAT/LONG, Seconds, 15AN, or
| (M) Geographic Position, UTM 10-Meter, 13AN, or
| (M) Geographic Position, LAT/LONG, Minutes, 11AN, or
| (M) Geographic Position, UTM 100-Meter, 11AN
(M) Level of Dose Rate/Dosage and Unit of Measurement*, 4-12ANS, or
(M) Level of Dose and Unit of Measurement**, 4-12ANS, or
(M) Level of Contamination and Unit of Measurement***, 4-12ANS, or
(M) Level of Hazard****, 3-5AN, or
(M) Miosis****, 4-5AN

Field 2 is repeatable to accommodate up to 50 data entries in order to describe respective contour lines.

XRAYA is repeatable up to 50 times to represent multiple contours.

***CGH**=Centigray per Hour, **CSH**=Centisievert per Hour, **MSH**=Millisievert per Hour, **USH**=Microsievert per Hour, **BQS**=Becquerel, **MM3**=Milligram-Minutes per Cubic Meter

**** CFU**=Colony-Forming Units, **CGY**=Centigray, **CSV**=Centisievert, **MGY**=Milligray, **MSV**=Millisievert, **USV**=Microsievert

*****ACPL**=Agent-Containing Particles per Liter, **BQM2**=Becquerel per Square Meter, **BQM3**=Becquerel per Cubic Meter, **MGM2**=Milligrams per Square Meter, **MGM3**=Milligrams per Cubic Meter, **PPM**=Parts per Million (10^6), **PPB**=Parts per Billion (10^9)

******LDXX**=Lethal Dose xx = LD_1 to LD_{99}, **IDXX**=Incapacitating Dose xx = ID_1 to ID_{99}, **ICTXX**=Incapacitating Dosage xx = ICt_1 to ICt_{99}, **LCTXX**=Lethal Dosage xx = LCt_1 to LCt_{99}, **MCTXX**=Eye-Affecting Dosage xx (Miosis) = MCt_1 to MCt_{99}

XRAYB** **Predicted Contour Information (** = 50)**

/- /- /-* // (*=50)
| | Limit Contour Line or Area of Contamination, one of the following:
| | (M) Geographic Position, LAT/LONG, Seconds, 15AN, or
| | (M) Geographic Position, UTM 10-Meter, 13AN, or
| | (M) Geographic Position, LAT/LONG, Minutes, 11AN, or
| | (M) Geographic Position, UTM 100-Meter, 11AN
| (M) Level of Dose Rate/Dosage and Unit of Measurement*, 4-12ANS or
| (M) Level of Dose and Unit of Measurement**, 4-12 ANS or
| (M) Level of Contamination and Unit of Measurement***, 4-12ANS
| (M) Level of Hazard****, 3-5AN, or
| (M) Miosis****, 5A
(M) Type of Contour*****, 2N

Field 3 is repeatable to accommodate up to 50 data entries in order to describe respective contour lines.

XRAYB is repeatable up to 50 times to describe multiple contours or segments.

***CGH**=Centigray per Hour, **CSH**=Centisievert per Hour, **MSH**=Millisievert per Hour, **USH**=Microsievert per Hour, **BQS**=Becquerel, **MM3**=Milligram-minutes per Cubic Meter
**** CFU**=Colony-Forming Units **, CGY**=Centigray, **CSV**=Centisievert, **MGY**=Milligray , **MSV**=Millisievert, **USV**=Microsievert
*** **ACPL**=Agent-Containing Particles per Liter, **BQM2**=Becquerel per Square Meter, **BQM3**=Becquerel per Cubic Meter, **MGM2**=Milligrams per Square Meter, **MGM3**=Milligrams per Cubic Meter, **PPM**=Parts per Million (10^6), **PPB**=Parts per Billion (10^9)
******LDXX**=Lethal Dose xx = LD_1 to LD_{99}, **IDXX**=Incapacitating Dose xx = ID_1 to ID_{99}, **ICTXX**=Incapacitating Dosage xx = ICt_1 to ICt_{99}, **LCTXX**=Lethal Dosage xx = LCt_1 to LCt_{99}, **MCTXX**=Eye-Affecting Dosage xx (Miosis) = MCt_1 to MCt_{99}

*******01 through 99**=Probability in percent terms of exceeding value in Field 2 of Set XRAYB

Table III-2. Required Information by Line (Continued)

YANKEE* **Downwind Direction and Downwind Speed (* = 20)**

/- /- //
| (M) Downwind Speed and Unit of Measurement*, 4-6AN
(M) Downwind Direction and Unit of Measurement**, 6-7AN

YANKEE is repeatable up to 20 times in order to describe multiple detection and monitoring or survey points.

* **MPS**=Meters per Second, **KPH**=Kilometers per Hour, **KTS**=Knots, **MPH**=Miles per Hour

** **DGM**=Degrees/Magnetic North, **DGT**=Degrees/True North, **DGG**=Degrees/GN, **MLM**=Mils/Magnetic North, **MLT**=Mils/True North, **MLG**=Mils/GN

ZULU* **Actual Weather Conditions (* = 20)**

/- /- /- /- /- //
| | | | (M) Cloud Coverage*, 1N
| | | (M) Significant Weather Phenomena**, 1AN
| | (M) Relative Humidity Range***, 1N
| (M) Surface Air Temperature and Unit of Measurement (for example, -48F, 27C), 2-4ANS
(M) Detailed Air Stability Category****, 1N or
(M) Simplified Air Stability Category, (U=Unstable, N=Neutral, or S=Stable), 1A

ZULU is repeatable up to 20 times in order to describe multiple detection and monitoring or survey points.

***0**=Less than half covered (scattered), **1**=More than half covered (broken), **2**=Completely covered (overcast), **3**=No clouds (clear conditions)
****0**=No Significant Weather Phenomena, **1**=Sea Breeze, **2**=Land Breeze, **3**=Blowing Snow, Sand Storm, Dust Storm, **4**=Fog, Ice Fog, Thick Haze (visibility less than 4 km), **5**=Drizzle, **6**=Rain, **7**=Snow, Rain, Snow mixed (no shower), **8**=Showers of Rain, Snow, Rain and Snow mixed, Hail, **9**=Thunderstorm with or without Precipitation, **A**=Top of inversion layer lower than 800 M, **B**=Top of inversion layer lower than 400 M, **C**=Top of inversion layer lower than 200 M

*****0**=0-9 Percent, **1**=10-19 Percent, **2**=20-29 Percent, **3**=30-39 Percent, **4**=40-49 Percent, **5**=50-59 Percent, **6**=60-69 Percent, **7**=70-79 Percent, **8**=80-89 Percent, **9**=90-100 Percent

******1**=Very Unstable, **2**=Unstable, **3**=Slightly Unstable, **4**=Neutral, **5**=Slightly Stable, **6**=Stable, **7**=Very Stable

GENTEXT **General Text (unlimited free text).**

/- /- //
| (M) Free Text, Unlimited X
(M) Text Indicator, (NBC INFO or NBC SITREP), 1-61X

Table III-3. Types of Agents

Nuclear		Biological		Chemical	
NIL	No agent detected (only used in NBC4)	**BIO**	Biological	**BL**	Blister agent
OTR	Other agent	**NIL**	No agent detected (only used in NBC4)	**BLOD**	Blood agent
RNP	ROTA nuclear power plant	**OTR**	Other agent	**CHOK**	Choking agent
TIM	TIM	**TIM**	TIM	**G**	G agent
UNK	Unknown	**TOX**	Toxin	**H**	Mustard agent
		UNK	Unknown	**INCP**	Incapaciting agent
		BAC	Bacterial	**IRT**	Irritant
		CLA	Chlamydia	**NERV**	Nerve agent

Table III-3. Types of Agents (Continued)

Nuclear		Biological		Chemical	
		RIC	Rickettsiae	**NIL**	No agent detected (only used in NBC4)
		VIR	Viral	**OTR**	Other agent
				PENT	Penetrating agent
				TIM	TIM
				UNK	Unknown
				V	V agent
				VMT	Vomiting agent

Note: If OTR is used, include any details available in GENTEXT set.

Table III-4. Agent Name

Nuclear		Chemical	
ALP	Alpha	**AC**	Hydrogen cyanide
BETA	Beta	**BZ**	Quinuclidinyl benzilate
GAM	Gamma	**CG**	Phosgene
NEU	Neutron	**CK**	Cyanogen chloride
COB	Cobalt-60	**CX**	Phosgene oxime
CES	Cesium-137	**DP**	Di-phosgene
FF	Fresh reactor fuel	**GA**	Tabun
FL	Nuclear weapon fallout	**GB**	Sarin
IO	Iodine	**GD**	Soman
OF	Spent reactor fuel	**GF**	Cyclo-Sarin
PU	Plutonium	**HD**	Mustard distilled
		HL	Mustard lewisite
		HN	Nitrogen mustard
		HT	Trimeric mustard
		L	Lewisite
		PS	Chloropicrin
		SA	Arsin
		TG	Tear gas
		VX	VX
NOTE: If the biological agent identity is known, enter it in GENTEXT set.			

6. Classification and Precedence

The classification and precedence of the CBRN messages ensure that they are disseminated in a timely and effective manner.

a. Classification. Unless the NBC message contains specific operational information (e.g., effects on troops), all such messages should be unclassified.

b. Precedence. NBC1 messages reporting the first enemy use of CBRN weapons (first use of nuclear weapons, first use of biological weapons, and first use of chemical weapons) or ROTA incidents must be given FLASH precedence. All other messages should be given a precedence that reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate. Once a CBRN event occurs, the number of NBC messages will be substantial. CBRN staffs must prepare their SOPs carefully in order to avoid an unnecessary load on the communication systems.

7. Decision Support Tools

Collecting, evaluating, processing, and relaying all the reports from the field can be an extremely difficult and time-consuming task when done manually. In order to help reduce

the number of errors and expedite the process, the United States Government (USG) has developed various modeling programs and systems to help commanders make more informed decisions quicker and more accurately. There are a large number of models available through various Department of Defense (DOD) and other federal agencies. Models are volatile and dynamic; therefore, considerable expertise is required to avoid misuse or misreading of the results. For additional information on models, refer to the Modeling and Simulation Information Analysis Center Web site <www.msiac.dmso.mil>.

8. Technical Reach-Back Capabilities

The commander will require not only accurate and timely information but also tremendous reach-back capabilities. Reach-back occurs when commanders access the capabilities of remotely located informational resources through their C2 systems. Reach-back is a process that employs communications assets to identify and bring to bear resources that are not present at a CBRN site.

a. General.

(1) Technical reach-back is the ability to contact technical subject matter experts (SMEs) when a technical issue exceeds the on-scene SME's capability. Reach-back should be conducted using established unit protocols. Many of the listed reach-back resources have other primary missions and are not specifically resourced for reach-back. Issues may include the following:

(a) Nonstandard Agent Identification of CBRN and TIM. If a TIM is used or is suspected, CBRN personnel must obtain technical information. This information could include persistency, medical effects, and decontamination or protection requirements.

(b) Modeling/Hazard Prediction. The spread of contamination must be known to operational units. Technical experts can use modeling to provide a better indication of where vapor, liquid, or aerosolized hazards may occur. Technical reach-back should provide the ability for detailed analysis of the area to assist in determining downwind hazard areas and locating staging areas, operation centers, decontamination sites, etc.

(2) Reach-back can be accomplished through various means, from the telephone to broadband satellites.

b. Technical Reach-Back Capabilities. The following technical reach-back capability is available if technical issues exceed on-site, local SME capabilities (see Table III-5). Reach-back should be conducted using established local protocols and SOPs.

Table III-5. Technical Reach-Back Points of Contact

DTRA	877-244-1187
AFRRI	301-295-0316/0530
Technical CB Assistance Hotline	877-269-4496
USAMRIID	888-872-7443
USAMRICD	800-424-8802
NEPMU	See paragraph 8b(6)
NMRC	301-319-7510
NEHC	See paragraph 8b(7)

Table III-5. Technical Reach-Back Points of Contact (Continued)

AFCESA	850-283-6995, DSN 523-6995
NRC, Chemical Terrorism/CB Hotline	800-424-8802

(1) Defense Threat Reduction Agency (DTRA). The DTRA can provide technical reach-back information and services for on-scene personnel. The focal/coordination point for support is through the DTRA emergency operations center (EOC). The DTRA EOC enables first responders and warfighters to deal with CBRN threats through online assistance and provides a wide-band infrastructure for user support. As part of the Combat Support Directorate in DTRA, the EOC is manned 7 days a week, 24 hours a day, and has the requisite communications links to act as the single point of contact (POC) for online assistance and the dispatch of other agency resources, as required. For more information on DTRA, visit <http://www.dtra.mil>.

(2) Armed Forces Radiobiology Research Institute (AFRRI). The AFRRI can provide DOD technical support for nuclear/radiological incidents or accidents.

(3) Technical CB Assistance Hotline. The USA Soldier and Biological Chemical Command (SBCCOM) hotline provides technical assistance to emergency responders. The hotline is manned and operated 7 days a week, 24 hours a day.

(4) USA Medical Research Institute of Infectious Diseases (USAMRIID). The USAMRIID provides medical and scientific SMEs and technical guidance to commanders and senior leaders on the prevention and treatment of hazardous diseases and the medical management of biological casualties. The USAMRIID serves as the DOD reference center for the identification of biological agents from clinical specimens and other sources. The USAMRIID can provide technical guidance for assessing and evaluating a biological terrorist incident from initial communication of the threat through incident resolution.

(5) USA Medical Research Institute for Chemical Defense (USAMRICD). The USAMRICD provides medical and scientific SMEs and technical guidance to commanders and senior leaders on the prevention and treatment of chemical casualties. The USAMRICD can provide technical guidance for assessing and evaluating a chemical terrorist incident from initial communications of the threat through incident resolution.

(6) Navy Environmental and Preventive Medicine Units (NEPMUs). Regional NEPMUs have the mission to provide specialized consultation, advice, recommendations, and technical support in matters of environmental health, preventive medicine, and occupational safety to USN and USMC shore activities and units of the operational forces within their designated areas of responsibility. An ashore or afloat command requesting guidance related to suspect bioagent material can consult one of the following NEPMUs within their area of responsibility. The units are available on-call 7 days a week, 24 hours a day. The NEPMU staff can provide technical assistance and confirmatory laboratory analysis for biological and chemical agents. They can also provide assistance on requests for additional support teams (CB incident response force, technical escort unit, CB response team, etc). Response teams are deployable within 48 hours upon notification. See OPNAV N931/BUMED M3F for more information. Regional NEPMU locations and contact information are listed below.

- NEPMU-2, Norfolk, VA
  (DSN) 564-7671, (COMM) 757-444-7671
  Email: <nepmu2@nepmu2.med.navy.mil>
  Classified Message Traffic:
  NAVENPVNTMEDU TWO NORFOLK VA

- NEPMU-5, San Diego, CA
  (DSN) 526-7070, (COMM) 619-556-7070
  Email: <nepmu5@nepmu5.med.navy.mil>
  Classified Message Traffic:
  NAVENPVNTMEDU FIVE SAN DIEGO CA

- NEPMU-6, Pearl Harbor, HI
  (DSN) 473-0555, (COMM) 808-473-0555
  Email: <nepmu6@nepmu6.med.navy.mil>
  Classified Message Traffic:
  NAVENPVNTMEDU SIX PEARL HARBOR HI

(7) Navy Medical Research Center (NMRC). The NMRC conducts research and development, test and evaluation, and disease surveillance to enhance the health, safety, performance, and deployment medical readiness of the USN and USMC. Its Biological Defense Research Directorate (BDRD) has a staff that is recognized as a leader in the rapid and confirmatory diagnosis of infectious diseases. The BDRD explores basic and applied microbiological, immunological, and related scientific research methodologies for the development of medical diagnostics. The BDRD staff has designed, developed, and tested a broad variety of methodologies that have allowed for swift and accurate diagnosis essential for substantive medical protection and readiness of USN and USMC personnel. They have been instrumental in the advancement and refinement of confirmatory diagnostic methods using polymerase chain reaction (PCR) methodologies in tandem with state-of-the-art biosensor technologies. Additional information is available at the NMRC Web site <http://www.nmrc.navy.mil>. The BDRD staff can be contacted via e-mail at <bdrd1@nmrc.navy.mil> or <bdrd2@nmrc.navy.mil>. Subsequent Secret Internet Protocol Router Network (SIPRNET) communications links will be established as requested.

(8) Navy Environmental Health Center (NEHC). The mission of the NEHC is to ensure USN and USMC readiness through leadership in the prevention of disease and promotion of health. The command has specialists in environmental health, radiation health, industrial hygiene, medical entomology, biochemistry, toxicology, and preventive medicine. Chemical, biological, radiological, and environmental medical defense technical support and consultative assistance is available within the Plans and Operations Directorate. The SIPRNET e-mail address is <plansops@nehc.navy.smil.mil>. The command Web site <http://www.nehc.med.navy.mil> contains numerous links to additional useful references and instructions.

(9) Air Force Civil Engineer Support Agency (AFCESA). The Full-Spectrum Threat Response (FSTR) Division plans, trains, equips, and conducts USAF FSTR programs that include nuclear, biological, chemical, and conventional (NBCC) weapons of mass destruction (WMDs), HAZMAT incidents, natural disasters, and major accidents. The

FSTR Integration Division also coordinates homeland security issues and is the lead US representative for international NBCC defense standardization.

(10) The National Response Center (NRC) mans the hotline service and serves as an emergency resource for first responders to request technical assistance during an incident. The intended users include trained emergency personnel, such as emergency operators and first responders. Other potential users may include the state EOCs and hospitals that may treat victims of agent exposure.

(a) The United States Coast Guard (USCG) operates the NRC, and trained operators staff the hotline 7 days a week, 24 hours a day. Operators use extensive databases and reference material in addition to having immediate access to the nation's top SMEs in the field of CBRN agents. NRC duty officers take reports of actual or potential domestic terrorism and link emergency calls with applicable SMEs (such as USA SBCCOM, USAMRICD) for technical assistance and with the Federal Bureau of Investigation (FBI) for federal-response actions. The NRC also provides reports and notifications to other federal agencies, as necessary. Specialty areas include the following:

- Detection equipment.
- Personal protective equipment.
- Decontamination systems and methods.
- Physical properties of CB agents.
- Toxicology information.
- Medical symptoms from exposure to CB agents.
- Treatment of exposure to CB agents.
- Hazard prediction models.
- Federal-response assets.
- Applicable laws and regulations.

(b) The CB hotline is a joint effort of the USCG, FBI, Federal Emergency Management Agency (FEMA), Environmental Protection Agency (EPA), Department of Health and Human Services (DHHS), and DOD. The NRC is the entry point for the CB hotline. The NRC receives basic incident information and links the caller to the DOD and FBI CB and terrorism experts. These and other federal agencies can be accessed within a few minutes to provide technical assistance during a potential CB incident. If the situation warrants, a federal-response action may be initiated.

(c) Use the local established policies and procedures for requesting federal assistance before contacting the CB hotline. State and local officials can access the hotline in emergency circumstances by calling 1-800-424-8802.

(d) For more information on the NRC, visit <http://www.nrc.uscg.mil/>.

9. Avoidance Tools

Conducting CBRN avoidance operations is a complex process. Various tools and TTP have been developed to systematically and accurately prepare for and conduct CBRN avoidance operations.

a. Many of the tools required to conduct CBRN avoidance operations are included in this manual. They are:

CBRN checklists (Appendix A)

CBRN center/cell operations (Appendix B).

Guidance on the management of radiological hazards (Appendix C).

MET reports (Appendix D).

TTP for chemical contamination avoidance (Appendix E).

TTP for biological contamination avoidance (Appendix F).

TTP for nuclear contamination avoidance (Appendix G).

TTP for ROTA contamination avoidance (Appendix H).

Guidance on the use of the STRIKWARN message (Appendix I).

Required nomograms, tables, and graphs (Appendix J).

Calculations used in conducting CBRN avoidance operations (Appendix K).

Example forms used when conducting CBRN avoidance operations (Appendix L).

b. Other TTP specifically designed to support CBRN avoidance operations are found in *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance*; *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Vulnerability Assessment*; and *Multiservice Tactics, Techniques, and Procedures for Biological Surveillance.*

- The vapor cloud formed by an agent normally employed for a persistent effect rises in a similar manner, but vapor concentrations build up more gradually.

(3) Wind.

(a) High wind speeds cause rapid dispersion of vapors or aerosols, thereby decreasing the effective coverage of the target area and the time of exposure to the agent. In high winds, larger quantities of munitions are required to ensure the effective concentrations. Agent clouds are most effective when wind speeds are less than 4 knots and steady in direction. The clouds move with the prevailing wind as altered by terrain and vegetation. Steady, low wind (speeds of 3 to 7 knots) enhances the coverage area unless an unstable condition exists. With high winds, chemical agents cannot be economically employed to achieve casualties.

(b) The evaporation of liquid agents due to wind speed depends on the amount of the liquid exposed to the wind (the surface of the liquid) and the rate that the air passes over the agent. Therefore, the duration of effectiveness is longer at the places of greater liquid-agent contamination and in places where the liquid agent is sheltered from the wind.

(c) The evaporation rate of agents employed for persistent effect in a liquid state is proportional to the wind speed. If the speed increases, evaporation increases, thus shortening the duration of the effective contamination. Increased evaporation, in turn, creates a larger vapor cloud. The vapor cloud is dispersed by higher winds. The creation and dispersion of the vapor is a continuous process, increasing or decreasing in proportion to the wind speed.

(4) Temperature. There will be increased vaporization with higher temperatures. Also, the rate of evaporation of any remaining liquid agent from an exploding munition can vary with the temperature.

(5) Humidity. Humidity is the measure of the water vapor content in the air. Hydrolysis is a process where compounds react to chemical change with water, resulting in chemical agents with high hydrolysis. Rates are less effective under conditions of high humidity. Humidity has little effect on most chemical-agent clouds. Some agents (phosgene and lewisite) hydrolyze quite readily. Hydrolysis causes these chemical agents to break down and change their chemical characteristics. If the relative humidity exceeds 70 percent, phosgene and lewisite cannot be employed effectively except for a surprise time-on-target attack because of rapid hydrolysis. Lewisite hydrolysis by-products are not dangerous to the skin; however, they are toxic if taken internally because of the arsenic content. The riot control agent CS also hydrolyzes, although slowly, in high humidity. High humidity combined with high temperatures may increase the effectiveness of some agents because of body perspiration that will absorb the agents and allow for better transfer.

(6) Precipitation.

(a) The overall effect of precipitation is unfavorable because it is extremely effective in washing chemical vapors and aerosols from the air, vegetation, and material. Weather forecasts or observations indicating the presence of, or potential for, precipitation present an unfavorable environment for the employment of chemical agents. However, light rains distribute persistent agents more evenly over a large surface. Since

more liquid is then exposed to the air, the rate of evaporation may increase and cause higher vapor concentrations. Precipitation also accelerates the hydrolysis effect. Heavy rain or rain of a long duration tends to wash away liquid chemical agents. These agents may then collect in areas previously uncontaminated (such as stream beds and depressions) and present an unplanned contamination hazard.

(b) The evaporation rate of a liquid agent reduces when the agent is covered with water, but returns to normal when the water is gone. Precipitation may bring some persistent agents back to the surface as contact hazards that have previously lost their contact effectiveness by soaking into the soil or other porous surfaces.

(c) Snow acts as a blanket, covering the liquid contaminant. It lowers the surface temperature and slows evaporation so that only very low vapor concentrations form. When the snow melts, the danger of the contamination reappears; however, hydrolysis may reduce its operational effectiveness.

3. Overview of Meteorological Reports

Weather reporting must be thoroughly integrated into the CBRNWRS.

a. BWR.

(1) The BWR provides information on the wind conditions (i.e., wind direction and wind speed) in a number of layers from the surface of the earth to 30,000 meters (m) altitude. Each layer has a thickness of 2,000 m.

(2) The NBC BWR is an ADP-formatted message used to accommodate the two types of BWRs.

(a) The BWM provides wind directions and speeds at various elevations for an initial 6-hour period based on actual weather data.

(b) The BWF provides wind directions and speeds for a subsequent 6-hour period based on predicted data.

(3) Within each of the two types of BWRs, the message always begins with information on the wind conditions within the lowest layer first (from the surface to 2,000 m), then for the 2,000- to 4,000-m layer, etc. A numerical identifier is used for each of the layers, beginning with 2 for the 0 m–2,000 m layer, 4 for the 2,000 m–4,000 m layer, etc.

b. EDR.

(1) The EDR is used to provide the effective downwind data needed to predict a fallout area following a nuclear burst. Seven downwind speeds and downwind directions (toward which the wind is blowing) are transmitted within each EDR, corresponding to seven preselected weapon yield groups.

(2) The NBC EDR is an ADP-formatted message used to accommodate two types of EDRs.

(a) The EDM provides downwind speeds and directions for the selected seven yield groups during an initial 6-hour period.

(b) The EDF provides wind directions and speeds for selected yield groups for a subsequent 6-hour period.

(3) Special Case. When the effective downwind speed is less than 8 kilometers per hour (kph), the predicted fallout area will be circular and the radii of two concentric circles around GZ will be equal to the Zone I downwind distance and the Zone II downwind distance, respectively.

c. CDR.

(1) A CDR contains basic MET information for predicting biological aerosol or chemical vapor hazard areas. These reports are also used for ROTA incidents where Type T, TIM, Case 2, RDD, Case 3, biological bunker or production facility, or Case 4, chemical stockpile or TIM transport/storage are involved.

(2) The NBC CDR is an ADP-formatted message used to accommodate two types of CDRs.

(a) The CDM provides required weather information during an initial 6-hour period.

(b) The CDF provides required weather information for a subsequent 6-hour period.

(3) These reports are prepared by corps and division CBRN cells from information obtained through the assigned weather support element (USAF Air Weather Service [AWS], SWO, or Naval Oceanography Program representative).

(4) The CDR is transmitted at least four times a day, and each message is valid for a 6-hour period. Each 6-hour period is subdivided into three 2-hour subperiods.

d. MET Report Fields. Tables D-3 and D-4 (page D-10) provide fields and lines used in the different MET reports.

Table D-3. Common Message Headings for MET Reports

Field	BWR	EDR	CDR
EXER	O	O	O
OPER	C	C	C
MSGID	M	M	M
REF	O	O	O
DTG	M	M	M
ORGIDDFT	M	M	M
NBCEVENT	M	M	M
M = Mandatory O = Operationally Determined C = Conditional			

Table D-4. NBC MET Reports

Field*	BWR	EDR	CDR
AREAM	M	M	M
ZULUM	M	M	M
UNITM	M	M	M
LAYERM	M	-	-
ALFAM	-	M	-
BRAVOM	-	O	-
CHARLIEM	-	O	-
DELTAM	-	O	-
FOXTROTM	-	O	-
ECHOM	-	O	-
GOLFM	-	O	-
WHISKEYM	-	-	M
XRAYM	-	-	O
YANKEEM	-	-	O
*The letter M is added behind the field to signify a meteorological message. - = Not used M = Mandatory O = Operationally Determined			

e. Common Report (ADP) Field Explanations.

- EXER

  Exercise identification

  Example using EXER/VALIANTCOURAGE2004/-//

  EXER/VALIANTCOURAGE2004/-//

  Exercise nickname

  1–56 X

  Mandatory if EXER is used

  EXER/VALIANTCOURAGE2004/-//

  Additional identifier

  4–16 letters and blank spaces

  Optional if EXER is used

- OPER

  Operation code word

  Example using GRAND ACCOMPLISHMENT/-/-/-//

  OPER/GRAND ACCOMPLISHMENT/-/-/-//

  Operation code word

  1–32 letters and blank spaces

  Mandatory if OPER is used

OPER/GRAND ACCOMPLISHMENT/-/-/-//

Plan originator and number

5–36 X

Optional if OPER is used

OPER/GRAND ACCOMPLISHMENT/-/-/-//

Nickname

1–23 X

Optional if OPER is used

OPER/GRAND ACCOMPLISHMENT/-/-/-//

Secondary nickname

1–23 X

Optional if OPER is used

- MSGID

  Message text identifier

  Example using MSGID/CDR/AWS/382856/-/-/-//

  MSGID/CDR/AWS/382856/-/-/-//

  Message text format identifier

  3–20 X

  Mandatory

  MSGID/CDR/AWS/382856/-/-/-//

  Originator

  1–30 X

  Mandatory

  MSGID/CDR/AWS/382856/-/-/-//

  Message serial number

  1–7 numbers

  Mandatory

  MSGID/CDR/AWS/382856/-/-/-//

  Month name

  3 letters

  Optional

  MSGID/CDR/AWS/382856/-/-/-//

  Qualifier

  3 letters

  Optional

MSGID/CDR/AWS/382856/-/-/-//

Serial number of qualifier

1–3 numbers

Optional

- REF

Reference

Set can be repeated up to 3 times

Example using REF/A/CMP/NBCACCUK/20040427/-/-/-//

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Serial letter

1 letter

Mandatory

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Communication type

3–20 X

Mandatory if REF is used

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Originator

1–30 X

Mandatory if REF is used

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Day-Time Group of Reference, 4 Digit Year or

14 AN

Day-Time of Reference or

7 AN

Day-Time and Month of Reference or

10 AN

Date of Reference, DDMMMYYYY or

9 AN

Date of Reference, DDMMYYYY or

8 N

Date of Reference, YYYYMMDD or

8 N

Month-Year

7 AN

Mandatory if REF is used

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Reference serial number or

1 – 30 X

Document serial number

10 X

Optional if REF is used

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Special notification

5 letters

Optional if REF is used

REF/A/CMP/NBCACCUK/20040427/-/-/-//

Signal indicator code (SIC) or

3 AN

File number

1–10 X

Can be repeated 3 times

Optional if REF is used

- DTG

  Date-Time-Group in Zulu-Time, Month, and Year

  14 letters and numbers

  Example DTG/231100ZNOV2004//

- ORGIDDFT

  Organization designator of drafter/releaser

  Example using ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

  ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

  Unit designation name

  1–15 letters, numbers, and special characters

  Mandatory

  ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

  Unit size indicator

  1–7 letters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Geographical entity

2 letters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Unit role indicator code “A”

2–6 letters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Unit role indicator code “B”

2–6 letters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Unit role indicator code “C”

2–6 letters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Unit role indicator code “D”

2–6 letters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Higher formation name

1–15 letters, numbers, or special characters

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Armed service (1 letter or number) or

Civilian agency code (2–8 letter and numbers)

Mandatory

ORGIDDFT/UKRA/BAT/UK/AA/BB/CC/DD/AG/A/-//

Unit identification code (UIC)

7–9 letters and numbers

Conditional – mandatory if field 2 is “CORPS,” “ARMY,” “AG,” “MOD,” or “MD” otherwise it is operationally determined

- NBCEVENT

  Type of NBC MET report

  Example using NBCEVENT/CDM/-//

  NBCEVENT/CDM/-//

  Type of weather report

  BWM

  BWF

  EDM

  EDF

  CDM

  CDF

  3 letters

  NBCEVENT/CDM/-//

  Validation code

  1–10 X

  Used only with ADP systems

f. MET Report (ADP) Field Explanations.

- AREAM

  Area affected; may be a map sheet number or an area such as I CORPS

  2–20 X

- ZULUM

  DTG for:

  Observation time

  Valid from

  Valid to

  Three sets of 14 letters and numbers

  Example ZULUM

  ZULUM/231100ZNOV2004/231200ZNOV2004/231800ZNOV2004//

- UNITM

  Units of measurement used in the message

  Example using UNITM/-/DGT/KPH/-//

  Length or height

  1-2 letters

NOTE: Not used for BWR or CDR.

-	Not used or unknown
KM	Kilometers
NM	Nautical Miles
FT	Feet
KF	Kilofeet (1,000 feet)
HM	Hectometers (100 meters)
YD	Yards
M	Meters
SM	Statute Miles

UNITM/-/DGT/KPH/-// (3 letters for degrees and 3 letters for mils; direction from which the wind is blowing)

DGM	Degrees/Magnetic North
DGT	Degrees/True North
DGG	Degrees/Grid North (GN)
MLM	Mils/Magnetic North
MLT	Mils/True North
MLG	Mils/GN

UNITM/-/DGT/KPH/-// (3 letters - Speed)

KPH	Kilometers per Hour
MPS	Meters per Second
KTS	Knots
MPH	Miles per Hour

UNITM/-/DGT/KPH/-// (1 letter - Temperature)

NOTE: Not used for EDR or BWR.

-	Not used or unknown
C	Celsius
F	Fahrenheit

- LAYERM

  Wind conditions at 2,000 m increments up to 30,000 m

  Repeatable up to 15 times

  Example using LAYERM/02/265/020//

  LAYERM/02/265/020// (2 numbers, wind layer)

02	0–2,000 m

04 2,000 m–4,000 m

28 26,000 m–28,000 m

30 28,000 m–30,000 m

LAYERM/04/290/030// (3 numbers for degrees and 4 numbers for mils; wind direction from which the wind is blowing)

LAYERM/26/025/020// (3 numbers, wind speed)

- ALFAM

  Effective downwind for 2 KT and less

  Example yield group explanations ALFAM/-/310/015/-//

  ALFAM/-/310/015/-// (yield group)

  ALFAM

  BRAVOM

  CHARLIEM

  DELTAM

  ECHOM

  FOXTROTM

  GOLFM

  ALFAM/**-**/310/015/-// (radius of Zone 1)

  - Not used or unknown

  3 numbers

NOTE: If used, then direction, wind speed, and the angle of expansion are not used.

ALFAM/-/310/015/-// (direction the wind is heading toward)

3 numbers for degrees and 4 numbers for mils

ALFAM/-/310/015/-// (wind speed)

- Not used or unknown

3 numbers

ALFAM**/-/**310/015**/-//** (angle of expansion)

- Not used or unknown

1 number

4 40 degrees

5 50 degrees

6 60 degrees

7 70 degrees

8 80 degrees

9 90 degrees

0 100 degrees

1 110 degrees

2 120 degrees

3 more than 120 degrees

- BRAVOM

  Effective downwind for more than 2 KT to 5 KT yield group

  Same as ALFAM

- CHARLIEM

  Effective downwind for 5 KT to 30 KT yield group

  Same as ALFAM

- DELTAM

  Effective downwind for more than 30 KT to 100 KT yield group

  Same as ALFAM

- ECHOM

  Effective downwind for 100 KT to 300 KT yield group

  Same as ALFAM

- FOXTROTM

  Effective downwind for 300 KT to 1 MT yield group

  Same as ALFAM

- GOLFM

  Effective downwind for more than 1 MT to 3 MT yield group

  Same as ALFAM

- WHISKEYM

  Weather conditions for first of three consecutive 2-hour periods

NOTE: The optimal measuring height should be 10 m above ground in open terrain averaged over a period of 10 minutes.

Example using WHISKEYM/120/010/4/18/7/4/2//

WHISKEYM/120/010/4/18/7/4/2//

Downwind direction

3 numbers for degrees and 4 numbers for mils

WHISKEYM/120/010/4/18/7/4/2//

Wind speed

3 numbers

NOTE: The optimal measuring height should be 10 m above ground in open terrain averaged over a period of 10 minutes.

WHISKEYM/120/010/4/18/7/4/2//

Air stability

1 letter or number

Simplified

U	Unstable
N	Neutral
S	Stable

Detailed

1	Very Unstable
2	Unstable
3	Slightly Unstable
4	Neutral
5	Slightly Stable
6	Stable
7	Very Stable

WHISKEYM/120/010/4/18/7/4/2//

Temperature

1 special character and 2 numbers or 2 to 3 numbers

-20	Minus 20 degrees
-03	Minus 3 degrees
00	0 degrees
02	2 degrees
15	15 degrees
999	999 degrees

WHISKEYM/120/010/4/18/7/4/2//

Humidity shown in percentage

1 number

0	0–9%
1	10–19%

2 20–29%

3 30–39%

4 40–49%

5 50–59%

6 60–69%

7 70–79%

8 80–89%

9 90–100%

WHISKEYM/120/010/4/18/7/4/2//

Significant weather phenomena

1 letter or number

0 No significant weather phenomena

1 Sea breeze

2 Land breeze

3 Blowing snow or sand

4 Fog, ice fog, or thick haze

5 Drizzle

6 Rain

7 Light rain or snow

8 Showers of rain, snow, hail, or a mixture

9 Thunderstorm

A Top of inversion layer lower than 800 m

B Top of inversion layer lower than 400 m

C Top of inversion layer lower than 200 m

WHISKEYM/120/010/4/18/7/4/2//

Cloud cover

1 number

0 Less than half-covered (scattered)

1 More than half-covered (broken)

2 Completely covered (overcast)

3 No clouds (clear conditions)

- XRAYM

  Surface weather conditions for the second of three consecutive 2-hour periods

  See WHISKEYM for the details of the message

- YANKEEM

  Surface weather conditions for the third of three consecutive 2-hour periods

  See WHISKEYM for the details of the message

4. Basic Wind Reports (Details and Examples)

This paragraph details how to effectively create and use BWRs.

a. BWRs. As described previously, the BWR is an ADP-formatted message used to accommodate the two types of BWRs—the BWM based on actual weather data, and the BWF based on predicted data. It provides wind conditions (direction and speed) in 2,000-meter intervals from the surface of the earth to 30,000 meters.

b. Wind Vector Plot.

(1) The information contained in the BWM is used for the construction of a wind vector plot. The BWM is converted into downwind directions for each layer of height by reversing the wind direction by 180 degrees.

(2) The wind speed of each layer, as given in the BWM, is represented by a vector, the length of which is extracted from the appropriate table. Tables D-5 through D-10 (pages D-22 through D-24) give the vector length in centimeters for different scale maps listed in kph and knots. Ensure that the correct map size and wind speed are selected.

NOTE: Above 18,000 meters, altitude layers for plotting vector diagrams continue at 2,000-meter intervals; however, since the map distance factors vary so little, some of the columns in the following tables have been combined for convenience.

Table D-5. Map Distance for Wind Speed (Map Scale 1:50,000)

Wind Speed (kph)	Altitude Layers (Thousands of Meters)											
	0–2	2–4	4–6	6–8	8–10	10–12	12–14	14–16	16–18	18–22	22–30	>30
5	6.8	5.8	5.2	5.0	4.8	4.4	4.2	4.0	3.8	3.8	3.6	3.4
10	13.6	11.8	10.4	10.0	9.6	9.0	8.4	8.0	7.8	7.6	7.2	6.8
15	20.4	17.6	15.6	15.0	14.4	13.4	12.6	12.0	11.6	11.2	10.8	10.2
20	27.2	23.6	20.8	20.0	19.2	18.0	16.8	16.0	15.6	15.0	14.2	13.6
25	34.0	29.4	26.0	25.2	24.0	22.4	21.0	20.0	19.4	18.8	17.8	17.0

Table D-6. Map Distance for Wind Speed (Map Scale 1:100,000)

Wind Speed (kph)	Altitude Layers (Thousands of Meters)											
	0–2	2–4	4–6	6–8	8–10	10–12	12–14	14–16	16–18	18–22	22–30	>30
5	3.4	2.9	2.6	2.5	2.4	2.2	2.1	2.0	1.9	1.9	1.8	1.7
10	6.8	5.9	5.2	5.0	4.8	4.5	4.2	4.0	3.9	3.8	3.6	3.4
15	10.2	8.8	7.8	7.5	7.2	6.7	6.3	6.0	5.8	5.6	5.4	5.1
20	13.6	11.8	10.4	10.0	9.6	9.0	8.4	8.0	7.8	7.5	7.1	6.8
25	17.0	14.7	13.0	12.6	12.0	11.2	10.5	10.0	9.7	9.4	8.9	8.5
30	20.4	17.7	15.6	15.1	14.4	13.4	12.6	12.0	11.7	11.3	10.7	10.2
35	23.8	20.6	18.1	17.6	16.8	15.7	14.7	14.0	13.6	13.1	12.5	11.9
40	27.2	23.6	20.7	20.1	19.2	17.9	16.8	16.0	15.6	15.0	14.3	13.6
45	30.6	26.5	23.3	22.6	21.6	20.2	19.0	18.0	17.5	16.9	16.1	15.3
50	34.0	29.5	25.9	25.1	24.0	22.4	21.1	20.0	19.4	18.8	17.9	17.0

(2) The unit reorders chemical defense equipment (i.e., MOPP suits, filters, and M291 refill kits).

(3) Continue the effort to identify the agent if the unit has not yet identified what agent was used. This will be done by—

- Using the M256A1 Kit.
- Using the ICAM.
- Using the ACADA.
- Taking samples and forwarding them to the area lab for analysis.

(4) Perform the following if the unit must continue to operate in or occupy the contaminated area:

- Continue efforts to refine the contamination hazard area and extent by continued sampling and detection.
- Adjust or improve MOPP as required.
- Mark contaminated areas, and identify "hot spots."
- Monitor contamination decay or covering to determine when natural decay may render the area safe.
- Be alert for "transient contamination" and the spread or movement of contamination by natural sources (i.e., wind, rain, runoff, rivers) or human sources, (i.e., vehicle traffic, rotor wash).

3. NBC1 CHEM Report

The NBC1 CHEM report is the most widely used report. The observing unit uses this report to provide chemical attack data. All units must be completely familiar with the NBC1 CHEM report format and the information needed to complete the report. This report is prepared at the unit level quickly and accurately and then sent to the next higher HQ. NBC1 CHEM reports are not routinely passed to corps or higher CBRN cells except for the initial-use report. Line items BRAVO (location of observer), DELTA (DTG), GOLF (means of delivery), INDIA (release information), and TANGO (terrain, topography, and vegetation description) are mandatory entries in the NBC1 CHEM report.

a. Precedence. The precedence of the NBC1 CHEM report depends on whether or not it is an initial report. The initial use of a CBRN weapon report is FLASH precedence; all others are IMMEDIATE precedence.

b. Report Preparation. Individuals identified by the unit SOP submit raw data to the unit CBRN defense team. NBC1 format should be used; however, a size, activity, location, unit, time, and equipment (SALUTE) or spot report may also be used and should be submitted to the unit CBRN defense team. The unit CBRN defense team normally consists of individuals who have been trained in CBRN defense. This ensures that the report is in the proper format and is as correct as possible.

c. Sample. A sample NBC1 CHEM report is shown in Figure E-1, page E-4). The column "Cond" indicates the means operationally determined (O) or

mandatory (M) for each message type. Operationally determined lines listed may be added or deleted at command discretion.

NBC1 CHEM Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	Will be assigned by the appropriate CBRN cell	
BRAVO	Location of observer and direction of attack or event	M	BRAVO/32UNB062634/2500MLG//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP2005/ 201420ZSEP2005//
FOXTROT	Location of attack or event	O	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/OBS/AIR/1/BML/-//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/NERV/P/MPDS//
TANGO	Terrain/topography and vegetation description	M	TANGO/FLAT/URBAN//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	None

Figure E-1. Sample NBC1 CHEM Report

4. NBC2 CHEM Report

The NBC2 CHEM report is based on one or more NBC1 CHEM reports. It is used to pass evaluated data to higher, subordinate, and adjacent units.

a. When actual attack areas are reported, it is easy to differentiate between attacks by their locations. When estimated attack areas are reported, the CBRN specialist uses the following sets to differentiate attacks:

- Set BRAVO: Location of the observer and direction of the attack.
- Set GOLF: Delivery means and quantity.
- Set INDIA: Release information.

b. Using the sets above, the CBRN specialist can determine whether the attacks occurred in the same proximity, whether the means of delivery/quantity were identical or similar (taking into account the fog of war), agent likeness, air or ground burst, and liquid or vapor.

c. The CBRN cell prepares the NBC2 CHEM report, assigns it a strike serial number, and disseminates it to the appropriate units. Each subordinate unit then decides whether to disseminate the report further. Line items ALFA (strike serial number), DELTA (DTG), FOXTROT (location of attack), GOLF (means of delivery), INDIA (release information), and TANGO (terrain, topography, and vegetation description) are mandatory entries in the NBC2 CHEM report. A sample NBC2 CHEM report is shown in Figure E-2.

NBC2 CHEM Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	M	ALFA/US/A234/001/B//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP2005// 201420ZSEP2005//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/OBS/AIR/1/BML/-//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/NERV/P/MPDS//
TANGO	Terrain/topography and vegetation description	M	TANGO/FLAT/URBAN//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	None

Figure E-2. Sample NBC2 CHEM Report

5. NBC3 CHEM Report

The NBC2 CHEM report and current wind information are used to predict the area of hazard. This prediction is disseminated as an NBC3 CHEM report, which is sent to all units or activities that could be affected by the hazard. Each unit or activity prepares a plot of the NBC3 CHEM report, determines which of its subordinate units or activities are affected, and warns them accordingly. Commanders should use this report as battlefield intelligence when planning missions. The NBC3 CHEM report is a prediction of the hazard area. This prediction is safe-sided to ensure that a significant hazard will not exist outside the predicted hazard area. Units within the hazard area must adjust their MOPP level as necessary. They must ensure that chemical-agent alarms are placed far enough upwind to provide adequate warning. A sample NBC3 CHEM report is shown in Figure E-3.

NBC3 CHEM Report			
Line	**Description**	**Cond**	**Example**
ALFA	Strike serial number	M	ALFA/US/A234/001/C//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP2005/ 201420ZSEP2005//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	O	GOLF/OBS/AIR/1/BML/-//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/NERV/P/MPDS//
OSCAR	Reference DTG for contour lines	O	
PAPAA	Predicted attack/release and hazard area	M	PAPAA/1KM/3-10DAY/10KM/ 2-6DAY//
PAPAX	Hazard area location for weather period	M	PAPAX/201600ZSEP2005/ 32VNJ456280/32VNJ456119/ 32VNJ576200/32VNJ566217/ 32VNJ456280//
XRAYB	Predicted contour information	C	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	GENTEXT/CBRNINFO/RECALCULATION BASED ON WEATHER CHANGE//
Note: XRAYB is prohibited if OSCAR is not used.			

Figure E-3. Sample NBC3 CHEM Report

a. Chemical Contamination Prediction and Plotting. The chemical prediction procedure for land provides information on the location and extent of the hazard area and the duration of the hazard resulting from attacks with chemical weapons. It provides the necessary information for commanders to warn units within the predicted hazard area. In general, the predicted hazard area will be dependent on the type of attack, the means of delivery, and MET factors in the attack area.

b. Definitions Used in Chemical Hazard Predictions.

(1) Attack Area. This is the predicted area immediately affected by the delivered chemical agent.

(2) Hazard Area. This is the predicted area in which unprotected personnel may be affected by vapor spreading downwind from the attack area. The downwind distance depends on the type of attack, the weather, and the terrain in the attack area and the area downwind of the attack area.

(3) Contaminated Area. This is the area in which liquid hazard may remain for some time after the attack. The actual shape and duration can only be determined by surveys.

NOTE: If actual surveys alter the initial data used for the determination of the attack, the NBC2 and NBC3 CHEM reports must be changed or updated.

c. Types of Chemical Attacks. Chemical attacks can be divided into three types, as follows:

(1) Type A: Air-Contaminating attacks (nonpersistent agents). Type A attacks are to be assumed unless liquid is present that is subsequently confirmed to be a persistent agent.

(2) Type B: Ground-contaminating attacks (persistent agents).

(3) Type C: Attack origin unknown.

d. Means of Delivery.

(1) The means of delivery and types of agent containers are listed in Table III-2.

e. Prediction of the Downwind Hazard. After an attack by chemical agents, personnel may encounter three types of hazards—liquid, vapor, or liquid and vapor—depending on their position relative to the attack area.

(1) Liquid Hazard. Personnel in an area contaminated with liquid chemical agents will be exposed to a hazard that varies according to—

(a) The type and amount of agent disseminated.

(b) The method of dissemination.

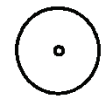
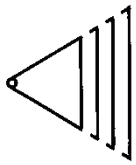
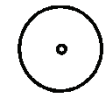
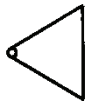
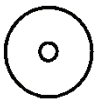
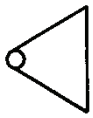
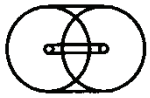
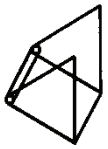
(c) The local climatic conditions.

(d) The nature of the terrain.

(e) The time lapse after the contamination.

Liquid agents may completely stop evaporating and result in an all-clear survey under very cold conditions. A hazard can be recreated when temperatures rise.

Table E-1. Types and Cases of Chemical Attacks

Type of Agent Container	Radius of Attack Area	Wind Speed	Type	Case	Symbol
BML, BOM, RKT, SHL, MNE, UNK, surface burst MSL	1 km	≤10 kph	A	1	
BML, BOM, RKT, SHL, MNE, UNK, surface burst MSL	1 km	>10 kph		2	
BML, SHL, MNE, surface burst RKT and MSL	1 km	≤10 kph	B	1	
BML, SHL, MNE, surface burst RKT and MSL	1 km	>10 kph		2	
BOM, UNK, air burst RKT and MSL	2 km	≤10 kph		3	
BOM, UNK, air burst RKT and MSL	2 km	>10 kph		4	
SPR, GEN	1 km	≤10 kph		5	
SPR, GEN	1 km	>10 kph		6	
Detection after unobserved attack (NBC4 CHEM)	10 km	N/A	C	N/A	
BML – Bomblets; BOM – Bomb; MNE – Mine; MSL – Missile; RKT – Rocket; SHL – Shell; SPR – Spray; UNK - Unknown					

(2) Nonpersistent Agents. Most nonpersistent agents are disseminated mainly as vapor, but some of the agent types may leave residual liquid in shell or bomb craters for hours or days depending on the climatic conditions and munition type. Craters should be avoided until tests have proven the absence of a liquid hazard.

(3) Persistent Agents. Persistent agents are disseminated as liquid and present a vapor and contact hazards. This hazard will last for several hours to days depending on the terrain, climatic conditions, and munition type.

(4) Border Areas. Some agents, normally classified as nonpersistent, may behave as persistent agents in very cold environments, and liquid from nonpersistent and persistent agents may freeze at low temperatures (e.g., HD freezes at temperatures below 14°C) and can present a delayed hazard to personnel when the temperature rises.

(5) Thickened, Nonpersistent Agents. Thickened, nonpersistent agents may have to be treated as persistent, ground-contaminating agents. Blister agents are normally classified as persistent agents and will be indicated as such when detected by three-way detector paper. Some ground-contaminating agents, however, are very volatile and should be treated as nonpersistent.

(6) Vapor Hazard. All chemical agents present a vapor or aerosol hazard to personnel downwind of the attack area. The area covered by this hazard may be estimated by using prediction techniques. The actual downwind distance covered by a toxic cloud will depend on the type and amount of agent disseminated, method of dissemination, climatic conditions, and terrain.

f. Attack Chronology.

(1) The dimensions of the downwind hazard area will depend on the means of delivery, category of agent, type of attack, weather, and terrain. The cloud arrival time at positions downwind of the attack point or area will depend on the representative downwind speed.

(2) The ability to provide a timely warning to personnel downwind of the point or area of attack will depend on the time taken to learn of the attack, the time taken to predict a downwind hazard area, and the time required to transmit the warning to those in the hazard area.

g. Principles of Chemical Predictions and Limitations.

(1) Unprotected personnel in an attack area will be exposed to chemical-agent hazards unless they take immediate protective action at the first indication of an attack. It is assumed that once chemical warfare has been initiated, troops in areas attacked by aircraft or missiles or coming under artillery or other bombardment will immediately and automatically carry out appropriate chemical defense tactics whether or not a chemical alarm has been given.

(2) An attacked unit will attempt to warn all friendly forces in the immediate vicinity, using the procedures described in STANAG 2047 (CBRN and air attacks only).

(3) At fixed installations and at other locations where established communications and alarms are available, the procedures in STANAG 2047 should be used.

(4) Units and installations that are warned should not promulgate the alarm beyond their own area.

NOTE: As soon as a CBRN cell realizes that the completion and submission of an NBC3 CHEM report would not warn a unit in the hazard area in time, it will attempt to pass the alarm by the most expeditious means available.

(5) CBRN cells will use information in the NBC3 CHEM report to provide timely warning to units and installations in the predicted downwind hazard area. Due to climatic and geographical variations, the lateral limits of the predicted hazard area are normally defined by an angle of lateral spread that is 30° on either side of the forecast representative downwind direction.

(6) The hazard area prediction will be less reliable as the distance from the point of emission increases.

(7) Units in the downwind hazard area that are warned by a CBRN cell will not raise an alarm outside their own area, but will submit an NBC4 CHEM report according to the SOP when the chemical agent cloud actually arrives.

(8) The limiting dosages of agents assumed in establishing the procedures for hazard area prediction, while not sufficient to produce casualties immediately, may produce later effects (i.e., miosis from nerve agents).

h. Simplified Hazard Prediction (Land). The simplified hazard prediction tells subordinate units whether they are in a chemical downwind hazard area. Since Type A attacks present the greatest hazard, the simplified procedures are based on that type of attack. It is valid until an NBC3 CHEM report is received. Units need to make a simplified prediction using a CDM and a simplified template. The template can be made from acetate, overlay paper, or plastic. Figure E-4, page E-10, shows a sample simplified predictor. The following steps describe how to use a simplified prediction:

(1) Step 1. Get the wind speed from the CDM. If it is less than 10 kph, use the circular portion of the prediction. If it is greater than 10 kph, follow the remaining steps.

(2) Step 2. Get the wind direction from the CDM. Mark that direction on the compass circle of the template.

(3) Step 3. Obtain the air stability code from the CDM and adjust the code using Table D-14, page D-34, to determine the downwind distance (see Table E-3, page E-11).

(4) Step 4. Place the template on the map with the attack center of the prediction (the cross mark) over the actual attack center. Rotate the predictor until the downwind direction points toward GN.

(5) Step 5. Draw the downwind line perpendicular to the downwind direction using the distance obtained in Step 3.

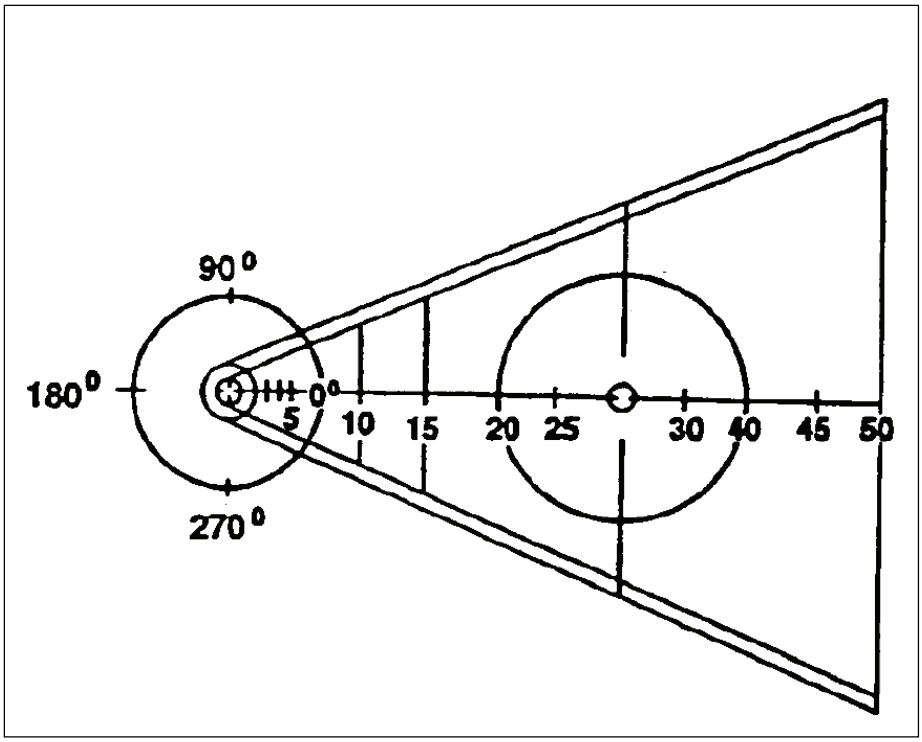


Figure E-4. Simplified Type A Chemical Predictor

Table E-2. DHD Versus Wind Speed (kph) and Air Stability, Land

Agent: Sarin Weapon: Artillery (Cannon/Mortar) Effective Payload: 650 kg									Agent: Soman Weapon: Rocket/Missile Effective Payload: 250 kg								
Stability	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Dose**	**Stability**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Dose**
Wind	<1	<1	<1	<1	<1	5	5	LCt50	Wind	<1	<1	<1	<1	<1	<1	<1	LCt50
11–17 kph	5	5	10	10	15	15	15	ICt5	11–17 kph	<1	5	5	5	10	10	10	ICt5
	5	10	10	15	20	25	20	Miosis		5	5	5	10	10	15	10	Miosis
Wind	<1	<1	<1	<1	<1	<1		LCt50	Wind	<1	<1	<1	<1	<1	<1		LCt50
18–26 kph	5	5	5	10	15	20		ICt5	18–26 kph	<1	5	5	5	5	10		ICt5
	5	5	10	15	20	25		Miosis		5	5	5	5	10	15		Miosis
Wind		<1	<1	<1	<1			LCt50	Wind		<1	<1	<1	<1			LCt50
27–36 kph		5	5	10	10			ICt5	27–36 kph		<1	5	5	5			ICt5
		5	10	10	15			Miosis			5	5	5	10			Miosis
Wind			<1	<1	<1			LCt50	Wind			<1	<1	<1			LCt50
37–45 kph			5	5	10			ICt5	37–45 kph			<1	5	5			ICt5
			5	10	15			Miosis				5	5	5			Miosis
Wind			<1	<1	<1			LCt50	Wind			<1	<1	<1			LCt50
46–54 kph			5	5	10			ICt5	46–54 kph			<1	5	5			ICt5
			5	10	15			Miosis				5	5	5			Miosis
Wind			<1	<1	<1			LCt50	Wind			<1	<1	<1			LCt50
55–63 kph			5	5	5			ICt5	55–63			<1	5	5			ICt5
			5	10	10			Miosis	kph			5	5	5			Miosis

(h) Draw a line from the maximum downwind distance at right angles to the downwind direction line. Extend the line on either side of the downwind direction line.

(i) Extend the downwind line upwind from the center of the attack area 2 km. This is equal to twice the radius of the attack area.

(j) Draw two lines from the upwind end of this line, which are tangents to the attack area circle, and extend them until they intersect with the maximum downwind distance line. These lines will form a 30° angle on either side of the downwind line.

(k) Ensure that the hazard area is taken to be the area bounded by—

- The upwind edge of the attack area circle.
- The two 30° tangents.
- The maximum downwind distance line.

(l) Prepare and transmit an NBC3 CHEM report and/or map overlays to those units and installations within the hazard area according to the SOP.

(5) To estimate the earliest and latest arrival times of the chemical cloud at a certain point, calculate the traveling speeds of the leading and trailing edges of the chemical cloud.

(a) Leading Edge Speed = Downwind Speed x 1.5

$$\text{Earliest Arrival Time} = \frac{\text{Distance to Point}}{\text{Leading-Edge Speed}}$$

(b) Trailing Edge Speed = Downwind Speed x 0.5

$$\text{Latest Arrival Time} = \frac{\text{Distance to Point}}{\text{Trailing-Edge Speed}}$$

NOTE: The distance to the points considered must be measured from the upwind edge (circle center for Case 1) of the attack area.

j. Detailed Type B Attack Downwind Hazard Prediction (Land).

(1) Type B agents are normally dispersed in liquid form to contaminate surfaces. Persistent nerve and mustard agents are examples of this type of attack. Ground-contaminating agents are normally dispersed by aircraft spray tanks, air-bursting artillery shells, rockets, missiles, and mines. The evidence of ground contamination may include the observer's report of the agent falling to the ground from air-bursting munitions, the identification of the agent with NBC-M8 paper, the positive response of M9 paper, or the identification of a blister agent with the M256 series sampler or reading on the ICAM.

(2) For the next six cases of chemical attacks the following information is required:

(a) NBC1 or NBC2 CHEM report.

(b) Detailed MET information (e.g., CDM or similar information).

Table E-4. Type B Attack, Probable Time After Ground Contamination at Which Personnel May Safely Remove Protective Masks

Daily Mean Surface Air Temperature	Within Attack Area (Number of Days)	Within Hazard Area (Number of Days)
< 10° C	3–10 days	2–6 days
11°–20° C	2–4 days	1–2 days
> 20° C	up to 2 days	up to 1 day

NOTES:

1. The daily mean surface temperature is needed for the estimation of the probable time after which personnel may safely remove their protective masks (see Table E-4).

2. The air stability category is not considered in Type B hazard predictions because the maximum downwind distance is always 10 km.

3. The estimates assume ground contamination densities up to 10 g/m^2.

4. When making hazard estimates, the vapor has been considered to be the determining factor within the attack area and in the downwind hazard area. The duration of the hazard from contact with bare skin is, however, difficult to predict. The duration can only be determined by the use of chemical-agent detection or identification devices.

5. When temperatures are considerably lower than 0°C, the duration of contamination may be longer than indicated in Table E-4, page E-16. The absence of vapor does not preclude the presence of contamination.

6. Daily mean surface air temperature may be obtained from local MET sources.

7. The information in Table E-4 is a worst-case scenario. Real, known information should be used to the extent possible.

(3) Type B, Case 1 (Figure E-7).

Sample NBC3 CHEM

ALFA/US/A234/001/C//

DELTA/271630ZAPR1999//

FOXTROT/33UUB206300/AA//

INDIA/SURF/NERV/P//

PAPAA/01KM/2-4DAY/10KM/1-2DAY//

PAPAX/271600ZAPR1999/-//

YANKEE/105DGT/009KPH//

ZULU/4/18C/9/-/2//

GENTEXT/CBRNINFO/TYPE B, CASE 1//

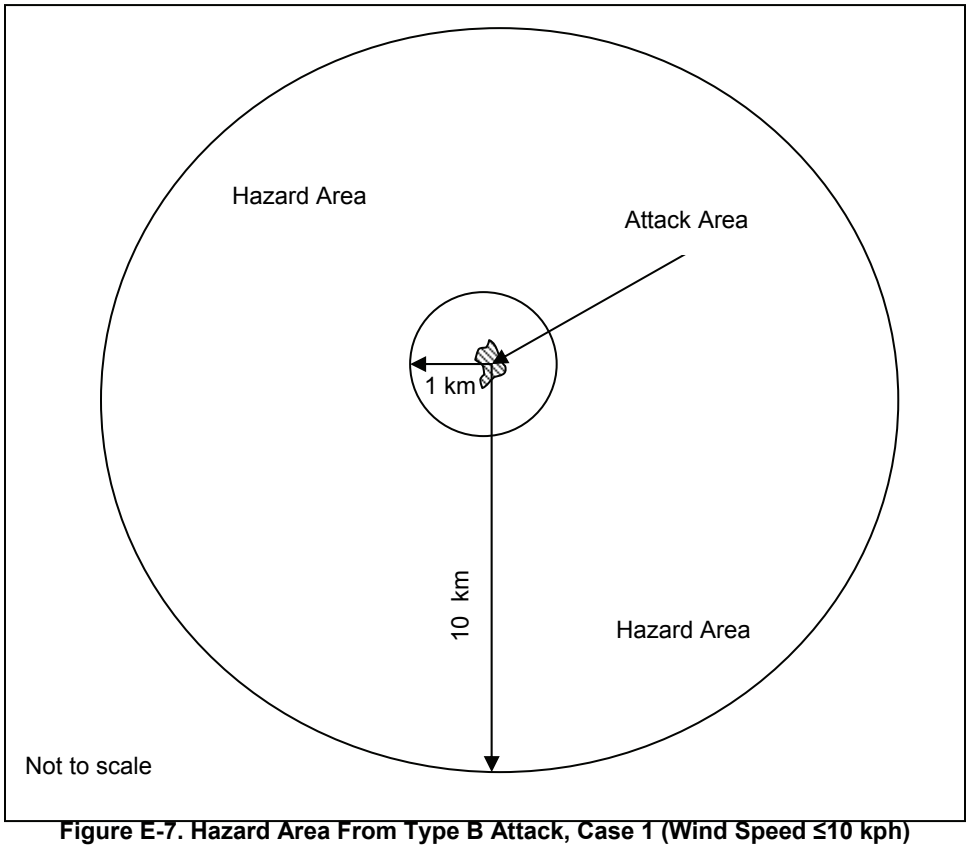


Figure E-7. Hazard Area From Type B Attack, Case 1 (Wind Speed ≤10 kph)

(a) Obtain the location of the attack from the relevant NBC chemical messages, and plot it on the map.

(b) Draw a circle (radius 1 km) around the center of the attack location. The area within this circle represents the attack area.

(c) Draw a circle (radius 10 km) around the center of the attack location. The area within this circle represents the hazard area.

(d) Prepare and transmit an NBC3 CHEM report and/or map overlays to those units and installations within the hazard area according to the SOP.

(4) Type B, Case 2.

Sample NBC3 CHEM

ALFA/US/A234/011/C//

DELTA/271650ZAPR1999//

FOXTROT/32UNH250010/AA//

INDIA/AIR/NERV/P//

PAPAA/01KM/2-4DAY/10KM/1-2DAY//

PAPAX/271600ZAPR1999/

32UNH371020/

32UNH250020/

32UNH241015/

32UNH241005/

32UNG301900//

YANKEE/120DGT/015KPH//

ZULU/2/15C/8/-/2//

GENTEXT/CBRNINFO/TYPE B, CASE 2//

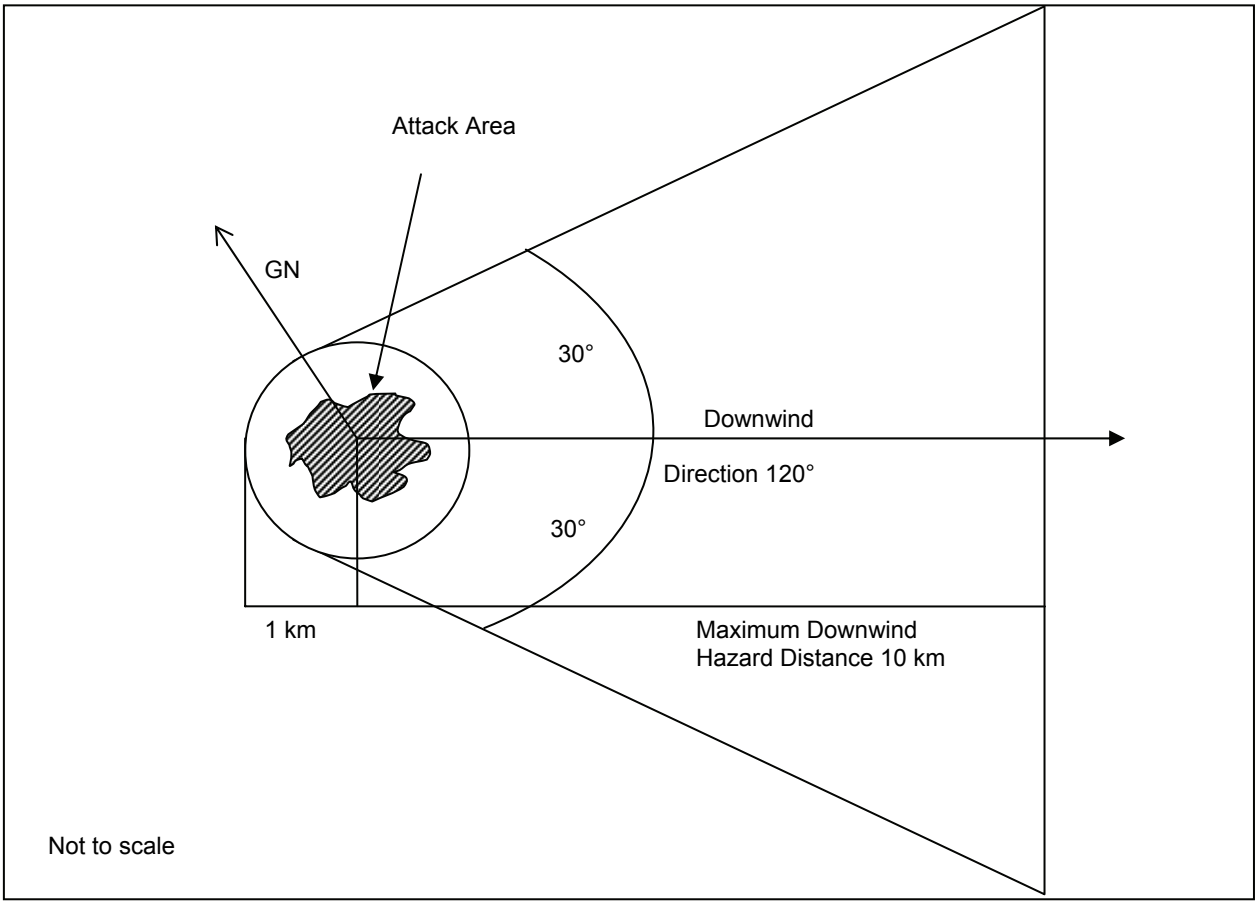


Figure E-8. Hazard Area From Type B Attack, Case 2 (Radius of Attack Area 1 km, Wind Speed >10 kph)

(a) Obtain the location of the attack from the relevant NBC CHEM reports, and plot it on the map.

(b) Draw a GN line from the center of the attack location.

(c) Draw a circle (radius 1 km) around the center of the attack location. The area within this circle represents the attack area.

(d) Draw a line from the center of the attack area showing the downwind direction.

(e) Plot the 10-km downwind distance from the center of the attack area on the downwind line.

(f) Draw a line from the 10-km downwind distance at right angles to the downwind direction line. Extend the line on either side of the downwind direction line.

(g) Extend the downwind line upwind from the center of the attack area 2 km. This is equal to twice the radius of the attack area.

(h) Draw two lines from the upwind end of this line, which are tangents to the attack area circle, and extend them until they intersect with the 10-km downwind distance line. These lines will form a 30° angle on either side of the downwind line.

(i) Find the probable time after ground contamination at which personnel may safely remove their protective masks using Table E-4, page E-16.

(j) Prepare and transmit an NBC3 CHEM report and/or map overlays to those units and installations within the hazard area according to the SOP.

(5) Type B, Case 3.

Sample NBC3 CHEM

ALFA/US/A234/013/C//

DELTA/211605ZAPR1999//

FOXTROT/32UNH431562/EE//

GOLF/OBS/MSL/10/-/-//

INDIA/AIR/NERV/P//

PAPAA/02KM/2-4DAY/010KM/1-2DAY//

PAPAX/211500ZAPR1999/-//

YANKEE/105DEG/8KPH//

ZULU/2/15C/6/-/2//

GENTEXT/CBRNINFO/TYPE B, CASE 3//

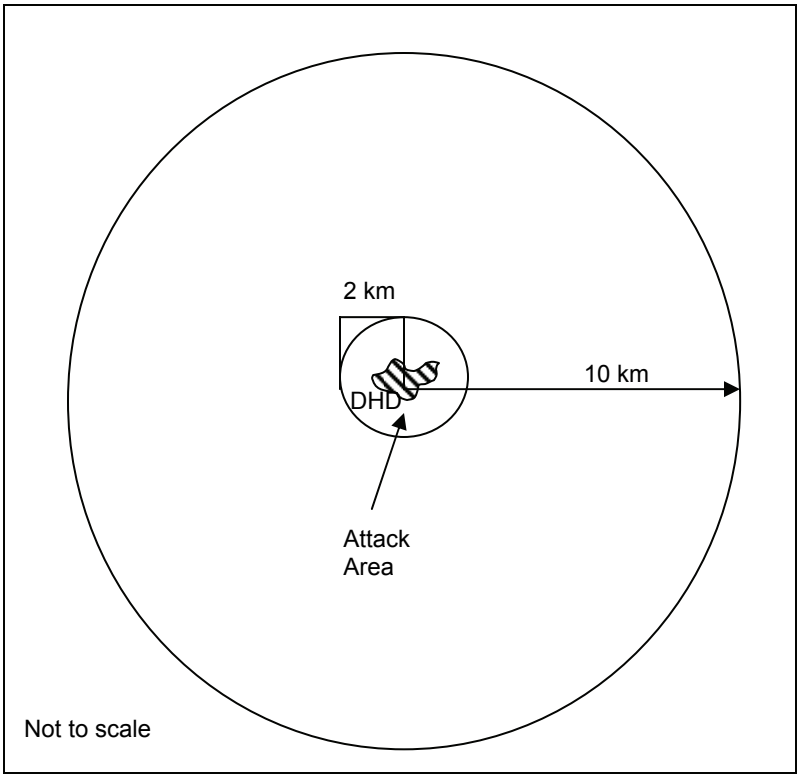


Figure E-9. Hazard Area From Type B Attack, Case 3 Attack Area (Radius 2 km, Wind Speed <10 kph)

(a) Obtain the location of the attack from the relevant reports, and plot it on the map.

(b) Draw a circle (radius 2 km) around the center of the attack location. The area within this circle represents the attack area.

(c) Draw a circle (radius 10 km) around the center of the attack location. The area within this circle represents the hazard area.

(d) Prepare and transmit an NBC3 CHEM report and/or map overlays to those units and installations within the hazard area according to the SOP.

(6) Type B, Case 4.

Sample NBC3 CHEM

ALFA/US/A234/006/C//

DELTA/181730ZAPR1999//

FOXTROT/32UNH320010/EE//

INDIA/AIR/NERV/P//

PAPAA/02KM/2-4DAY/10KM/1-2DAY//

PAPAX/181600ZAPR1999/

32UNH441051/

32UNH316029/

32UNH301016/

32UNG304997/

32UNG386899//

YANKEE/110DGT/020KPH//

ZULU/4/16C/-/-/2//

GENTEXT/CBRNINFO/TYPE B, CASE 4//

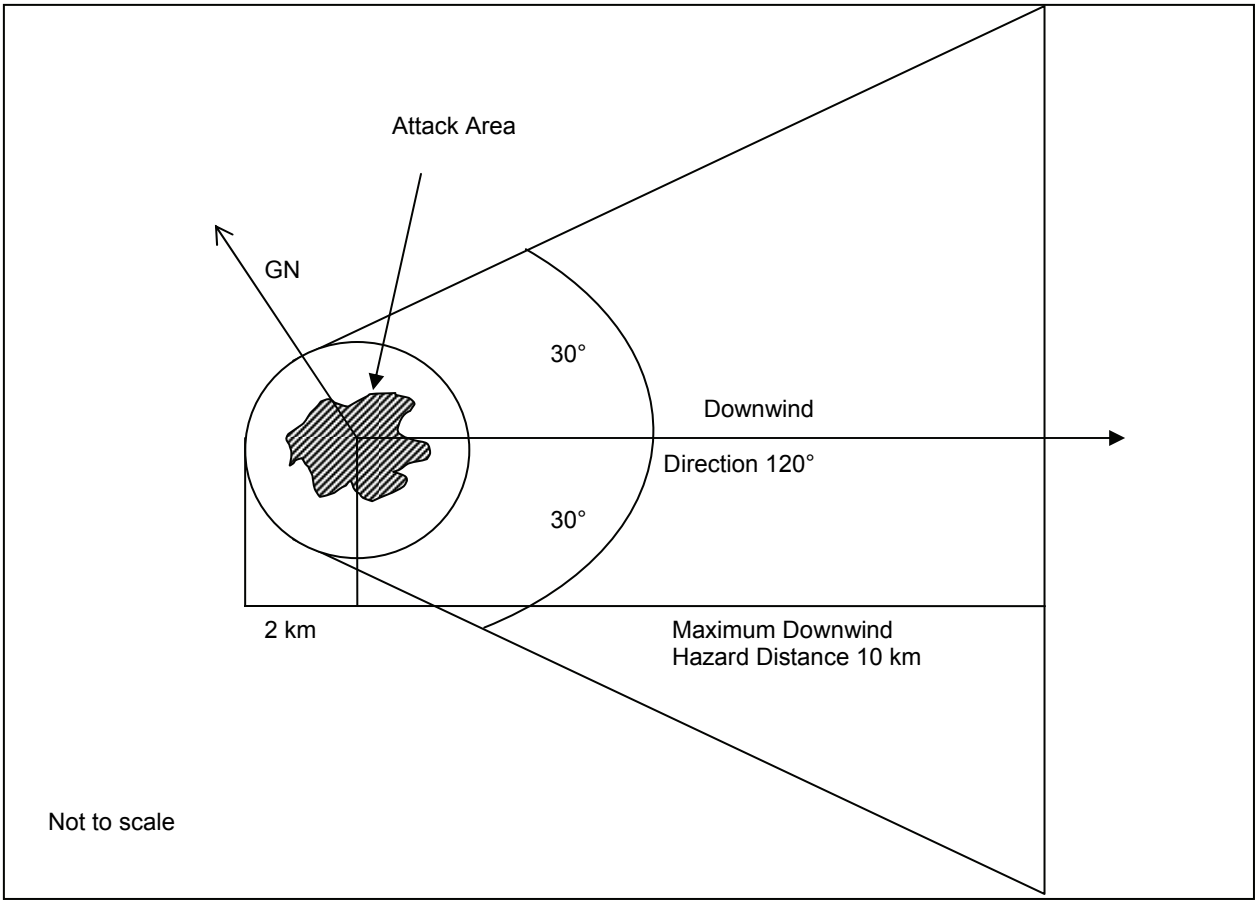


Figure E-10. Hazard Area From Type B Attack, Case 4 (Attack Area Radius 2 km, Wind Speed >10 kph)

(a) Obtain the location of the attack from the relevant NBC CHEM reports, and plot it on the map.

(b) Draw a GN line from the center of the attack location.

(c) Draw a circle (radius 2 km) around the center of the attack location. The area within this circle represents the attack area.

(d) Draw a line from the center of the attack area showing the downwind direction.

(e) Plot the 10-km downwind distance from the center of the attack area on the downwind line.

(f) Draw a line from the 10-km downwind distance at right angles to the downwind direction line. Extend the line on either side of the downwind direction line.

(g) Extend the downwind line upwind from the center of the attack area 4 km. This is equal to twice the radius of the attack area.

(h) Draw two lines from the upwind end of this line, which are tangents to the attack area circle, and extend them until they intersect with the 10-km downwind distance line. These lines will form a 30° angle on either side of the downwind line.

(i) Find the probable time after ground contamination at which personnel may safely remove their protective masks by using Table E-4, page E-16.

(j) Prepare and transmit an NBC3 CHEM report and/or map overlays, to those units and installations within the hazard area according to the SOP.

(7) Type B, Case 5.

Sample NBC3 CHEM

ALFA/US/A234/014/C//

DELTA/201530ZAPR1999//

FOXTROT/32UNG420620/EE/

32UNG435620/EE//

INDIA/AIR/NERV/P//

PAPAA/01KM/2-4DAY/010KM/1-2DAY//

PAPAX/211500ZAPR1999/-//

YANKEE/147DGT/009KPH//

ZULU/2/15C/6/-/2//

GENTEXT/CBRNINFO/TYPE B, CASE 5//

(b) Identify and mark the extremities of the estimated attack area, and connect the end points to form one or more attack lines.

(c) Draw circles (radius of 1 km), using the extremities as center points, around each point. Connect these circles on both sides by drawing tangents to the circles parallel to the attack line to designate the attack area.

(d) Draw a GN line from the center of each circle.

(e) Consider each circle as a separate attack area, and carry out the following procedure for each attack area:

- Draw a line from the center of the attack area showing the downwind direction.
- Plot the 10-km downwind distance from the center of the attack area on the downwind line.
- Draw a line from the 10-km downwind distance at right angles to the downwind direction line. Extend the line on either side of the downwind direction line.
- Extend the downwind line upwind from the center of the attack area 2 km. This is equal to twice the radius of the attack area.
- Draw two lines from the upwind end of this line, which are tangents to the attack area circle, and extend them until they intersect with the 10-km downwind distance line. These lines will form a 30° angle on either side of the downwind line.
- Draw a line connecting the downwind corners of the two vapor hazard areas (Points A and B in Figure E-12, page E-24).

(f) Use Table E-4, page E-16, to find the probable time after ground contamination at which personnel may safely remove their protective masks.

(g) Prepare and transmit an NBC3 CHEM report and/or map overlays to those units and installations within the hazard according to the SOP.

(9) Calculate the traveling speeds of the leading and trailing edges of the chemical cloud to estimate the earliest and latest arrival times of the chemical cloud at a certain point.

(a) Leading Edge Speed = Downwind Speed x 1.5

$$\text{Earliest Arrival Time} = \frac{\text{Distance To Point}}{\text{Leading Edge Speed}}$$

(b) Trailing Edge Speed = Downwind Speed x 0.5

$$\text{Latest Arrival Time} = \frac{\text{Distance To Point}}{\text{Trailing Edge Speed}}$$

k. Type C Attack Downwind Hazard Prediction (Land). A Type C attack (Figure E-13) is an attack where the attack origin is unknown. These attacks will most likely be found by a survey or reconnaissance.

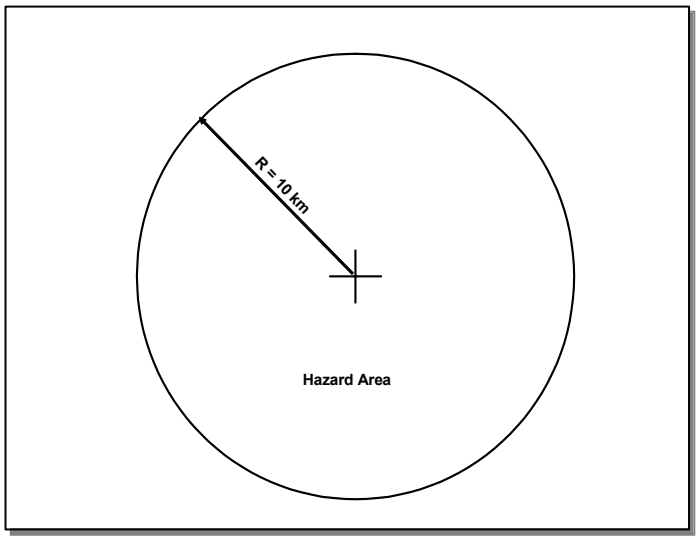


Figure E-13. Type C Attack

(1) Obtain the location of detection from the relevant NBC4 CHEM report (Line QUEBEC), and then plot it on the map.

(2) Draw a circle with a 10-km radius around the center of the detection location. The area within this circle represents the attack area and the hazard area.

(3) Prepare and transmit an NBC3 CHEM report to the units and installations in the predicted hazard area according to the unit SOP.

(4) Repeat the above procedures for the new location if a new NBC4 CHEM message that cannot be allocated to a strike specifies a location outside of the hazard area.

l. Adjusted Hazard Prediction (Land). The methods previously discussed are based on constant environmental conditions. After significant weather changes, the NBC3 CHEM report may no longer be accurate or apply. An adjusted NBC3 CHEM report must be sent to the unit or installation in the new hazard area if possible. Also, notify units who may no longer be in the hazard area. Significant weather changes include the following:

- Representative downwind speed of 10 kph or more or a wind speed that increases from less than 10 kph to more than 10 kph or the reverse.
- Air stability category (Type A attacks only).
- Changes in downwind direction by 30° or more.

Table E-5 shows which cases and types of attacks may be affected by different atmospheric changes.

Table E-5. Cases and Types of Attacks

Changes	A 1	A 2	B 1	B 2	B 3	B 4	B 5	B 6
Wind Speed: By 10 kph or more		X						
From >10 kph to ≤10 kph		X		X		X		X
From ≤10 kph to >10 kph	X		X		X		X	
Wind Direction by 30° or more		X		X		X		X
Stability Category		X						

NOTE: For a change in wind speed, determine the geographical center of the frontline of the traveling cloud at the time the new data becomes available. Calculate this distance by multiplying the original wind speed by twice the time in hours since the attack. The center of the cloud front is then considered to be the new center of attack area. Once the new center of attack is determined, the downwind hazard area is determined using the procedures for that type of attack.

(1) Recalculation of Hazard Distances. When significant weather changes occur or are predicted to occur, the following procedures for Type A attacks should be used to determine—

(a) The distance the chemical agent cloud will have traveled prior to the change by using—

$d_1 = u_1 \times t_1$

d_1 = distance traveled prior to change in weather conditions

u_1 = downwind speed prior to change in weather conditions

t_1 = time elapsed between the time of attack and the end of the current CDR time period

NOTE: If the distance traveled, as calculated above, is equal to or exceeds the original maximum DHD, recalculation is not required.

(b) For Type A case 2 attacks, measure the distance d_1 along the downwind line and mark it. If that point is outside the current CDR area, get the CDR for the area containing the new point and get the weather conditions for the next time period. Compare these weather conditions with those used for the current CDR time period, and determine if significant weather changes are predicted.

(c) Determine the distance the chemical cloud will travel after the change by using—

$d_2 = H_2 - d_1$

d_2 = remaining hazard distance

H_2 = maximum hazard distance under the conditions prevailing after the change

d_1 = distance traveled prior to change in weather conditions

NOTES:

1. If the second time period has a wind speed ≤10 kph (Type A1), always draw a circle with a radius of 10 km (as if d_2 = 10 km).

2. In constructing the hazard area, keep in mind that the maximum hazard distance, valid during either set of weather conditions, must not be exceeded. If d_2 is ≤0, recalculation is not required.

(2) Type A, Case 1 Changing to a Type A, Case 2 (Figure E-14 shows an increase in wind speed from ≤10 kph to >10 kph).

Sample NBC CDM
AREAM/NFEA12//
ZULUM/230600ZAPR1999/230900ZAPR1999/231500ZAPR1999//
UNITM/KM/DGT/KPH/C//
WHISKEYM/140/008/4/06/8/-/2//
XRAYM/140/012/4/10/8/-/2//
YANKEEM/150/014/4/14/8/-/2//

Sample NBC2 CHEM
ALFA/US/A234/005/C//
DELTA/231030ZAPR1999//
FOXTROT/32VNH450956/AA//
GOLF/OBS/CAN/-/SHL/24//
INDIA/SURF/NERV/NP//
TANGO/FLAT/SCRUB//
YANKEE/140DGT/008KPH//
ZULUA/4/10C/8/-/2//
GENTEXT/CBRNINFO/
TYPE OF AGENT CONFIRMED BY CHEMICAL DETECTION KIT. RECALCULATION BASED ON CHANGE IN WIND SPEED 231100Z//

(a) Calculate d_1.

(b) Draw a circle around the center of the original attack area (radius d_1). The area inside this circle represents the new attack area.

NOTE: If d_1 is >10 km then use d_1 = 10 km.

(c) Draw a line from the center of the attack area showing the downwind direction.

(d) Draw a GN line from the center of the attack.

(e) Measure and mark the distance d_2 on the downwind direction line from where the downwind direction line cuts the new attack area circle.

(f) Draw a line from the d_2 distance at right angles to the downwind direction line, and extend it on either side of the downwind direction line.

(g) Extend the downwind line upwind from the center of the attack area by 2 x d_1. This is equal to twice the radius of the new attack area.

(h) Draw two lines from the upwind end of this line, which are tangents to the new attack area circle, and extend them until they intersect with the right-angle line resulting from (f).

(i) Prepare and transmit an NBC3 CHEM report and/or map overlays to those units and installations within the hazard area according to the SOP.

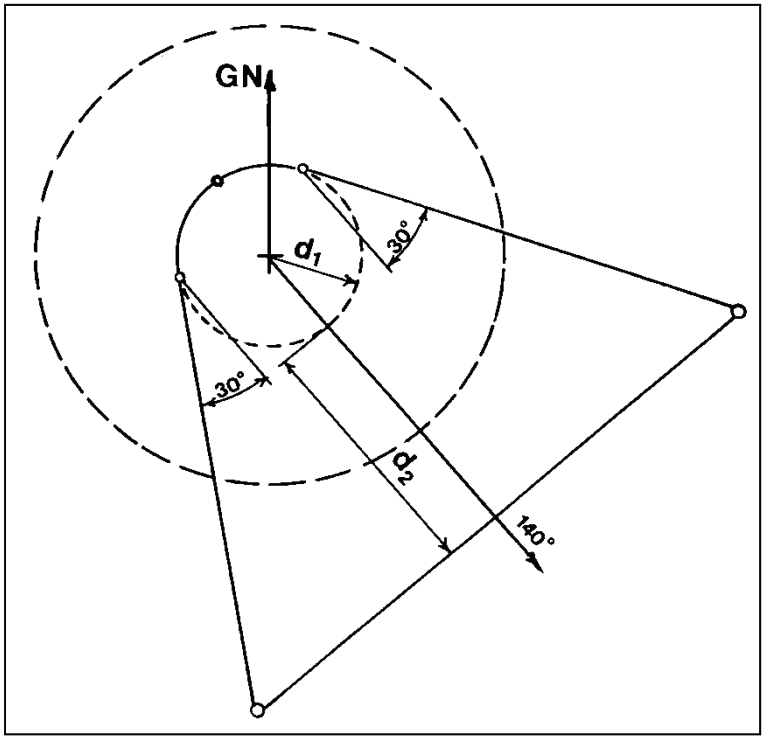


Figure E-14. Recalculation of Downwind Hazard Area Type A Attack (Change in Wind Speed From ≤10 kph to >10 kph)

(3) Type A, Case 2 Changing to a Type A, Case 1 (Figures E-15, E-16, and E-17, pages E-31, E-32, and E-33 show a decrease in wind speed from >10 kph to ≤10 kph)

Sample NBC CDM

AREAM/NFEB43//

ZULUM/281200ZAPR1999/281500ZAPR1999/
282100ZAPR1999//

UNITM/KM/DGT/KPH/C//

WHISKEYM/090/018/4/14/8/-/2//

XRAYM/090/008/4/10/8/4/2//

YANKEEM/090/006/2/06/8/4/2//

Example NBC2 CHEM

ALFA/US/A234/005/C//

DELTA/281615ZAPR1999//

FOXTROT/32UPG387764/AA//

GOLF/OBS/MLR/-/RKT/12//

INDIA/SURF/NERV/NP//

TANGO/FLAT/SCRUB//

YANKEE/090DGT/018KPH//

ZULUA/4/14C/8/-/2//

GENTEXT/CBRNINFO/

SYMPTOMS OF NERVE-
AGENT POISONING.
RECALCULATION
BASED ON CHANGE IN WIND
SPEED AS OF 281700Z//

Sample NBC2 CHEM

ALFA/US/A234/004/C//

DELTA/281000ZAPR1999//

FOXTROT/32VMH747388/EE//

GOLF/OBS/AIR/-/SPR/-//

INDIA/AIR/NERV/P//

TANGO/FLAT/SCRUB//

YANKEE/090DGT/020KPH//

ZULU/4/18C/8/-/0//

GENTEXT/CBRNINFO/SYMPTOMS OF NERVE-AGENT POISONING//

Sample NBC CDM

AREAM/NFEA12//

ZULUM/280600ZAPR1999/280900ZAPR1999/281500ZAPR1999//

UNITM/KM/DGT/KPH/C//

WHISKEYM/090/020/4/18/8/-/0//

XRAYM/150/020/4/18/8/-/0//

YANKEEM/150/020/4/18/8/-/0//

Sample NBC3 CHEM

ALFA/US/A234/004/C//

DELTA/281000ZAPR1999//

FOXTROT/32VMH747388/EE/32VMH897388/EE//

INDIA/AIR/NERV/P//

PAPAA/01KM/96HR/10KM/48HR//

PAPAX/281100ZAPR1999/

32VMH846318/32VMH846329/

32VMH856335/32VMH846341/

32VMH847456/32VMH742396/

32VMH740395/32VMH739394/

32VMH738393/32VMH738392/

32VMH737391/32VMH737389/

32VMH737388/32VMH736266/

32VMH836324/32VMH846318//

YANKEE/090DGT/020KPH//

ZULU/4/18C/8/-/0//

GENTEXT/CBRNINFO/
RECALCULATION BASED ON NBC CDM WEATHER CHANGE AS OF 281100Z//

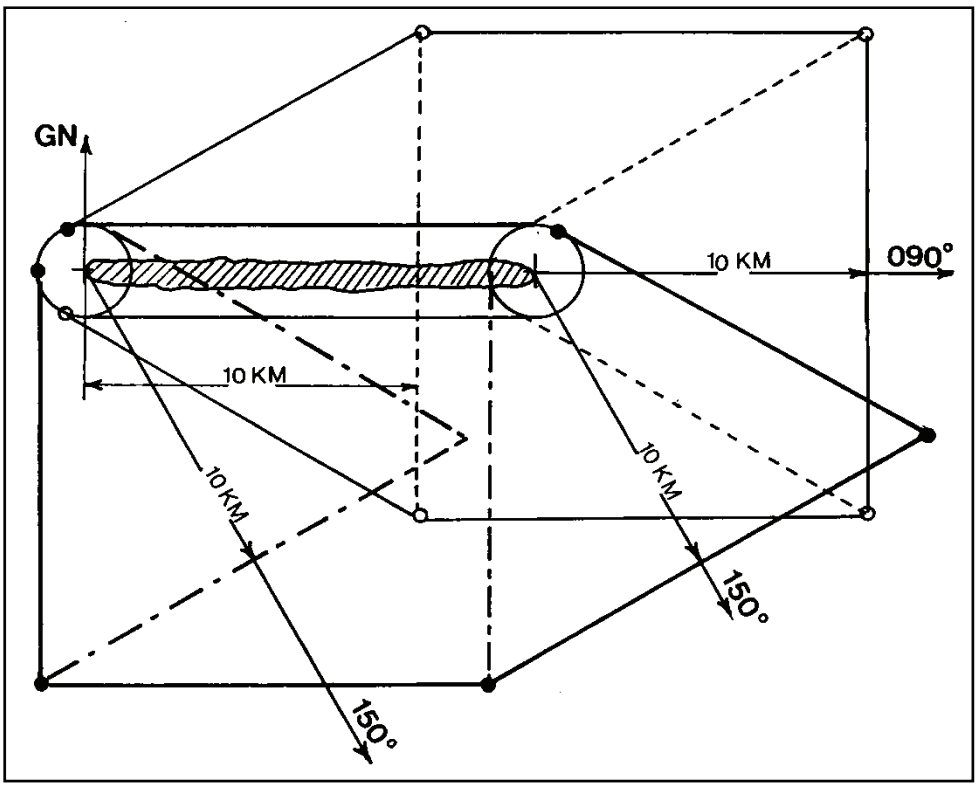


Figure E-20. Recalculation of Downwind Hazard Area Type B, Case 6 Attack (Change in Downwind Direction)

(a) Plot the hazard area as calculated before and after the change in wind direction, using the procedure described above.

(b) Indicate on the GENTEXT/CBRNINFO line the reason for recalculation and the effective time for the new hazard area.

(8) Type B, Case 2, 4, and 6 Attacks With a Change in Wind Speed from >10 kph to ≤10 kph.

(a) Plot the hazard area as calculated for the wind speed >10 kph, using the appropriate procedure described above for the correct case.

(b) Plot the hazard area as calculated for the wind speed ≤10 kph, using the appropriate procedure described above for the correct case.

(9) Hazard Area. The examples of the hazard area are valid after a change in wind direction; they also include the area before the change. This takes into account transient hazards caused by the shift in wind direction in the areas between the two hazards.

(10) After Recalculation. When recalculation is complete, calculate the arrival time of the hazard and issue an NBC3 CHEM report/map overlays to the units or installations that will be affected. Issue the new NBC3 CHEM report to those units initially warned to inform them that there may be a residual vapor hazard in their area. The same strike serial number should be used as in the

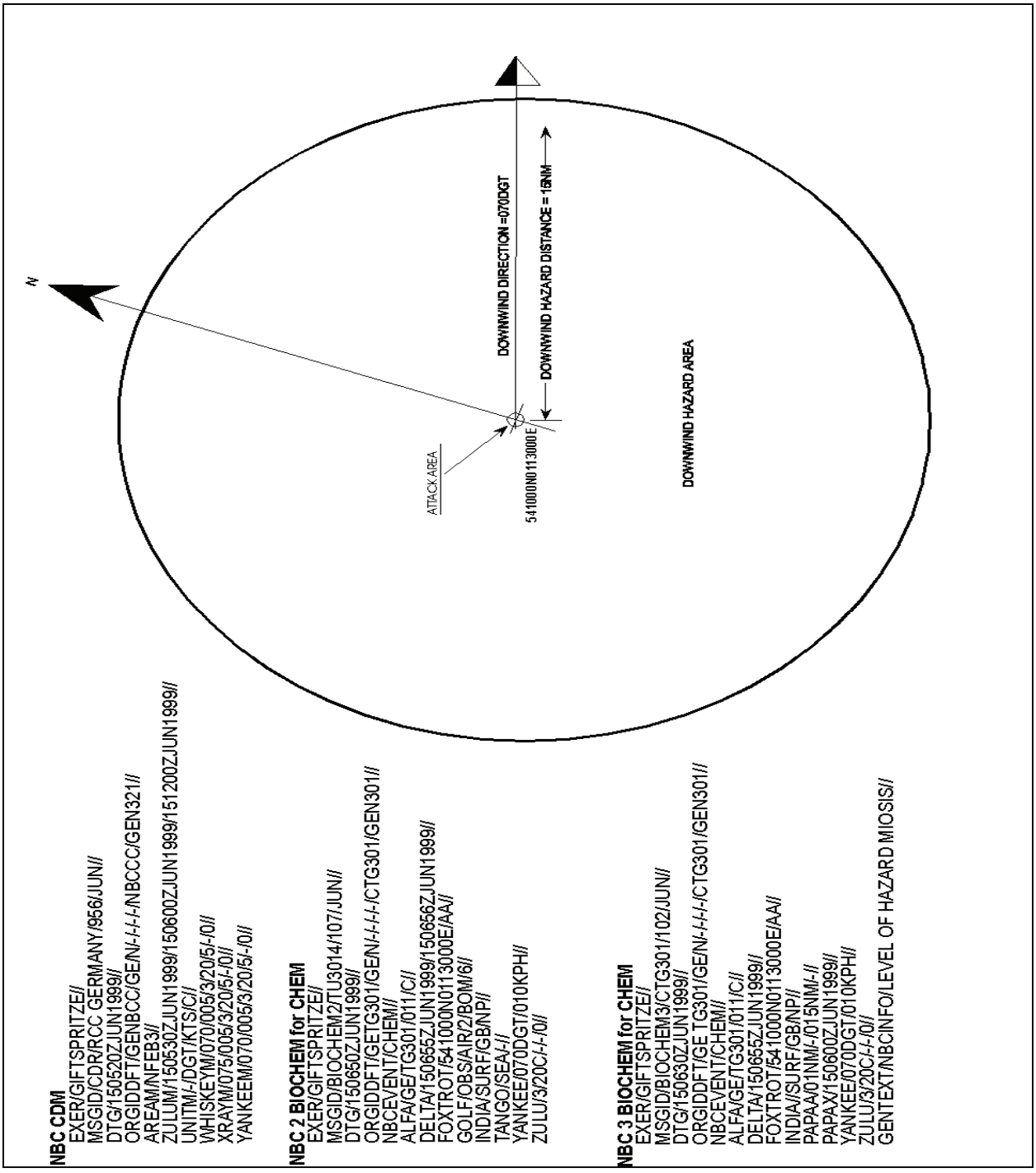


Figure E-26. Downwind Hazard Area, Type A Attack, Wind Speed ≤5 Knots or Variable

r. Change in MET Conditions.

(1) Adjustment Requirements. If the MET conditions change during the hazard, the predicted hazard area must be adjusted for the following:

(a) Stability category changes from one category to another.

(b) Wind speed changes of more than 5 knots or from 5 knots or less, to more than 5 knots, and vice versa.

(c) Wind direction changes of more than 20°.

(2) Recalculation of Hazard. The new hazard area is determined by calculating the downwind distance that the agent cloud may have traveled at the time of the change in the MET conditions using the representative downwind speed. Consider this point to be the center point of a new attack area, and draw a circle around it with a radius equal to half the width of the hazard area at that point. From there on, repeat the steps using the procedure described previously. The distance which the agent cloud may already have traveled must be subtracted from the maximum DHD under the new weather conditions (see Figure E-27, page E-52).

(3) Agent Clouds Crossing the Coast Line. When a cloud from a chemical agent crosses the coast line from sea to land or vice versa, consider the point where the downwind direction line (downwind axis) intersects the coast line to be the center point of a new attack area. Follow the procedure described above using the appropriate tables for sea and land to determine the DHDs. When frequent changes occur, use the land procedure when working manually.

(4) Beginning and End of Hazard. In the case of air-contaminating attacks (nonpersistent agent), the beginning and end of the hazard at a given point may be determined using the following:

(a) Representative downwind speed.

(b) Distance of the location from the edge of the attack area.

(c) Beginning and end of the attack.

The following two formulas are used:

$t_B = (d_A \times 60) / (1.5 \times V_Z)$ or $t_B = (d_A \times 40) / V_Z$

and

$t_E = (d_B \times 60) / (0.5 \times V_Z)$ or $t_E = (d_B \times 120) / V_Z = 3 \times t_B$

Where—

t_B = time in minutes from the beginning of the attack to the beginning of the hazard.

d_A = distance between the location and the downwind leading edge of the dissemination area (in NM).

d_B = distance between the location and the downwind trailing edge of the dissemination area (in NM).

V_Z = wind speed in knots. If necessary, the wind speed must be determined as the mean wind speed over several periods of validity of the NBC CDM.

t_E = time in minutes from the end of the attack to the end of the hazard.

6. NBC4 CHEM Report

a. When any unit detects CBRN hazards through monitoring, survey, or reconnaissance, this information is reported using an NBC4 CHEM report (see Figure E-28). Separate NBC4 CHEM reports are consolidated and then plotted on the tactical map to show where the hazard exists. If monitoring information is incomplete, a survey may be directed. Monitoring reports contain the type of agent detected (line INDIA) indicating the type of chemical agent and persistency, the location of the sampling (geographical position), the type of sample (air sample or liquid sample) (line QUEBEC), the date-time of the detection (line SIERRA), and topography information (line TANGO).

NBC4 CHEM Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/C//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/UNK/NERV//
QUEBEC	Location of reading/sample/detection and type of sample/detection	M	QUEBEC/32VNJ481203/-/MSVY//
ROMEO	Level of contamination, dose rate trend and decay rate trend	O	ROMEO/20PPM//
SIERRA	DTG of reading or initial detection of contamination	M	SIERRA/202300ZSEP1997//
TANGO	Terrain/topography and vegetation description	M	TANGO/FLAT/URBAN//
WHISKEY	Sensor information	O	WHISKEY/POS/POS/NO/MED//
YANKEE	Downwind direction and downwind speed	M	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	-

Figure E-28. Sample NBC4 CHEM Report

b. Lines QUEBEC, ROMEO, SIERRA, and TANGO are a segment. With the exclusion of line ROMEO, this segment is mandatory. Lines/segments are repeatable up to 20 times in order to describe multiple detection, monitoring, or survey points.

c. If no chemical agent is detected, this should be reported by entering NIL in line INDIA. When all hazards from one attack are gone, the responsible CBRN cell should annotate this in an NBC4 CHEM report by entering NIL in line INDIA and by entering "CHEMICAL FREE ATTACK" in line GENTEXT/NBC INFO. To be able to identify the attack, the strike serial number (line ALFA from the NBC2 CHEM report) must be included in the report.

d. For detailed information regarding chemical reconnaissance, refer to *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance.*

7. NBC5 CHEM Report

a. The NBC5 CHEM report is prepared from the contamination plot. This report is last in order because it consists of a series of grid coordinates. Often, this message must be sent via radio nets. This requires lengthy transmission. The recipient is required to plot each coordinate and redraw the plot. This report may also be sent as a map overlay.

b. For NBC5 CHEM reports, line items INDIA (release information), OSCAR (reference time), and XRAYA (actual contour information) are mandatory (see Figure E-29).

NBC5 CHEM Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/C//
DELTA	DTG of attack or detonation and attack end	O	DELTA/201405ZSEP1997//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/NERV/P/-//
OSCAR	Reference DTG for estimated contour lines	M	OSCAR/201505ZSEP1997//
TANGO	Terrain/vegetation information	O	
XRAYA*	Actual contour information	M	XRAYA/LCT50/32VNJ575203/ 32VNJ572211/32VNJ560219/ 32VNJ534218/32VNJ575203//
XRAYB*	Predicted contour information	O	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*Line items are repeatable up to 50 times to represent multiple contours.			

Figure E-29. Sample NBC5 CHEM Report

8. NBC6 CHEM Report

The NBC6 CHEM report is a summary of the information concerning the CBRN and ROTA events. NBC6 CHEM reports consist mainly of general text, which gives information on the event (see Figure E-30).

NBC6 CHEM Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/C//
DELTA	DTG of attack or detonation and attack end	O	DELTA/201405ZSEP1997/ 201420ZSEP1997//
FOXTROT	Location of attack and qualifier	O	FOXTROT/32UNB058640/EE//
INDIA	Release information on CB agent attacks or ROTA events	O	INDIA/AIR/NERV/P/MSDS//
QUEBEC	Location and type reading/sample/ detection	O	QUEBEC/32VNJ481203/-/MSDS//
ROMEO	Level of contamination, dose rate trend, and decay rate trend	O	
SIERRA	DTG of reading	O	SIERRA/202300ZSEP1997//
GENTEXT	General text	M	GENTEXT/CBRNINFO/SICA LAB REPORT HAS IDENTIFIED THE AGENT AS VX//

Figure E-30. Sample NBC6 CHEM Report

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Appendix F

BIOLOGICAL-CONTAMINATION AVOIDANCE TACTICS, TECHNIQUES, AND PROCEDURES

1. Background

As with all forms of CBRN attacks or ROTA, an effective means of communication must be trained and rehearsed for the avoidance of biological contamination to be successful. Once a unit is aware that it may have been in a biological attack or is within a possible hazard area, the avoidance procedures throughout this manual should be initiated. The CBRNWRS should be used to relay information about the biological agents and hazards in an efficient and timely manner. Biological avoidance requires an understanding of what biological agents are, how they may be employed, and what happens to the agents after they are released. Biological agents are broken down into two broad categories—pathogens and toxins.

- Pathogens are infectious agents that cause disease in man, animals, or plants. Agents that constitute antipersonnel BW threats include bacteria, viruses, and rickettsias.

- Toxins are poisonous substances produced as by-products of the microorganisms (pathogens), plants, and animals.

2. Biological-Agent Dissemination Methods

There are three general methods of disseminating biological agents—aerosol, vector, and covert. Each method is designed to get the agent into the body, and each method targets a specific portal of entry in order to infect the individual.

a. Aerosol Dissemination.

(1) Biological Agents. Biological agents may be disseminated by ground- or air-bursting munitions, aircraft spray tanks, or boat- or truck-mounted aerosol generators. An aerosol attack will most likely occur in a covert (hidden) manner. Dissemination is likely to occur at altitudes of 1,000 feet or less (100 feet optimum). The estimation of the hazard areas resulting from dissemination at altitudes greater than 1,000 feet aboveground requires extensive MET analysis.

(2) Toxins. Toxins can be disseminated as a liquid (such as “yellow rain”). This makes the toxin highly visible and an immediate hazard. It will generally be limited to the immediate area of the attack.

(3) Aerosol Cloud Travel. In a tactical aerosol attack, the aerosol cloud (after initial formation) will travel downwind at a rate determined by the wind speed. The cloud will lengthen and widen as it travels downwind. The length of the agent cloud will equal about one-third of the distance traveled. Units near the release point will encounter a more concentrated cloud. However, units located farther downwind (even though exposed to a less concentrated agent cloud) will be exposed for a longer period of time, so unprotected personnel may inhale a higher total dose. The peak danger area will be located in the area where the cloud stays intact, while at the same time, it is at its maximum width and length. This distance is approximately the maximum downwind hazard prediction for a

chemical agent; therefore, it is vital to determine whether or not the attack is biological or chemical.

(4) Casualty Production. The biological-agent cloud can cause immediate and delayed casualties. This is due to the fact that each individual will receive a different dose, and the time until the onset of symptoms will depend on the amount of agent received and each individual's physiological makeup. The onset of illness will also be affected by the person's reaction time and any other forms of protection (i.e., inoculation, masking time) that were available against the agent. Biological-agent casualties can occur in an area as much as two times the maximum DHD for a chemical agent.

(5) Dispersal and Settling Out. Traveling farther downwind, the cloud is exposed to the environmental elements. It is subjected to dispersal, settling, and impaction on the terrain features. The agent cloud will lose much of its concentration, and the losses will be such that the majority of unprotected personnel will not receive an infective (pathogen) or effective (toxin) dose. Dispersal will not be uniform, and casualties may occur as far as four to five times the maximum DHD of chemical agents.

(a) Bursting-Type Munitions. When a biological projectile or bomb bursts, the filling (liquid slurry or dry powder) is initially dispersed in all directions. An effective ground-bursting munition will project the majority of the filling into the air to form an aerosol cloud. Air-bursting munitions may also form an aerosol cloud that will behave in a similar manner to a spray attack. The agent may be designed to fall to the ground as a surface contaminant, much like persistent chemical agents. The dimensions of the aerosol cloud will be influenced by the means of delivery, weather conditions, and terrain.

(b) Spray Tanks and Generators. Aircraft and vehicle spray tanks or aerosol generators may be employed to form an aerosol cloud. This form of attack is likely to take place covertly.

b. Vector Dissemination. Some pathogens may be delivered by the use of vectors, such as fleas, ticks, lice, or mosquitoes. Many of these same vectors have carried diseases since recorded history, and avoidance procedures should be practiced at all times to limit the potential for infection.

(1) Controlling Vectors. One of the major difficulties with vectors is control. Once they are released, they are basically out of control and can attack anyone. Vectors are quite mobile and can easily leave the area where they were released.

(2) Logistical and Production Problems. Getting a live, infective pathogen inside a vector is a difficult proposition. Getting the vector inside a delivery vehicle that will not damage or kill the vector is another difficult issue. Doing these things and then delivering sufficient quantities of the vectors to be effective in producing a disease outbreak will be difficult.

c. Covert Dissemination. Sabotage and terrorist personnel may possess a variety of aerosol and contamination (poisoning) techniques for various targets. Aerosol techniques can be fairly large operations, using aerosol generators (or foggers) that produce large, open-air hazard areas. These techniques also can be more limited and selective, targeting the enclosed air space of key C2 facilities, aircraft, ships, troop billets, and similar areas. Biological agents in liquid, powders, or spray can be placed directly into foodstuffs at harvest, processing, distribution, and preparation points. They can also be placed into the water reservoir or distribution chain.

3. Avoidance Procedures

Avoidance procedures are broken down into actions—before, during, and after the attack. For a biological attack, these procedures will also be broken down by the different dissemination methods. The lists given, while not all-encompassing, will assist in developing the unit SOP and directives.

a. Aerosol Avoidance Procedures.

(1) Preattack.

(a) Alert subordinate units.

(b) Establish and enforce preventive medicine (PVNTMED) programs to include immunizations, area sanitation, personal-hygiene standards, and rest and nutritional needs of the troops.

(c) Gain intelligence on the threat capabilities and intentions.

(d) Seek out, intercept, and destroy enemy weapon systems, production facilities, and storage sites.

(e) Instruct troops on the threat, how to recognize the attack, and protective measures to be taken.

(f) Train and drill on the fitting and donning of protective masks and clothing.

(g) Set up collective protection systems for personnel, equipment, and supplies.

NOTE: Field-expedient collective protection must be airtight.

(h) Identify backup (alternate) food, water, and supply sources.

(i) Establish detection and sampling procedures.

(j) Conduct a vulnerability analysis.

(k) Increase MEDSURV.

(l) Increase food and water surveillance.

(m) Distribute prophylaxis if the threat agents are known and prophylaxis for the agent exists.

(2) During Attack.

(a) Recognize the attack.

(b) Initiate personnel protective measures. In the event of a potential biological attack involving a munitions release, masking is the first priority; but since the attack may be chemical or toxin, MOPP4 is initially required. For the maximum protection and the lowest risk of incurring casualties, soldiers should wear protective clothing and masks for at least 4 hours after the unit has been attacked or the agent cloud is predicted or known to have passed through the unit area. Every effort must be made to identify the exact agent, including its characteristics. If the skin is contaminated, remove the contamination immediately using the procedures provided in the *Multiservice Tactics,*

Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination.

(c) Repulse or eliminate the delivery vehicle or weapons.

(d) Observe for distinguishing signs between a biological- and chemical-agent attack or a mixture of a conventional and biological attack.

(e) Report the attack utilizing the CBRNWRS. A biological attack that cannot be immediately identified will be reported as an NBC1 UNK.

(3) Postattack.

(a) Estimate the downwind hazard. Significant casualties in unprotected personnel can occur at two times the maximum DHD for a chemical agent.

(b) Determine the BW agent.

(c) Initiate prophylaxis and vaccination against a biological attack. This should be the first priority once the agent is known.

(d) Begin sampling and collection procedures according to the unit SOP.

(e) Consume only sealed rations and properly contained water. Outer-container surfaces, if exposed, must be properly decontaminated. Call PVNTMED personnel when the safety of the unit level water supplies is questionable. Inspect food storage depots and supply points. Replenish water supplies from the water purification units.

(f) Separate the biological casualties. Separate the ill from the well individuals if the BW agent is contagious (isolation of ill). If possible, only properly protected individuals (vaccinated, on prophylaxis, or in proper personal protective equipment) should provide treatment to sick individuals. If unprotected individuals must provide treatment, use a minimum number of personnel until protective prophylaxis or equipment can be obtained. Keep in mind that when dealing with contagious individuals, evacuation options may be limited.

(g) Implement movement restriction if the BW agent is contagious.

b. Vector Avoidance Procedures.

(1) Preattack.

(a) Apply insect repellant on the exposed skin.

(b) Gain intelligence on the threat capabilities and intentions.

(c) Seek out, intercept, and destroy enemy weapon systems and production and storage sites.

(d) Instruct troops on the threat, recognition of the attack, and protective measures.

(e) Establish and enforce PVNTMED programs, to include immunizations, area sanitation, personal-hygiene standards, and rest and nutritional needs of the troops.

NBC1 BIO Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	Will be assigned be the servicing CBRN cell	
BRAVO	Location of observer and direction of attack or event	M	BRAVO/32UNB062634/2500MLG//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP1997/ 201420ZSEP1997//
FOXTROT	Location of attack or event	O	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/OBS/AIR/1/BML/-//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/BIO/NP/UMPDS//
TANGO	Terrain/topography and vegetation description	M	TANGO/FLAT/URBAN//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	-

Figure F-1. Sample NBC1 BIO Report

6. NBC2 BIO Report

The NBC2 BIO report is based on one or more NBC1 BIO reports. It is used to pass evaluated data to higher, subordinate, and adjacent units. The CBRN cell is usually the lowest level that prepares NBC2 BIO reports. However, CBRN personnel at an intermediate HQ may prepare NBC2 BIO reports if they have sufficient data. These intermediate HQ, however, will not assign a strike serial number. The CBRN cell prepares the NBC2 BIO report, assigns it a strike serial number, and disseminates it to the appropriate units. Each subordinate unit then decides whether to disseminate the report further. Lines ALFA (strike serial number), DELTA (DTG), FOXTROT (location of attack), GOLF (means of delivery), INDIA (release information), and TANGO (terrain, topography, and vegetation description) are mandatory entries in the NBC2 BIO report. A sample NBC2 BIO report is shown in Figure F-2, page F-8.

NBC2 BIO Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	M	ALFA/US/A234/001/B//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP1997/ 201420ZSEP1997//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/OBS/AIR/1/BML/-//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/BIO/NP/UMPDS//
TANGO	Terrain/topography and vegetation description	M	TANGO/FLAT/URBAN//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	

Figure F-2. Sample NBC2 BIO Report

7. NBC3 BIO Report

Area CBRN centers use NBC2 BIO reports and current wind information to predict the area of hazard. This prediction is disseminated as an NBC3 BIO report. It is sent to all units or activities that could be affected by the hazard. Each unit or activity prepares a plot of the NBC3 BIO report, determines which of its subordinate units or activities are affected, and warns them accordingly. Commanders should use this report as battlefield intelligence when planning missions. The NBC3 BIO report is a prediction of the hazard area. This prediction is safe-sided to ensure that a significant hazard will not exist outside the predicted hazard area. As the JWARN is developed and fielded, its built-in models will give a more realistic depiction of the predicted hazard area. Units within the hazard area must adjust their MOPP level if necessary. A sample NBC3 BIO report is shown in Figure F-3.

NBC3 BIO Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	M	ALFA/US/A234/001/B//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP1997/ 201420ZSEP1997//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	O	GOLF/OBS/AIR/1/BML/-//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/BIO/NP/MPDS//
OSCAR	Reference DTG for contour lines	O	
PAPAA	Predicted attack/release and hazard area	M	PAPAA/1KM/3-10DAY/10KM/2-6DAY//
PAPAX	Hazard area location for weather period	M	PAPAX/201600ZSEP1997/ 32VNJ456280/32VNJ456119/ 32VNJ576200/32VNJ566217/ 32VNJ456280//
TANGO	Terrain/vegetation information	O	
XRAYB	Predicted contour information	C	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
Note: XRAYB is prohibited if OSCAR is not used.			

Figure F-3. Sample NBC3 BIO Report

a. Definitions. In order to avoid contamination, the commander needs to know where the contamination is located. The biological prediction procedure provides information on the location, extent of the hazard area, and duration of the hazard resulting from attacks with biological weapons. It provides the necessary information for commanders to warn units within the predicted hazard area. The following definitions are used in predicting biological hazards.

(1) Attack Area. This is the predicted area immediately affected by the delivered biological agent.

(2) Hazard Area. This is the predicted area in which unprotected personnel may be affected by an agent spreading downwind from the attack area. The downwind distance depends on the type of attack and on the weather and terrain in the attack and downwind areas.

(3) Contaminated Area. This is the area in which a biological hazard may remain at hazardous levels for some time after the attack. The contamination may be in solid or liquid form. The actual shape and duration can only be determined by surveys and sampling.

b. Types of Biological Attacks. Biological attacks can be categorized into the following four groups, based on the means of delivery and wind speed (see Table F-1, page F-11).

(1) Type P. Type P consists of attacks with localized exploding munitions (such as bomb [BOM], shell [SHL], rocket [RKT], mine [MNE], surface burst missile [MSL]), surface release spray (SPR), or surface release aerosol generator (GEN).

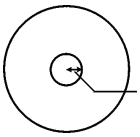
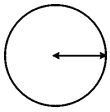
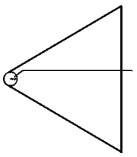
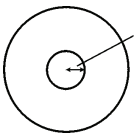
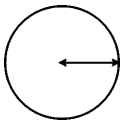
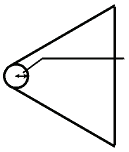
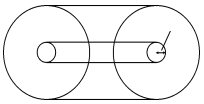
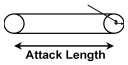
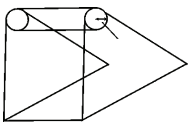
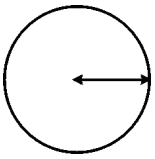
(2) Type Q. Type Q consists of attacks with munitions that cover a large area (such as bomblets [BML] or air burst MSL).

(3) Type R. Type R consists of attacks where the location of the attack is known, but the type of container is unknown (UNK), or the attack was from an air release SPR or GEN.

(4) Type S. Type S consists of detection after an unobserved attack.

NOTE: **A surface release SPR or GEN should be treated as Type R if it is mobile and releases material over a distance exceeding 1 km.**

Table F-1. Types and Cases of Attacks

Type Of Agent Container	Radius Of Attack Area*	Wind Speed	Type**	Case	Figure
BOM, RKT, SHL, MNE, Surface-burst MSL, Surface release SPR, or GEN	= 2KM	≤10 kph	P	1	
		>10 kph		2	
BML or Air-burst MSL	= 10KM	≤10 kph	Q	1	
		>10 kph		2	
Air release SPR and GEN or UNK	= 2KM 100 KM default	≤10 kph	R	1	
		>10 kph		2	
Detection after unobserved attack (NBC4 BIO message)	= 50KM		S	1/2	

NOTE: An NBC1 BIO report may be received after an unobserved attack and should be treated as an NBC4 BIO report.

***A different observed radius may be specified in GENTEXT.**

****If two types of attack are found, use the following order to determine which type of attack to use: Type R, Type Q, or Type P.**

c. Hazard Prediction. Before a detailed prediction can be made, the CBRN staff will determine the type of biological attack and the case. This information is crucial for the hazard prediction.

(1) Attack Location. Determine or estimate the location of the attack from the NBC1 BIO reports, and mark it on a map overlay.

(2) Attack Areas. Determine or estimate the type of attack from the NBC1 BIO reports. The attack area is plotted as outlined below.

(a) Type P. The attack area for Type P is drawn as a 2 km radius circle, centered at the release location.

(b) Type Q. The attack area for Type Q is drawn as a 10 km radius circle, centered at the release location.

(c) Type R. The attack area for Type R is defined by the line end points entered as two positions in set FOXTROT. A 2 km radius circle is drawn at the center position or at the two end positions, with tangents connecting the two circles together. If the flight direction cannot be established, assume it to be perpendicular to the wind direction. If only one position is reported in set FOXTROT, the line is 100 km, long-centered on this point, oriented in the direction of the aircraft trajectory, and centered at the middle of the observed flight path.

(d) Type S. The attack area for Type S is drawn as a 50 km radius circle, centered at the detection location. The attack area is unknown; this is only an initial area.

NOTE: The attack area for Types P, Q, or R may be reduced or enlarged based on the available information specified in GENTEXT. In computer-generated messages, this information will be formatted as RDS: XXX km, always using three digits for the radius (e.g., RDS: 045 km).

d. Downwind Travel Distances.

(1) Downwind Travel. The downwind travel distance is defined as the distance traveled by the center of the cloud. The downwind travel distance is broken into three segments corresponding to the three time periods of the NBC CDR as follows:

$$d_1 = u_1 t_1$$

$$d_2 = 2u_2$$

$$d_3 = u_3 * (4 - t_1)$$

Where—

d_1 = distance (in km) travelled within the first NBC CDR 2-hour period of the attack.

d_2 = distance (in km) travelled within the next NBC CDR 2-hour period.

d_3 = distance (in km) travelled within the third NBC CDR 2-hour period.

u_1 = wind speed (in kph) for the first NBC CDR 2-hour period following the attack.

u_2 = wind speed (in kph) for the next NBC CDR 2-hour period.

u_3 = wind speed (in kph) for the third NBC CDR 2-hour period.

t_1 = hours remaining after the attack or detection within the NBC CDR 2-hour period of validity corresponding to the attack.

(2) Special Cases.

- For any NBC CDR time periods where the wind speed is <10 kph, a value of 10 kph should be used for computations.

- Weather information may not be available for the full 6-hour period after an attack. If this is the case, the hazard distances can only be calculated for the time weather is available.

(3) Downwind Travel Distance. To calculate the downwind travel distance, perform the following steps:

- Step 1. If the attack or detection occurs in the first NBC CDR 2-hour time period, three downwind distances are calculated: d_1, using the first NBC CDR time period (set WHISKEYM); d_2, using the second NBC CDR time period (set XRAYM); and d_3, using the third NBC CDR time period (set YANKEEM).

- Step 2. If the attack or detection occurs in the second NBC CDR time period, downwind distances are calculated: d_1, using the second NBC CDR time period (set XRAYM) and d_2, using the third NBC CDR time period (set YANKEEM).

- Step 3. If the attack or detection occurs in the third NBC CDR time period, only d_1 can be calculated using set YANKEEM.

(4) Total Downwind Distance. The total downwind distance of the center of the biological cloud is the sum of the three distances:

$$DA = d_1 + d_2 + d_3$$

Where —

DA = total downwind distance in km.

(5) Leading and Trailing Edges. The leading and trailing edges for the current NBC CDR should also be computed, based on the downwind distance path and using the factors of 1.5 and 0.5, respectively:

$$DL = 1.5DA$$

$$DT = 0.5DA$$

Where—

DL = leading edge distance, in km

DT = trailing edge distance, in km

(f) Third Time Period. If only the third time period is applicable, it must be extended to include the leading edge:

$$DE = DL - d_1 - d_2$$

Where—

DE = extended distance (in km) traveled within the third NBC CDR 2-hour period.

e. Determining Initial Hazard Areas.

(1) Case 1 Attacks.

(a) Wind Speed. The wind speed is 10 kph or less, so a wind speed of 10 kph should be used.

(b) Radius of Hazard Area. The radius of the hazard area circle equals the attack area radius plus the product of a wind speed of 10 kph times the time in hours remaining after the attack or detection in the corresponding CDR time period. For example, in a Type P, Case 1 attack having a 2-hour travel duration, the hazard area radius would equal:

(time × wind speed) = radius for Case 1

(2 h × 10 km/h) + 2 km = 22 km

(c) Types P, Q, and S. A single hazard area circle will result for Types P, Q, and S. The area within this circle represents the hazard area. The attack area for Type S is drawn as 50 km.

(d) Type R. Two circles are drawn for Type R, with tangents drawn between the hazard area circles. The total enclosed area represents the hazard area.

(e) Downwind Distance. A value of zero is used for the downwind distance path, leading edge, and trailing edge computations for Case 1 attacks, since the wind direction is considered variable. The leading edge can be considered to be the edge of the hazard area circle.

(2) Case 2 Attacks.

(a) Downwind Direction. Determine the downwind direction from the NBC CDM. Draw a line through the center of the attack circle, oriented in the downwind direction.

(b) Type R. For a Type R release, choose one of the attack area circles. Calculate the downwind distance for the first period (d_1). The line should extend to distance d_1 in the downwind direction from the center of the circle. In the upwind direction along the same line, mark a distance equal to twice the attack circle radius.

(c) End of d_1. Draw a line perpendicular to the downwind direction line, at the downwind distance (d_1), and extending in both directions.

(d) Tangent Lines. Draw two lines tangent to the attack circle from the upwind point marked, extending until they intersect with the perpendicular line. These lines will form a 30° angle on either side of the downwind direction line.

(e) Type R. For a Type R release, repeat this procedure for the other attack area circle and connect the lower hazard area corners to enclose the combined downwind hazard area.

(f) Type S. For a Type S release, there is no hazard area plotted because the location and time of the release is unknown. A 50-km radius circle defines an area

where there is a risk of being exposed to the biological agent. Informing friendly units throughout the area of this risk should be considered. Before a hazard prediction can be carried out, reports are required from units in the area or survey teams. Once more information about the attack has been obtained, Type S attacks should then be treated as Type P, Q, or R.

f. Prediction of the Initial Hazard.

(1) Type P, Case 1 Attack (Figure F-4).

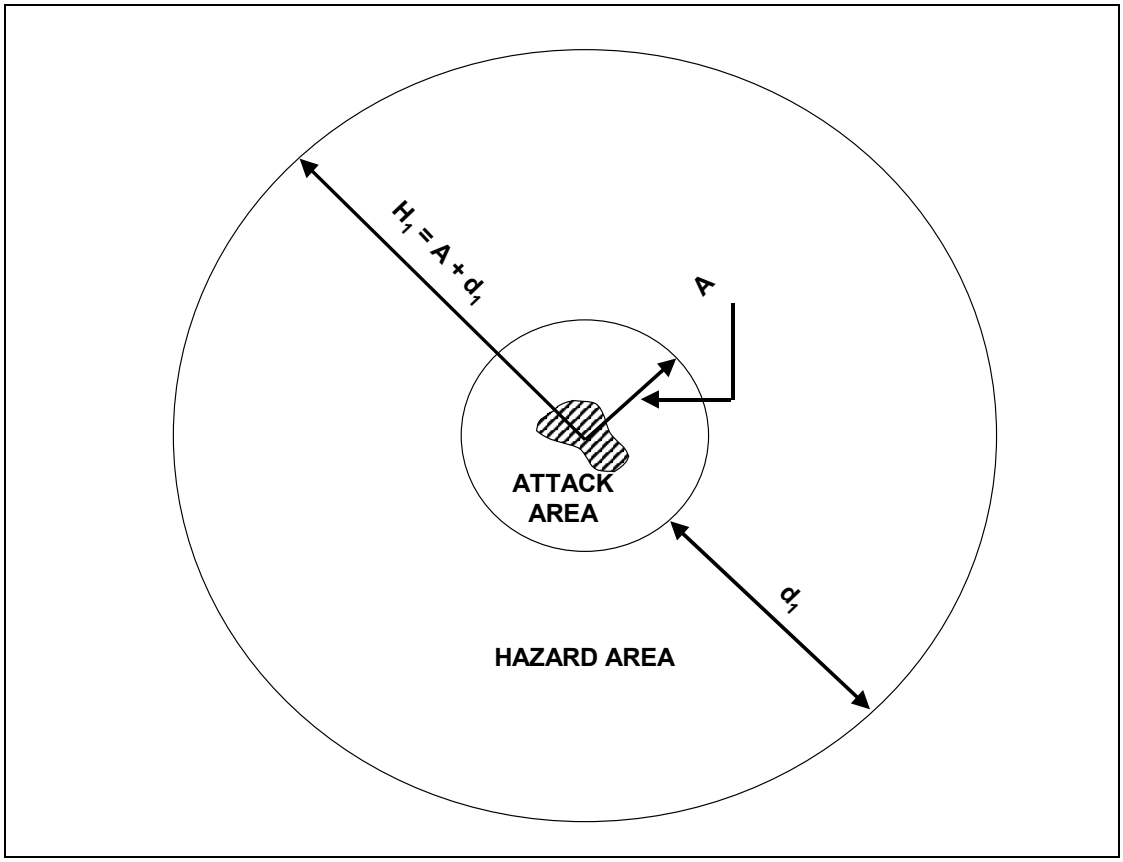


Figure F-4. Type P, Case 1, Attack

NOTE: A = radius of attack area, H_1 = radius of initial hazard area, d_1 = downwind travel distance in the CDR time period, t_1 = time remaining from attack in the CDR time period, u_1 = wind speed (10 kph), $H_1 = A + d_1$, $d_1 = u_1 \times t_1$. A wind speed of 10 kph is assumed.

(a) Step 1. Obtain the location of the attack from the relevant NBC BIO message (line FOXTROT), and plot it on the map.

(b) Step 2. Draw a circle with a radius (A) around the center of the attack location. The area within this circle represents the attack area.

(c) Step 3. Draw a circle with a radius (H_1) that equals the radius of the attack area (2 km) plus the downwind travel distance (d_1). Distance d_1 is equal to the wind speed (u_1) for the CDR time period, times the remaining time (t_1) from the attack within that CDR time period.

(d) Step 4. Prepare and transmit an NBC3 BIO report to units and installations in the predicted hazard area in accordance with SOPs, using the prediction in Figure F-4, page F-15.

(2) Type P, Case 2, Attack (Figure F-5).

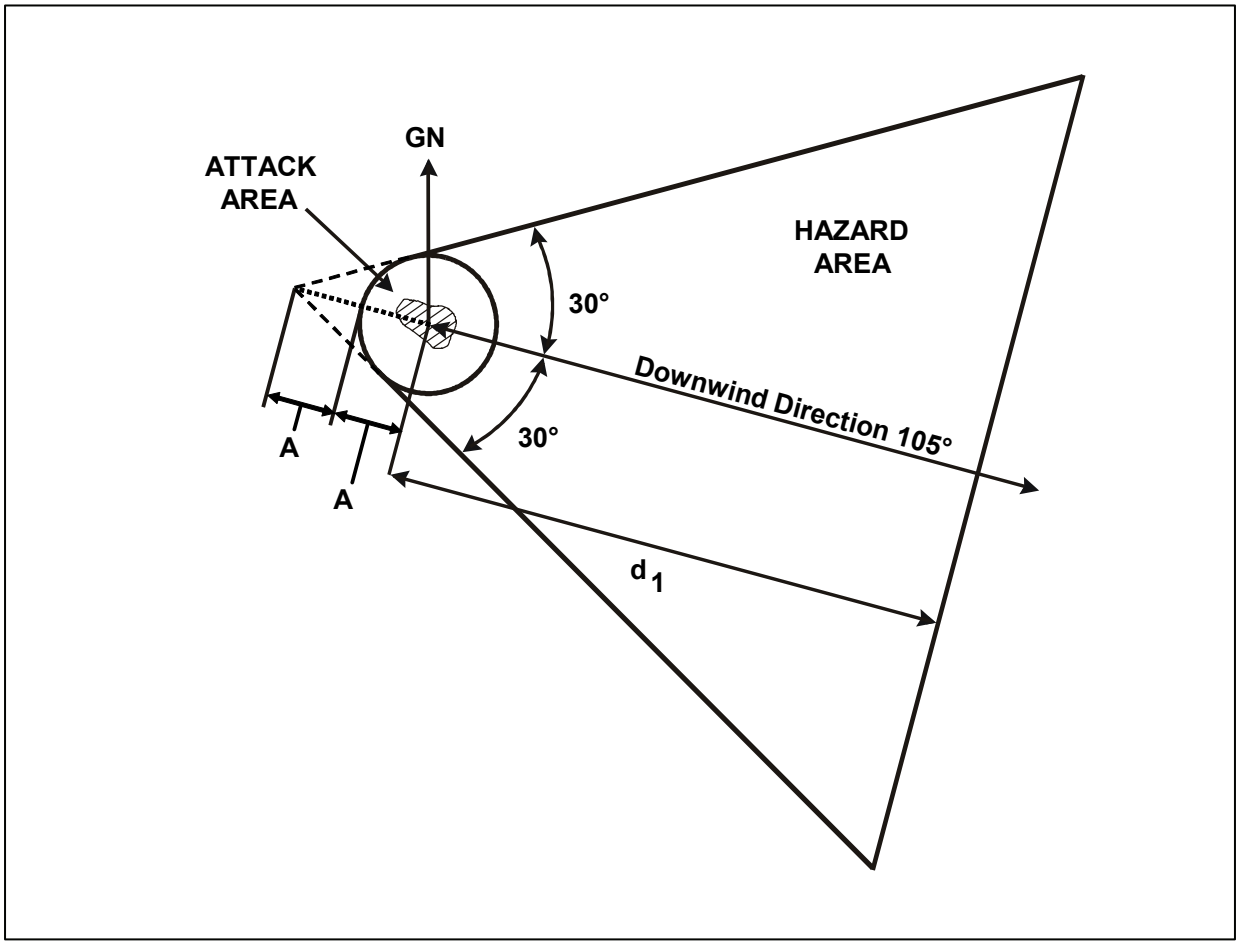


Figure F-5. Type P, Case 2, Attack

NOTE: A = radius of attack area, d_1 = downwind travel distance in the CDR time period, t_1 = time remaining from attack in the CDR time period, u_1 = wind speed, $d_1 = u_1 \times t_1$.

(a) Step 1. Obtain the location of the attack from the relevant NBC BIO message(s) (set FOXTROT), and plot it on the map (see Figure F-5).

(b) Step 2. From the center of the attack location, draw a GN line.

(c) Step 3. Draw a circle with the attack area radius around the center of the attack location. The area within this circle represents the attack area.

(d) Step 4. Using the valid NBC CDM, identify the downwind direction and the downwind speed.

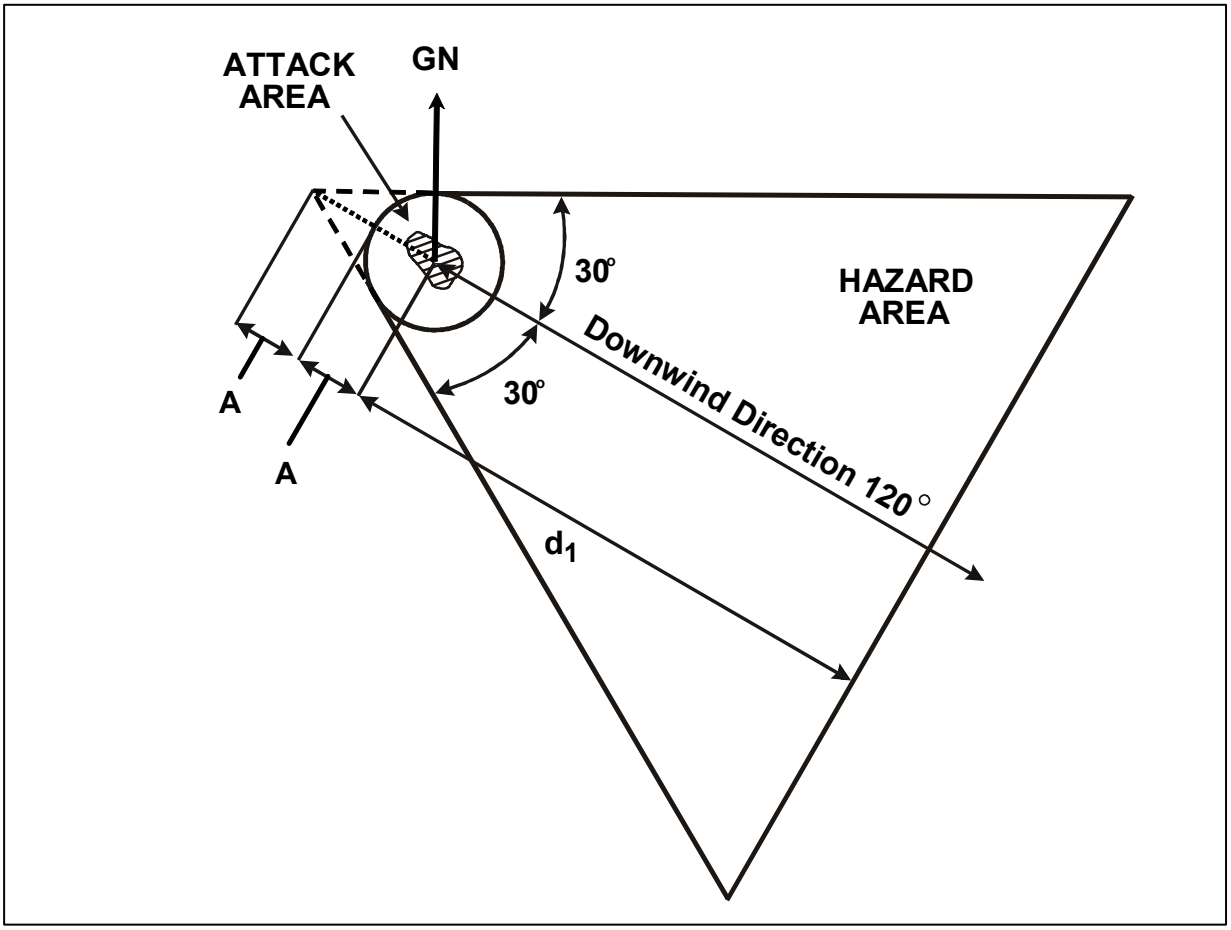


Figure F-7. Type Q, Case 2, Attack

NOTE: A = radius of attack area, d_1 = downwind travel distance in the CDR time period, t_1 = time remaining from attack in the CDR time period, u_1 = wind speed, d_1 = u_1 x t_1.

(a) Step 1. Obtain the location of the attack from the relevant NBC BIO message(s) (set FOXTROT) and plot it on the map (see Figure F-7).

(b) Step 2. From the center of the attack location, draw a GN line.

(c) Step 3. Draw a circle with the attack area radius around the center of the attack location. The area within this circle represents the attack area.

(d) Step 4. Using the valid NBC CDM, identify the downwind direction and the downwind speed.

(e) Step 5. From the center of the attack area, draw a line showing the downwind direction.

(f) Step 6. Determine the downwind travel distance (d_1) (see paragraph 7d(3), page F-13). If d_1 is less than the attack area radius, set it equal to the attack area radius.

(g) Step 7. Plot the downwind travel distance from the center of the attack area on the downwind direction line.

(h) Step 8. From the downwind travel distance, draw a line perpendicular to the downwind direction line. Extend the line to either side of the downwind direction line.

(i) Step 9. Extend the downwind direction line, twice the attack area radius, upwind from the center of the attack area. This is equal to twice the radius of the attack area.

(j) Step 10. From the upwind end of this line, draw two lines that are tangents to the attack area circle, and extend them until they intersect with the perpendicular to the downwind direction line. These lines will form a 30° angle on either side of the downwind direction line.

(k) Step 11. The hazard area is bound by—

- The upwind edge of the attack area circle.
- The two 30° tangents.
- The line perpendicular to the downwind direction line.

(l) Step 12. Prepare and transmit an NBC3 BIO report to units and installations in the predicted hazard area according to the SOP.

(5) Type R, Case 1, Attack (Figure F-8).

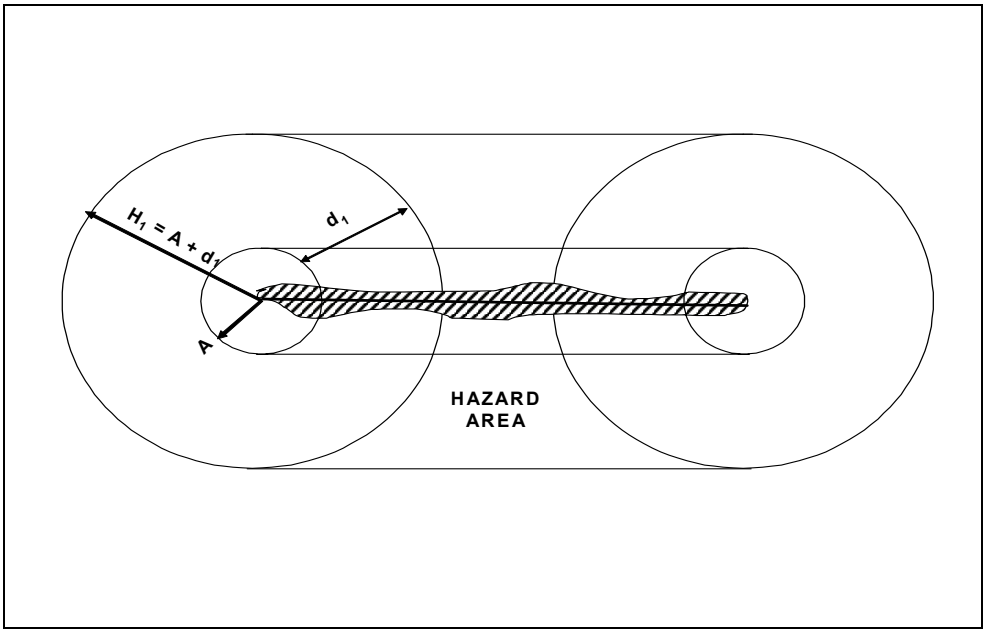


Figure F-8. Type R, Case 1, Attack

j. Hazard Duration. Upon confirmation of a specific biological agent or toxin, the expected duration of viability of the agent should be recorded in the second field of set PAPAA. The attack area radius computed for the current NBC CDR should be entered into the first field of set PAPAA. Agents may continue to be a hazard on the ground in the contaminated area from days to, potentially, years.

8. NBC4 BIO Report

The NBC4 BIO report (see Figure F-13) is the recorded result of an initial detection, reconnaissance, survey, or monitoring action at a location being checked for the presence of biological agents. Each line QUEBEC, ROMEO, SIERRA, TANGO, WHISKEY, YANKEE, and ZULU segment in every NBC4 BIO report is a record of one contamination sample point location, environment, time of reading, type and level of contamination, method of sampling, and local MET conditions. The NBC4 BIO report will often be far downwind of the attack area location as defined in the corresponding NBC2 and NBC3 BIO reports, since biological agents will most likely be detected as airborne contamination. An NBC4 BIO report can be assumed to be associated with the same attack if —

- It can be placed in the hazard area for an NBC3 BIO report between the expected earliest and latest times of arrival.
- It is within 10 km and 2 hours of another NBC4 BIO report, which has already been assigned to an attack.

NBC4 BIO Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/B//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/BIO/NP//
QUEBEC*	Location of reading/sample/detection and type of sample/detection	M	QUEBEC/32VNJ481203/-/DET//
ROMEO*	Level of contamination, dose rate trend and decay rate trend	O	ROMEO/20PPM//
SIERRA*	DTG of reading or initial detection of contamination	M	SIERRA/202300ZSEP1997//
TANGO*	Terrain/topography and vegetation description	M	TANGO/FLAT/URBAN//
WHISKEY	Sensor information	O	WHISKEY/POS/POS/NO/MED//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*Lines QUEBEC, ROMEO, SIERRA, and TANGO are a segment. With the exclusion of set ROMEO, this segment is mandatory. Sets/segments are repeatable up to 20 times in order to describe multiple detection, monitoring, or survey points.			

Figure F-13. Sample NBC4 BIO Report

9. NBC5 BIO Report

The NBC5 BIO report (Figure F-14) is prepared from the contamination plot. This report is last in order because it consists of a series of grid coordinates. Often, this message must be sent on the radio nets. This requires lengthy transmission. If an overlay is not sent, the recipient is required to plot each coordinate and redraw the plot. For NBC5 BIO reports, lines INDIA (release information), OSCAR (reference time), and XRAYA (actual contour information) are mandatory.

NBC5 BIO Report			
Line Item	**Description**	**Cond**	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/B//
DELTA	DTG of attack or detonation and attack end	O	DELTA/201405ZSEP1997//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/AIR/BIO/NP//
OSCAR	Reference DTG for estimated contour lines	M	OSCAR/201505ZSEP1997//
TANGO	Terrain/vegetation information	O	
XRAYA*	Actual contour information	M	XRAYA/LCT50/32VNJ575203/ 32VNJ572211/32VNJ560219/ 32VNJ534218/32VNJ575203//
XRAYB*	Predicted contour information	O	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*Sets are repeatable up to 50 times to represent multiple contours.			

Figure F-14. Sample NBC5 BIO Report

10. NBC6 BIO Report

This optional NBC BIO report is a narrative description of biological attacks that have occurred in the reporting unit AO. The NBC6 BIO report contains as much information as is known about the attacks. It is submitted only when requested.

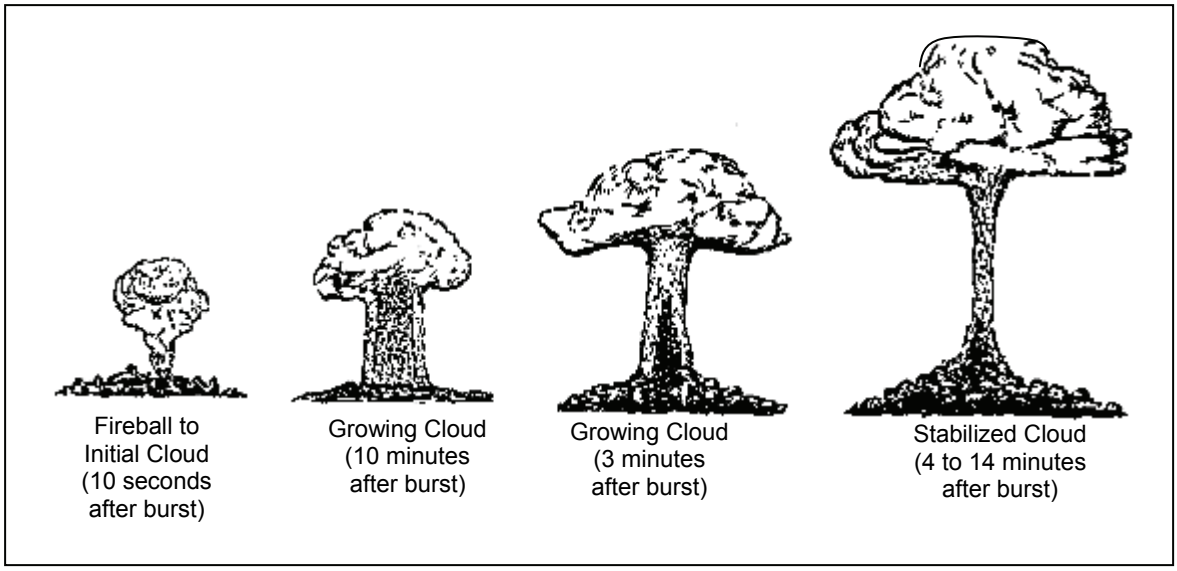


Figure G-2. Growth of a Nuclear Cloud

(4) Nuclear-cloud measurements (parameters) have been correlated with the yield of the weapon. This information can be extracted from nomograms and the ABC-M4A1 nuclear yield calculator. The use of the nomograms and the ABC-M4A1 is described in more detail later in this appendix.

(5) Unit SOPs detail the duties and circumstances concerning when and how measurements are taken. For accuracy, the following list of measurements (in order of reliability) is provided to aid in SOP development:

(a) Nuclear-burst angular cloud width at H+5 minutes.

(b) Stabilized cloud top or cloud bottom height at H+10 minutes.

(c) Stabilized cloud top or cloud bottom angle at H+10 minutes.

4. NBC1 NUC Report

The NBC1 NUC report can have the most far-reaching consequences of all NBC reports.

a. Introduction. The NBC1 NUC report (Figure G-3, page G-10) is the most widely used report. The observing unit uses this report to provide nuclear-attack data. All units must be familiar with the NBC1 NUC report format and its information. The unit must prepare this report quickly and accurately and send it to the next higher HQ. The battalion (squadron) and higher elements decide which NBC1 NUC reports to forward to the next higher HQ. If several reports are received on the same nuclear attack, then a consolidated NBC1 NUC report is forwarded instead of separate reports. This reduces the number of reports to a manageable level. The data in an NBC1 NUC report is used to locate GZ and to determine the yield of the nuclear burst.

NBC1 NUC Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike Serial Number	Will be assigned by the appropriate CBRN cell	
BRAVO	Location of observer and direction of attack or event	M	BRAVO/32UNB062634/2500MLG//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP2005//
FOXTROT	Location of attack or event	O	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/SUS/AIR/1/BOM/1//
HOTEL	Type of nuclear burst	M	HOTEL/SURF//
JULIET	Flash-to-bang time, in seconds	O	JULIET/57//
LIMA	Nuclear-burst angular cloud width at H+5 minutes	O	LIMA/18DGT//
MIKE	Stabilized cloud measurement at H+10 minutes	O	MIKE/TOP/33DGT/9KM//
PAPAC	Radar-determined external contour of radioactive cloud	O	
PAPAD	Radar-determined downwind direction of radioactive cloud	O	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*The Cond column shows that each line item is operationally determined (O) or mandatory (M).			

Figure G-3. Sample NBC1 NUC Report

(1) Purpose. The purpose of the NBC1 NUC report is to provide nuclear-attack data.

(2) Message Precedence. The first time a nuclear weapon is used against US forces, the designated unit will send the NBC1 NUC report with a FLASH precedence. If a previous NBC1 NUC report has been forwarded, an IMMEDIATE precedence will be used.

b. Observer Position. Use universal transverse mercator (UTM) coordinates latitude (LAT) and longitude (LONG) or a place name. Enter this location on line BRAVO of the NBC1 NUC report. Line BRAVO is required on all reports from ground observers and should be encoded. This is the location of the angle-measuring equipment. It may or may not be the unit location. The direction of the attack from the observing unit is also reported on this line.

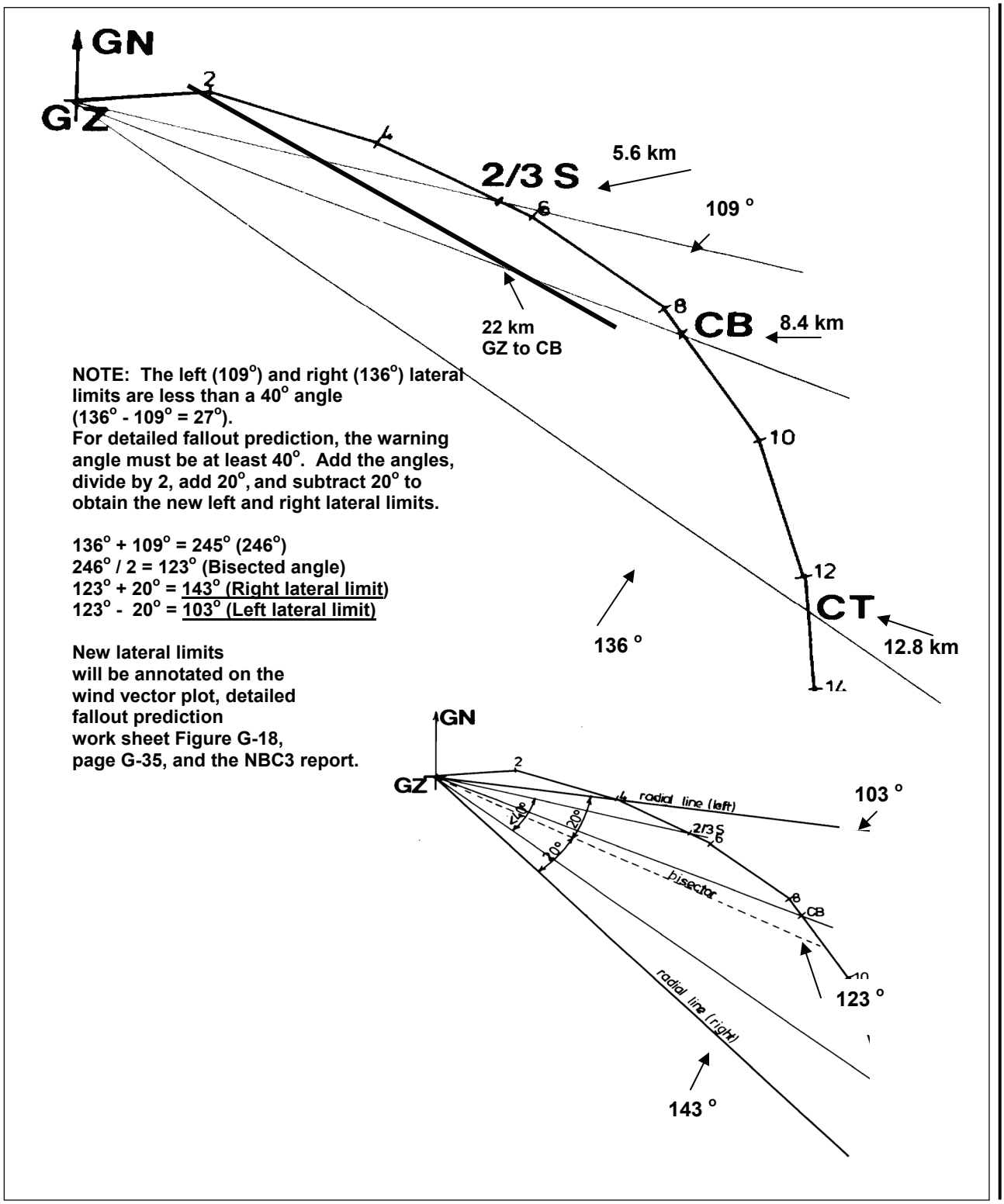


Figure G-19. Wind Vector Plot with Cloud and Stem Radial Lines (50 KT) (Example)

g. Detailed Fallout Prediction.

(1) Purpose. The purpose of the detailed fallout prediction is to provide the subordinate units an immediate warning of the predicted contamination resulting from a nuclear detonation. The commander will use the detailed fallout prediction in the tactical decision-making process.

(2) Procedures. The CBRN cell is responsible for preparing and plotting the detailed fallout predictions. The fallout prediction work sheet provides the CBRN cell with a standard work sheet for recording the nuclear burst (surface) information data. Completing the fallout prediction work sheet is the first step in drawing the prediction. Use the steps listed below to complete the work sheet.

(a) Step 1. Obtain a current wind vector plot. Before any bursts occur, the wind vector plots are drawn. Refer to Appendix D for detailed information regarding wind vector plotting (see Figure G-19, page G-37).

(b) Step 2. Complete a detailed fallout prediction work sheet. Using an NBC2 NUC report, determine the nuclear-burst information. Record this information on the work sheet (see Figure G-20).

- Lines ALFA, BRAVO, and ECHO are transcribed from the NBC2 NUC report.
- Lines CHARLIE and DELTA are used if the enemy burst or friendly burst data is unknown. When enemy or friendly burst information is unknown, assume that a worst case (100 percent fission yield [FY]) scenario has occurred and enter a 1 on line CHARLIE. When the height of burst (HOB) is unknown, enter a 0 (zero) on line DELTA, which represents a worst case HOB.
- A friendly burst with known data information will come from the fire support element (target analyst) delivering the weapon. The data will include the weapon yield, FY/total yield (TY) ratio, HOB, GZ coordinates, DTG of the attack, and strike serial number.

(c) Step 3. Determine the cloud parameters. Using the yield of the weapon from line ECHO and the nomogram (Figure G-21, page G-40), locate the yield on the right- or left-hand scale. Place a straightedge (hairline) on the yield, and align the values on both scales. Read and record all cloud parameter values on lines FOXTROT through JULIET of the fallout prediction work sheet.

NOTE: The following steps are exactly the same as the steps used in making an EDM (refer to Appendix D for more information regarding EDMs).

(d) Step 4. Determine the lateral limits of the prediction using the wind vector plot. Mark the points representing the cloud top height and the two-thirds stem height. Draw radial lines from the GZ point through these height points.

NOTE: If the wind vectors between the two-thirds stem height point and the cloud top height point fall outside the radial lines drawn from GZ, expand the angle formed by these two radial lines to include these outside wind vectors.

(1) Purpose. The purpose of the NBC3 NUC report is to report immediate warning of the predicted contamination and hazard areas to higher, subordinate, and adjacent units.

(2) Message Precedence. All other messages, after the initial NBC1 NUC report has been sent, should be given a precedence, which reflects the operational value of the contents. Normally IMMEDIATE would be appropriate.

NBC3 NUC Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	M	ALFA/US/A234/001/N//
DELTA	DTG of attack or detonation and attack end	M	DELTA/201405ZSEP2005//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	O	GOLF/SUS/AIR/1/BOM/4//
HOTEL	Type of nuclear burst	O	HOTEL/SURF//
NOVEMBER	Estimated nuclear yield, in KT	O	NOVEMBER/50//
OSCAR	Reference DTG of contour lines	O	
PAPAB	Detailed fallout hazard prediction parameters	M	PAPAB/019KPH/33KM/5KM/ 272DGG/312DGG//
PAPAC	Radar-determined external contour of radioactive cloud	O	PAPAC/32VNJ456280/32VNJ456119/ 32VNJ556182/32VNJ576200/ 32VNJ566217/32VNJ456280//
PAPAD	Radar-determined downwind direction of radioactive cloud	O	PAPAD /030DGT//
XRAYB*	Predicted contour information	C	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*The Cond column shows that each line item is operationally determined (O), mandatory (M), or conditional (C). **Note: XRAYB is prohibited if OSCAR is not used.**			

Figure G-26. Sample NBC3 NUC Report

b. Plotting Detailed Fallout Predictions (NBC3 NUC) (see Figure G-27, page G-48).

(1) Step 1. Identify the map scale to be used. Obtain a sheet of overlay paper or other transparent material. Mark a GZ location and GN.

(2) Step 2. Examine line PAPAB. Starting at the GZ location, draw the left (dddd) and right (cccc) radials line measured from GZ.

(3) Step 3. From line PAPAB, determine the downwind distance of

Zone I (xxx).

(a) Starting from GZ, draw an arc between the radial lines with a radius equal to the distance of Zone I. Label this area Zone I.

(b) Draw a second arc between the radial lines at twice the radius as the downwind distance of Zone II. Label this area Zone II.

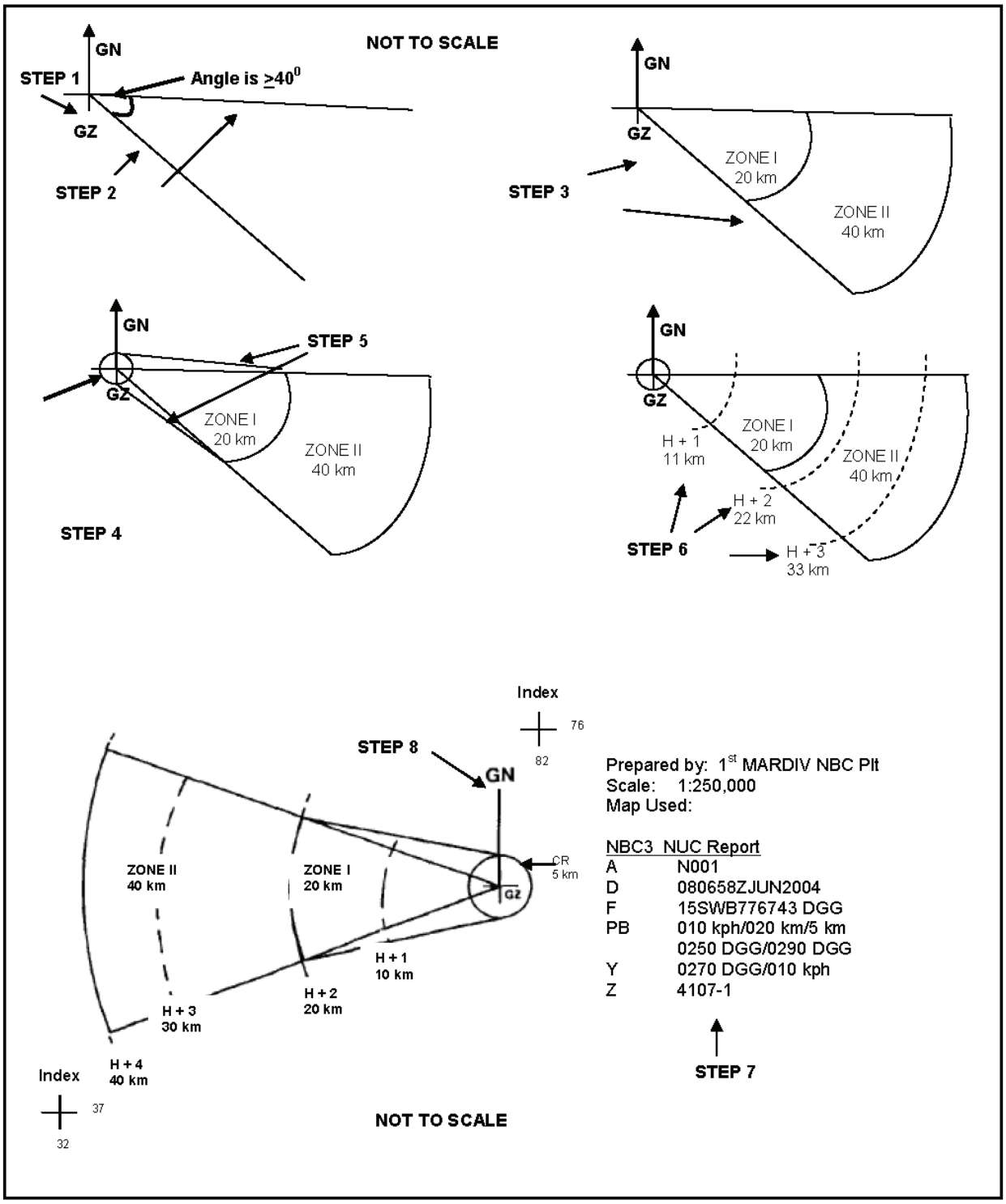


Figure G-27. Detailed Fallout Prediction

d. Time of Completion of Fallout.

(1) Most contaminated particles in a radioactive cloud rise to considerable heights. Therefore, fallout may occur over a large area. It may also last for an extended period of time. A survey conducted before the fallout is complete would be inaccurate because contaminants would still be suspended in the air. For this reason (and the hazard to surveying personnel), nuclear surveys are not conducted before completion of fallout.

(2) An estimate of the time of completion (T_{comp}) of fallout for a particular location may be determined using a mathematical equation. The time (in hours) after a burst when the fallout will be completed at any specific point is approximately 1.25 times the time of fallout arrival (in hours after burst). Add the time (in hours) required for the nuclear cloud to pass over. This is expressed by using the following formula:

$$T_{comp} = (1.25 \times T_{arrival}) + \frac{(2 \times \text{cloud radius})}{\text{EWS}}$$

Example: For a given location, the following data has been determined:

- Time of detonation = H.
- Time of arrival = H+2 hours (time of arrival is determined by dividing the distance from GZ to the given point by the EWS).
- Cloud diameter = 4 km (2 x cloud radius) (cloud diameter/radius [rr] is determined from Figure G-20, page G-39, or from line item PAPAB of the NBC3 NUC report).
- EWS = 20 kph (EWS [sss] is determined from Figure G-19, page G-38, or from line item PAPAB of the NBC3 NUC report).

$$T_{comp} = (1.25 \times 2 \text{ hr}) + \frac{4 \text{ km}}{20 \text{ kph}}$$

$$T_{comp} = 2.5 \text{ hr} + 0.2 \text{ hr}$$

$$T_{comp} = 2.7 \text{ hr}$$

Therefore, fallout for the given location is expected to be complete by H+2.7 hours.

NOTE: To convert 2.7 hours into clock time, multiply 0.7 by 60. The product in this example is 42. Therefore, T_{comp} is 2 hours and 42 minutes.

(3) The actual completion of fallout can be determined if a peak NBC4 NUC report is received from the AOI. For detailed information regarding nuclear reconnaissance, monitoring, and survey, refer to *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance.*

8. NBC4 NUC Report

The NBC4 NUC report is a key tool used by units to define the type and extent of the contamination.

a. Locating and Reporting Nuclear Contamination.

(1) Fallout predictions provide a means of defining possible areas of a nuclear contamination. Militarily significant fallout is expected to occur only within the predicted area. However, the prediction does not indicate exactly where the fallout will occur or what

the dose rate will be at a specific location. Rainout or washout can also increase nuclear contamination on the ground, creating local hot spots. Areas of neutron-induced radiation can also be caused by low air bursts.

(2) Before planning operations in a nuclear environment, commanders must be aware of these residual contamination hazards. The information required for such planning is derived from the equations and nomograms given in the following sections and in Appendixes J and K. The basic information needed is contained in NBC4 NUC reports. They provide information on the actual measured contamination in the form of dose rates.

b. Message Precedence. All other messages, after the initial NBC1 NUC report has been sent, should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate (see Figure G-30 for a sample NBC4 NUC report).

NBC4 NUC Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/N//
KILO	Crater description	O	KILO/UNK//
QUEBEC	Location of reading/sample/detection and type of sample/detection	M	QUEBEC/32VNJ481203/GAMMA/-//
ROMEO	Level of contamination, dose rate trend and decay rate trend	M	ROMEO/7CGH/DECR/DN//
SIERRA	DTG of reading or initial detection of contamination	M	SIERRA/202300ZSEP1997//
TANGO	Terrain/vegetation information	O	
WHISKEY	Sensor information	O	WHISKEY/POS/POS/YES/HIGH//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	-
*The Cond column shows that each line item is operationally determined (O) or mandatory (M).			

Figure G-30. Sample NBC4 NUC Report

(1) The location is sent as UTM or LAT/LONG grid coordinates; the level of contamination reading is expressed in cGy/h.

(2) Lines QUEBEC, ROMEO, and SIERRA may be repeated as many times as necessary to give a specific picture of the contamination throughout an area. A zero dose rate may also be reported on line ROMEO, and it is an extremely valuable piece of information in determining the extent and duration of the contamination.

(3) Only outside unshielded dose (OD) rates are reported by the unit, and the DTG is reported in Zulu time. Certain abbreviations are associated with the dose rate to describe the circumstances surrounding the contamination. Note that the definition of line ROMEO includes information on the dose rate trend and the relative or actual radiation decay rate. The dose rate must be reported, while the latter two items are optional. They require evaluation, which may be done above unit level. A monitor cannot provide this information.

c. Shielding. Shielding reduces the effects of gamma radiation on personnel and equipment. The denser the material is, the better the shield. Low-density materials are as effective as higher-density materials when the total thickness of the low-density material is increased. It is not possible for gamma radiation to be completely absorbed. However, if enough material is placed between the individual and the radiation source, the dose rate can be reduced to negligible proportions.

(1) Shielding Principles.

(a) Density. Density is defined as the number of molecules or mass per unit of volume.

(b) Half-Thickness. This is the amount of material required to reduce the dose rate by one-half. See Table G-2 for selected half-thicknesses.

Table G-2. Half-Thicknesses (X ½) of Materials

Material	Half-Thickness (Inches)
Steel	0.7
Concrete	2.2
Earth	3.3
Wood	8.8

(c) Total Thickness. This is the actual thickness of the shielding material.

(d) Position of the Shield. The closer the shield is to the source, the better.

(e) Dose Rate Buildup. The dose rate buildup is produced by the shield. The shield causes radiation to scatter; therefore, the closer to the shield, the higher the dose rate.

(2) Shielding Materials.

(a) Earth. Earth is the most common shielding material. About 1 foot of earth makes an adequate shield.

(b) Concrete. About 6 to 8 inches of concrete makes a good shield.

(c) Steel. Tanks and amtracks are very good shields against radiation.

(d) Buildings. Wood or brick buildings make good shields.

(3) Effectiveness. The effectiveness of a given material in decreasing radiation intensity is measured in units of half-value layer thickness (half-thickness). This unit is

defined as the thickness of any material which reduces the dose rate of gamma radiation to one-half its unshielded value.

NOTE: **If personnel are surrounded by a 6-inch concrete wall (half-thickness) and the gamma radiation outside is 200 cGy/h, they would receive gamma radiation at the rate of 100 cGy/h. The addition of another 6 inches reduces the rate to 50 cGy/h. Each succeeding half-thickness of concrete would reduce the radiation.**

d. Measuring Nuclear Data.

(1) Measurements of nuclear data must be taken in accordance with the unit SOP. Measurements can be taken directly from an unshielded position if dose rates are low enough or from a shielded position, such as a shelter or vehicle.

(2) When the indirect technique is used, most of the readings are taken inside the vehicle or shelter. However, at least one outside reading is necessary to determine the TF, which relates the readings inside to the unshielded values outside. The latter readings are to be reported since they are necessary for further calculations pertaining to troops in the open or other vehicles or shelters.

(3) To determine the TF, both the inside and outside readings must be taken after fallout is complete. Calculate the TF using the following formula:

$$TF = \frac{\text{inside shielded dose (ID) rate}}{\text{OD rate}}$$

NOTE: The TF is always less than 1. It can be determined from the measurement of the dose.

(4) The readings taken inside the vehicle or shelter represent the ID. These readings must be converted to OD before reporting. Readings are converted using the following formula:

$$OD = ID / TF$$

(5) A precalculated list of TFs is contained in national manuals, an example of which is shown in Table G-3. This information is <u>not</u> used by unit CBRN defense personnel when calculating or reporting OD rates. Its principal use is to establish the relative shielding ability of one shelter, structure, or vehicle as compared to another. It is also used for instructional and practice purposes.

(6) These factors are for the most exposed, occupied location. They are not based on dose rates from fallout; they are based on gamma radiation from cobalt-60. Since cobalt-60 radiation is almost twice as strong as the radiation from fallout, the actual TF should be much lower (more protection).

(7) In some cases the term CF is used. It is always the reciprocal of the TF. The formula to convert a TF to a CF is:

$$CF = \frac{1}{TF} = \frac{OD}{ID}$$

(8) Determination of Decay Rate for Induced Radiation. Decay characteristics of an induced radiation are considerably different from those of a fallout. The Kaufmann equation may not be applied.

(a) The decay of induced radiation depends on the elements in which it is induced. Soil contains many different elements with varying half-lives, so the decay rate changes in time and must be monitored constantly.

(b) The decay rate (n) at a fixed location can only be determined from consecutive measurements, using the following equation:

$$\frac{1}{t} \text{ X } 1n \left(\frac{R_a}{R_a + t} \right)$$

(c) R_a is the dose rate reading in cGy/h at an arbitrary time and (Ra + t) is a second reading taken at the same location after t hours.

(d) Manganese and sodium are two elements with relatively long half-lives that are frequently found in soils. Therefore, they are expected to be the principal sources of radiation after a burst. For sodium, with its half-life of 15 hours, the decay rate is 0.046. For manganese, with its half-life of 2.6 hours, the decay rate is 0.27.

(9) Determination of Dose Rate for Arbitrary Time. The dose rate (R_1+t), in cGy/h, at an arbitrary time (t hours) after a reading is calculated as—

$$R_1 + t = Ra^{(-n \text{ x } t)}$$

R_a is the dose rate at the time (t) of the reading, n is the decay rate at that time, and EXP () is the exponential function (inverse or INV; the argument is the power to which e=2.71828…is raised).

(10) Determination of Dose Accumulated in Neutron-Induced Area. The dose D, in cGy, accumulated between entry to and exit from a neutron-induced gamma activity (NIGA) area is found by using the formula—

$$D = R_1/n(^{(-n \text{ x } t_{in})} - (-n \text{ x } t_{out}))$$

R_1 is the dose rate in cGy/h at the reference time, n is the decay rate at that time, t_{in} and t_{out} are the time of entry and exit from the NIGA area, in hours, after the reference time.

(11) Determination of Earliest Time of Entry. To ensure that a limiting dose (DL) is not accumulated during a stay in an NIGA area, the earliest time of entry (t_{in}) can be determined as follows:

$$T_e = -1/n * (DL/(R * n * (1^{-(-n * T_s)}).$$

T_S = Time of stay in the area in hours

R = Dose rate at the reference time H+1

n = Decay rate at that time

(12) Determination of Time of Exit from Neutron-Induced Area Given a Maximum Dosage. If a certain limit DL for the dose accumulated during a stay in an NIGA

area is given, the time (t_{out}) to leave the area can be determined from the following equation:

$$T_{out} = -1/n*n(^{(-n*T_e)-(n*DL)/R_1})$$

T_e = Time of entry, in hours, after the reference time at which the dose rate was R_1 and the decay rate was D.

11. NBC6 NUC Report

The NBC6 NUC report (Figure G-42) provides commanders and staff with detailed information that is vital to the operation.

a. Purpose. The NBC6 NUC report is used to provide detailed information on a nuclear attack. The NBC6 NUC report is submitted to higher HQ. It is written in narrative form with as much detail as possible.

b. Message Precedence. All other messages, after the initial NBC1 NUC report has been sent, should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate.

NBC6 NUC Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	O	ALFA/US/A234/001/N//
DELTA	DTG of attack or detonation and attack end	O	DELTA/201405ZSEP2005//
FOXTROT	Location of attack and qualifier	O	FOXTROT/32UNB058640/EE//
QUEBEC	Location and type reading/sample/ detection	O	QUEBEC/32VNJ481203/GAMMA/-//
ROMEO	Level of contamination, dose rate trend, and decay rate trend	O	ROMEO/7CGH/DECR/DN//
SIERRA	DTG of reading	O	SIERRA/202300ZSEP2005//
GENTEXT	General text	M	GENTEXT/NBCINFO/WEAPON YIELD ESTIMATED FOR EVALUATION OF COLLATERAL DAMAGE PURPOSES ONLY//
*The Cond column shows that each line item is operationally determined (O) or mandatory (M).			

Figure G-42. Sample NBC6 NUC Report

information concerning this collection effort is addressed in *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance.*

c. Evaluating ROTA Information. After the ROTA information has been collected, it is evaluated. It is then used as battlefield intelligence. The CBRN cell is the primary evaluation center. The units and intermediate HQ use this raw data to develop ROTA intelligence for their own use until detailed results are available from the CBRN cell.

d. Transmitting ROTA Information. The procedures used to transmit ROTA information to and from the CBRN cell are an important part of the IM. The method of transmitting information depends on the tactical situation and mission of the unit. Refer to Chapter III for more detailed information.

4. NBC1 ROTA Report

The NBC1 ROTA report (Figure H-1, page H-6) is the most widely used report. The observing unit uses this report to provide ROTA data. All units must be completely familiar with the NBC1 ROTA report format and its information. The unit must prepare this report quickly and accurately and send it to the next higher HQ. Battalion (squadron) or the service equivalent and higher elements decide which NBC1 ROTA reports to forward to the next higher HQ. If several reports are received for the same ROTA event, a consolidated NBC1 ROTA report is forwarded. This reduces the number of reports to a manageable level.

a. Purpose. The purpose of the NBC1 ROTA report is to provide ROTA data.

b. Precedence. The first time a ROTA event occurs, the designated unit will send the NBC1 ROTA report with a FLASH precedence. If a previous NBC1 ROTA report has been forwarded, an IMMEDIATE precedence will be used.

c. Information Included. The report will include lines BRAVO, CHARLIE, GOLF, INDIA, and TANGO and may include line items ALFA, FOXTROT, MIKER, YANKEE, ZULU, and GENTEXT with the information as currently described for CBRN reports. Line CHARLIE provides the same information as line DELTA, except it indicates an observed ROTA event rather than an observed attack. Line GOLF will include the type of delivery if applicable, the ROTA type of container (e.g., bunker, waste, reactor, transport, stockpile), and the size of the release (small, large, or extra large) if appropriate. Line INDIA will indicate the observed release height and indicate the type of release as ROTA nuclear power plant, TIM, or the agent name or identification number. Line INDIA will indicate the material persistency. Additional descriptive entries for a ROTA event can be entered into line MIKER. Line TANGO will indicate a description of the terrain/topography and the vegetation. Lines YANKEE and ZULU may indicate locally observed weather. Line GENTEXT will provide the specific chemical compound or the type of biological agent if available.

d. Preparation. Determine the line items for this report by using the same procedures as the previous contamination avoidance TTP appendixes per the type of attack or event.

NBC1 ROTA Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	O	
BRAVO	Location of observer and direction of attack or event	M	BRAVO/32UNB062634/2500MLG//
CHARLIE	DTG of report or observation and end of event	M	CHARLIE/281530ZSEP2005//
FOXTROT	Location of attack or event	O	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/SUS/TPT/1/TNK/SML//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/SURF/2978/-/MPDS//
MIKER	Description and status	O	MIKER/LEAK/CONT//
TANGO	Terrain/topography and vegetation description	M	TANGO/URBAN/URBAN//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*The Cond column shows that each line item is operationally determined (O) or mandatory (M).			

Figure H-1. Sample NBC1 ROTA Report

5. NBC2 ROTA Report

The NBC2 ROTA report reflects the evaluated ROTA data. It is based on one or more NBC1 ROTA reports. Users of the NBC2 ROTA reports are not limited to the use of the line items shown in Figure H-2. Other line items may be added as appropriate.

a. Purpose. The purpose of the NBC2 ROTA report is to pass the evaluated data to higher, subordinate, and adjacent units.

b. Precedence. All messages, after the initial NBC1 ROTA report has been sent, should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate.

c. Preparation. The division (or designated higher HQ) CBRN cell prepares the NBC2 ROTA report, assigns a strike serial number, and disseminates the report to the appropriate unit.

d. Subsequent Data. Subsequent data may be received after the NBC2 ROTA report is sent. Use the same strike serial number and DTG of the attack or incident. Determine the line items for this report using the same procedures as the previous contamination avoidance TTP appendixes per the type of attack or event.

NBC2 ROTA Report			
Line Item	**Description**	**Cond.**	**Example**
ALFA	Strike serial number	M	ALFA/US/WEP/001/RN//
CHARLIE	DTG of report /observation and event end	M	CHARLIE/281530ZSEP2005/ 281545ZSEP1997//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	M	GOLF/SUS/TPT/1/TNK/1//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/SURF/2978/-/MPDS//
MIKER	Description and status	M	MIKER/LEAK/CONT//
TANGO	Terrain/topography and vegetation description	M	TANGO/URBAN/URBAN//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*The Cond column shows that each line item is operationally determined (O) or mandatory (M).			

Figure H-2. Sample NBC2 ROTA Report

6. NBC3 ROTA Report

The NBC3 ROTA report reflects the predicted areas of contamination. It is based on the NBC2 ROTA report and any current relative data. Users of the NBC3 ROTA reports are not limited to the use of the line items shown in Figure H-3, page H-8. Other line items may be added as appropriate.

a. Purpose. The purpose of the NBC3 ROTA report is to report the immediate warning of the predicted contamination and hazard areas to higher, subordinate, and adjacent units.

b. Precedence. All messages after the initial NBC1 ROTA report has been sent should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate.

c. Preparation. The report will use the information as described in this manual for lines ALFA, CHARLIE, FOXTROT, GOLF, INDIA, MIKER, OSCAR, PAPAA, PAPAX, TANGO, XRAYB, YANKEE, ZULU, and GENTEXT. The hazard area location is described in line PAPAX, with the defining release area radius and protective action distance summarized in line PAPAA. Determine the line items for this report using the same procedures as the previous contamination avoidance TTP appendixes per the type of attack or event.

NBC3 ROTA Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	M	ALFA/US/WEP/001/RN//
CHARLIE	DTG of report /observation and event end	M	CHARLIE/281530ZSEP2005//
FOXTROT	Location of attack or event	M	FOXTROT/32UNB058640/EE//
GOLF	Delivery and quantity information	O	GOLF/SUS/TPT/1/TNK/1//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/SURF/2978/-/MPDS//
MIKER	Description and status of ROTA event	O	MIKER/SPILL/CONT//
OSCAR	Reference DTG for contour lines	O	
PAPAA	Predicted attack/release and hazard area	M	PAPAA/1000M/-/5KM/-//
PAPAX**	Hazard area location for weather period	M	PAPAX/081200ZSEP1997/ 32VNJ456280/32VNJ456119/ 32VNJ576200/32VNJ566217/ 32VNJ456280//
TANGO	Terrain/vegetation information	O	
XRAYB***	Predicted contour information	C	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	

*The Cond column shows that each line item is operationally determined (O) or mandatory (M).

**Line item is repeatable up to three times in order to describe three possible hazard areas corresponding to the time periods from the CDM. A hazard area for a following time period will always include the previous hazard area.

***Line item is repeatable up to 50 times to represent multiple contours.

Note: XRAYB is prohibited if OSCAR is not used.

Figure H-3. Sample NBC3 ROTA Report

d. Types of Releases. There may be chemical, biological, and/or radiological material present in any AO, which will present a hazard to persons if it is released into the atmosphere. Releases may be accidental or intentional. The amount of material released may be small or extremely large. Such ROTA events can be divided into two types based on their origin:

(1) Type N, ROTA Nuclear. Nuclear material can be released into the atmosphere from the core of a nuclear reactor, has been damaged or which has gone out of control. Similar incidents may occur at nuclear-fuel reprocessing or production facilities. Such a release can result in very high levels of radiation, covering distances of hundreds of km.

(2) Type T, TIM. There are five cases of incidents under Type T. These cases include items that may be used or stored for use for industrial, commercial, medical, military, or domestic purposes. TIM may be TIC, TIB, or TIR.

(a) Case 1, Nuclear-Waste or Radiological-Material Storage. Damage to a nuclear-waste or radiological-material storage facility may result in the release of radiological material into the atmosphere. Such a release will result in LLR covering a fairly short distance, which will be dangerous to anyone remaining in the hazard area for an extended period of time.

(b) Case 2, RDD. The intentional release of large amounts of radiological material can result in hazardous areas extending far downwind.

(c) Case 3, Biological Bunker or Production Facility. Damage to a storage bunker containing biological agents intended for use in BW or to production facilities for such agents containing active agent containers will result in smaller release areas and lower quantities than if agents had been dispersed from a weapon. However, due to the toxicity of such agents and the likelihood of having an elevated plume, dispersed material may travel downwind at hazardous levels for many hours.

(d) Case 4, Chemical Stockpile or TIM Transport/Storage. Damage to stockpiled munitions containing chemical agents will result in considerably smaller quantities of agent released than the intentional use of munitions; therefore, the downwind hazard area will usually be smaller than for a chemical attack. Damage to containers of TIM being transported by road, rail, or boat can result in large quantities released into the atmosphere. However, the toxicity and stability of these materials will be less than for chemical agents and the hazard areas will also be smaller than for a chemical attack. This category also includes small storage quantities and single munitions found leaking on the battlefield.

(e) Case 5, Bulk Chemical Storage. TIC are stored in very large quantities (greater than 1,500 kg) in large tanks, often under pressure and at low temperatures. A catastrophic rupture of such a tank will result in a highly toxic cloud, which usually exhibits dense-gas behavior. This type of release may also occur intentionally by a terrorist or other deliberate action. Such a cloud will not travel with the wind until after its concentration has been reduced considerably, often when it is below toxic levels. In addition to their toxicity, TIC are often corrosive, flammable, explosive, or able to react violently with air or water. These hazards may be greater than the immediate toxic effects.

e. Procedures and Constraints.

(1) Procedures.

(a) Record and update the following information:

- Weather information from relevant CBRN commanders, which may contain forecast data and measured data.
- Weather information from local measurements and observations, which may contain data before and during the cloud passage period.
- A database of local meteorology measured during the cloud passage period.

(b) Record the terrain features (wooded areas, mountains, plains, etc.), which may influence the direction and speed of the ROTA clouds.

(c) Generate an NBC3 ROTA report, and consider distribution whenever the threat of a ROTA event is high.

(d) Estimate the MET parameters for the release area and downwind of the release area upon the receipt of an NBC1 or NBC2 ROTA report.

(e) Select (according to the national directives) the weather information to be used, and calculate the predicted downwind hazard area.

(2) Constraints.

(a) When calculating the predicted downwind hazard area from ROTA events, many factors will affect the accuracy of the prediction. Some of these factors include the following:

- Type and amount of CBRN agents or materials.
- Type and amount of delivery or storage systems.
- Type and amount of agent containers.
- Terrain composition.
- Weather.
- Air stability.
- Type of surface.
- Vegetation.
- Surface air temperature.
- Relative humidity.

(b) Some of the above factors are not considered when using the procedures in this appendix or annotated to refer to a previous appendix for appropriate hazard prediction procedures unless evaluated and estimated manually by the user.

(c) The procedures shown in this appendix or annotated to refer to a previous appendix for appropriate hazard prediction procedures are based on the limited amount of information available at the time of the ROTA event.

(d) To be able to make more accurate predictions, more information about the listed factors has to be available and more sophisticated methods have to be used for prediction.

f. ROTA Types and Cases (see Table H-1). A sample decision flowchart for the ROTA types and cases is shown in Figure H-4, page H-12.

Table H-1. ROTA Types and Cases

Type of Release/ Material Type	Subcategory	Type	Case	Procedures
Nuclear reactor		N	-	Refer to Appendix F*
TIM	Nuclear waste	T	1	1 km radius
	Radiological dispersion		2	Refer to Appendix F*
	Biological bunker		3	Refer to Appendix F
	Chemical stockpile or TIM transport		4	Refer to Appendix E and the ERG*
	Bulk chemical storage		5	2 km daytime; 6 km night time*
*Also refer to the hazard prediction for elevated releases.				

g. Hazard Prediction Methods.

(1) Type N, Releases of Nuclear Fuel from a Nuclear Reactor. Material released from a nuclear-reactor incident will be mostly, or all, particles of nuclear fuel. Since the decay of the particles from a nuclear-reactor accident is different than for nuclear-weapon fallout, the procedures used for the hazard prediction after nuclear detonations cannot be used.

(a) The release may be violent enough to send the nuclear-fuel particles into the upper atmosphere. The hazard area prediction procedures described in Appendix F should be used, assuming a Type P attack. If the release takes more than 5 minutes, the latest arrival time may need to be adjusted for the duration of the release.

(b) Hazard areas for extended duration releases should be recalculated as a Type R attack. The end points of the line are the release location and the current position of the front end of the cloud. Use 1.5 times the mean wind speed. For wind speeds of 10 kph or less, Type P must be used.

(c) If the release is reported as continuous and the reported duration exceeds 2 hours or is not reported, the procedures for Type S should be followed.

(d) If the bulk of the material is elevated to a high altitude, the wind speed and bearing at that height from the CBRN BWM or other appropriate MET data should be used. If the material extends continuously from near the ground to a high elevation (above 50 m), the procedures for an elevated release should also be used.

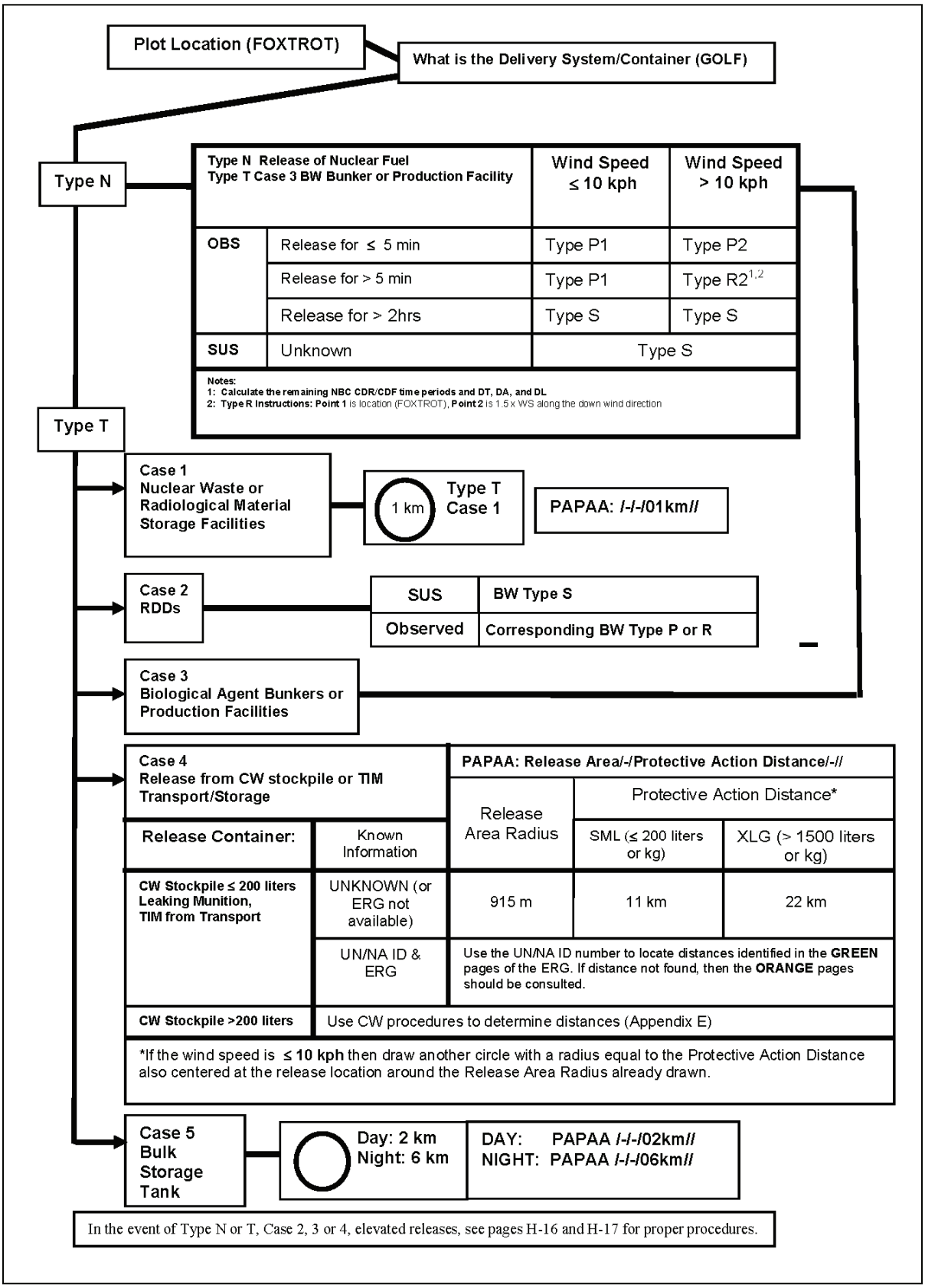


Figure H-4. Sample Decision Flowchart for ROTA Types and Cases

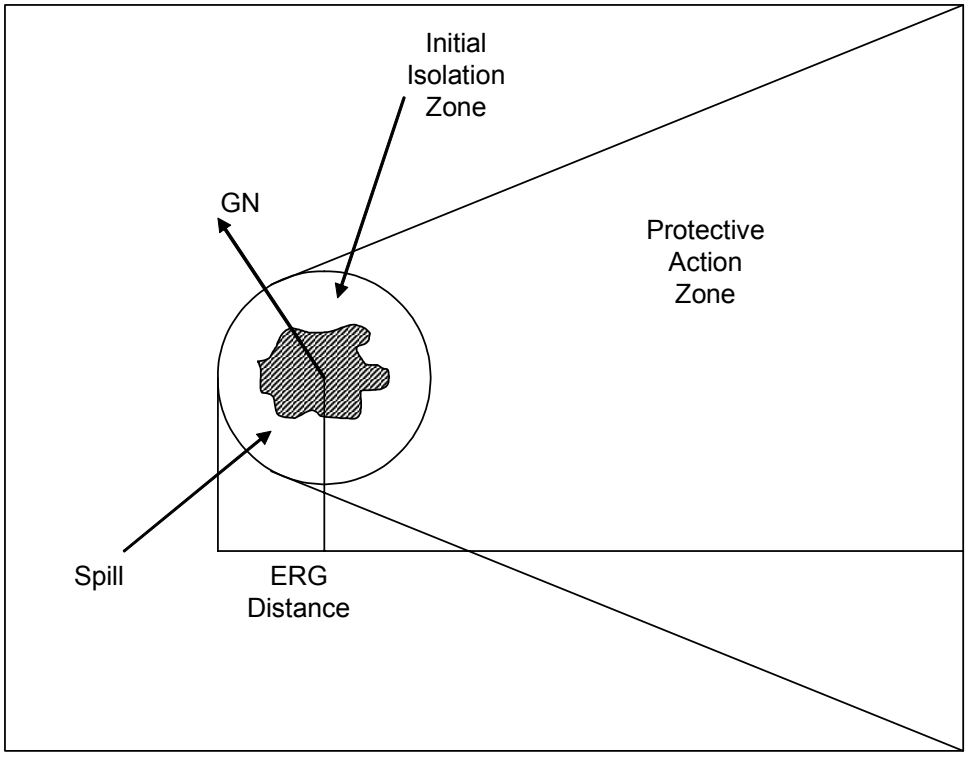


Figure H-5. Type T, Case 4: Small Methyl Isocyanate (UN/NA ID #2480) Spill at Night

- Wind Speed ≤10 kph. The wind direction is considered to be variable, so draw another circle of radius equal to the protective action distance, centered at the release location.

- Wind Speed >10 kph. Draw a line in the downwind direction starting at the release location, of a length equal to the protective action distance. (For the remaining steps, follow the drawing procedures from Appendix E rather than from the ERG.) Draw a line at the end of the downwind direction line, perpendicular to the downwind direction. Extend the downwind direction line in the upwind direction a distance equal to twice the release area radius. Draw two lines from the upwind end of the downwind direction line to the perpendicular line at the other end, which are tangent to the top and bottom of the release area circle (see Figure H-5).

- Elevation. If the bulk of the material is elevated to a high altitude, the wind speed and bearing at that height from the CBRN BWM or other appropriate MET data should be used. If the material extends continuously from near the ground to high elevation (above 50 m), the procedures for an elevated release should also be used.

- Limitations. The initial hazard area is considered valid until additional information is available. When significant changes in weather conditions occur, a recalculation must be carried out (see Appendix E).

(e) Case 5, Release from a Bulk Storage Tank. Chemical storage tanks can contain thousands of liters of TIC. Many of these chemicals exist as gases under atmospheric conditions and are stored as a liquid under high pressure and low temperatures. Some of the chemicals are extremely flammable as a vapor cloud. Damage

to one of these tanks can result in the stored liquid being ejected very quickly as a large pool of very cold liquid. The pool will evaporate to form a vapor cloud, which is denser than the surrounding air due to the lower temperature and differences in molecular weight. This cloud will initially be affected more by gravity than the wind. The cloud will begin to dilute by being mixed with surrounding air. Eventually, the cloud will no longer be denser than the air and will move with the air as any other vapor or aerosol cloud. At this point, however, the cloud concentration will most likely be low enough that it is no longer toxic. So, any prediction procedures must focus on the behavior of the cloud before it has been diluted. This behavior will be different than that predicted by assuming the hazard area with the ERG. A simplified hazard is comprised of a circle, with the release location at its center. The radius of the circle should be 2 km for the daytime and 6 km for nighttime (see Figure H-6).

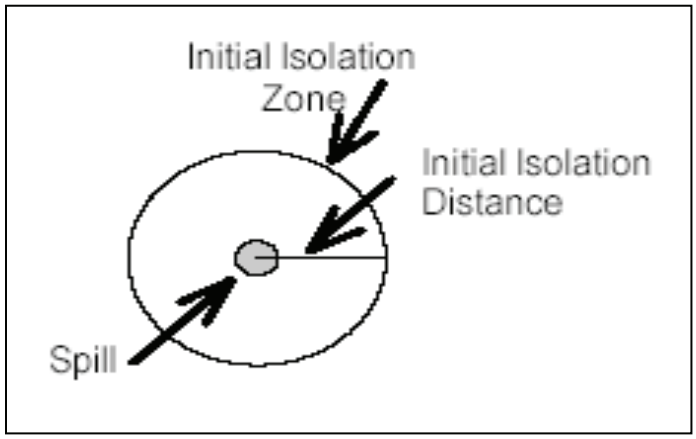


Figure H-6. Type T, Case 5

(3) Hazard Prediction for Elevated Releases.

(a) If the release, momentum, or buoyancy carries the material significantly (>50 m) above the ground surface, the hazard prediction should be repeated using 2,000 m elevation from the CBRN BWM. The hazard area for an elevated release is considered to be a combined hazard area, including spaces in between (see Figure H-7).

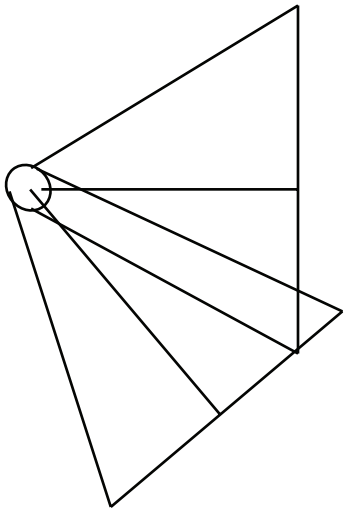


Figure H-7. Type T, Case 4: GB Rocket Stockpile Fire During the Day

(b) If merging or combining hazard regions for elevated releases or changing MET conditions involves two triangular hazard regions having downwind directions that are different by more than 90 degrees, the regions to be merged should be replaced with a circle of a radius equal to the larger of the downwind distances. The time of arrival at a location should be the earliest time resulting from the BWM or CDM.

(c) Changes in MET conditions in the following BWMs should be handled in the same manner as using CDMs.

7. NBC4 ROTA Report

The NBC4 ROTA Report (Figure H-8, page H-18) is used to pass subsequent off-target monitoring data or the results of a deliberate directed survey. The report will use the information as described in Chapter III for lines ALFA, INDIA, QUEBEC, ROMEO, SIERRA, TANGO, WHISKEY, YANKEE, and ZULU. Line GENTEXT in this message will provide the initial background reading taken by the survey team for a nuclear or radiological release. Readings for line ROMEO will indicate a reading above the initial reported background reading and measured values for chemical and biological releases. Decimals may be entered into line ROMEO if the reading is below 1 in the relevant unit of measurement recorded (e.g., 0.123456 cGy/h).

a. Purpose. The purpose of the NBC4 ROTA report is to report detection data and pass monitoring and survey results. This report is used for two cases. Case 1 is used if an attack is not observed and the first indication of contamination is by detection. Case 2 is used to report the measured contamination as a part of a survey or monitoring team mission.

b. Precedence. All other messages after the initial NBC1 ROTA report has been sent should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate.

c. Preparation. For detailed information regarding CBRN/ROTA reconnaissance, monitoring, and survey, refer to *Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical Reconnaissance.*

NBC4 ROTA Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	O	ALFA/US/WEP/001/RN//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/SURF/2978/-/MSVY//
QUEBEC**	Location of reading/sample/detection and type of sample/detection	M	QUEBEC/32VNJ481203/MSVY/-//
ROMEO**	Level of contamination, dose rate trend, and decay rate trend	O	ROMEO/7CGH/DECR/DF//
SIERRA**	DTG of reading or initial detection of contamination	M	SIERRA/202300ZSEP1997//
TANGO**	Terrain/topography and vegetation description	M	TANGO/URBAN/URBAN//
WHISKEY	Sensor information	O	WHISKEY/-/POS/NO/HIGH//
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	-

*The Cond column shows that each line item is operationally determined (O) or mandatory (M).

**Sets QUEBEC, ROMEO, SIERRA, and TANGO are a segment. With the exception of line ROMEO, this segment is mandatory. Line items/segments are repeatable up to 20 times in order to describe multiple detection, monitoring, or survey points.

Figure H-8. Sample NBC4 ROTA Report

8. NBC5 ROTA Report

The NBC5 ROTA Report (Figure H-9) outlines the actual extent of the ROTA ground contamination from the survey data. The report uses information as described above for lines ALFA, CHARLIE, INDIA, TANGO, XRAYB, YANKEE, ZULU, and GENTEXT. Line OSCAR indicates the time for which the contour is appropriate. Line XRAYA describes the level of the contamination for the contour and the ground contaminated area resulting from any ROTA event, whether it is radiological, biological, or chemical.

a. Purpose. The purpose of the NBC5 ROTA report is to pass information on areas of actual contamination. This report can include areas of possible contamination, but only if the actual contamination coordinates are included in the report.

b. Precedence. All other messages after the initial NBC1 ROTA report has been sent should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate.

NBC5 ROTA Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	O	ALFA/US/WEP/001/RN//
CHARLIE	DTG of report/observation and event end	O	CHARLIE/281530ZSEP1997//
INDIA	Release information on CB agent attacks or ROTA events	M	INDIA/SURF/2978/-/MSVY//
OSCAR	Reference DTG for estimated contour lines	M	OSCAR/281830ZSEP1997//
TANGO	Terrain/vegetation information	O	
XRAYA**	Actual contour information	M	XRAYA/0.003CGH/334015N1064010W/ 334020N1064010W/ 334020N1064020W/ 334015N1064020W/ 334015N1064010W//
XRAYB**	Predicted contour information	O	
YANKEE	Downwind direction and downwind speed	O	YANKEE/270DGT/015KPH//
ZULU	Actual weather conditions	O	ZULU/4/10C/7/5/1//
GENTEXT	General text	O	
*The Cond column shows that each line item is operationally determined (O) or mandatory (M). **Sets are repeatable up to 50 times to represent multiple contours.			

Figure H-9. Sample NBC5 ROTA Report

c. Preparation.

(1) Contaminated areas are shown on the contamination situation map, and information about them must be passed to the other units and higher HQ. The most expeditious means for this is the contamination overlay.

(2) The preparation of this overlay is described in each respective appendix (e.g., for the chemical contamination overlay, refer to Appendix E). Overlays are preferred for transmission of NBC3 and NBC5 ROTA reports (see Figure H-10, page H-20). They offer the advantages of being readily usable and accurate, and they are in hard copy for future references. Overlays have the disadvantages of requiring special equipment or messengers.

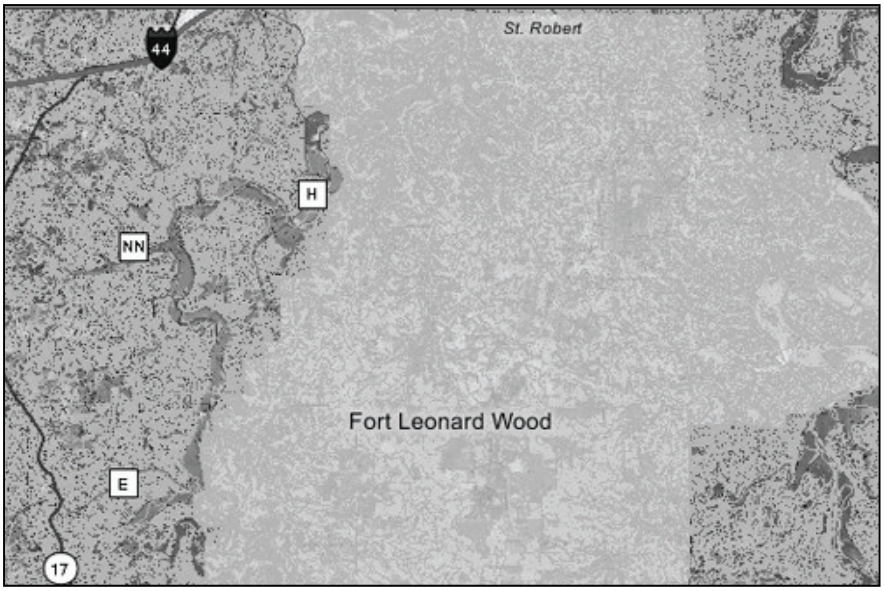


Figure H-10. Sample NBC5 ROTA Report Overlay (Without Marginal Data)

(3) Marginal information that should be included on the overlay includes the following:

- Map name.
- Map number.
- Scale.
- Organization of preparer.
- A legend containing nonstandard symbols/colors.
- Type of report.
- Lines of the report.
- Grid register marks.

d . Reporting Data.

(1) Electronic communications are not always available. If this is the case, the contamination overlay must be converted into a series of readings and coordinates for transmission as an NBC5 ROTA report.

(2) If electronic communications of the data or communications of a hard copy are not available and if time and distance permit, contamination overlays are sent by messenger. Data is transmitted manually by the NBC5 ROTA report as a last resort.

(3) On the NBC5 ROTA report, a closed contour line on a plot is represented by repeating the first coordinate.

9. NBC6 ROTA Report

The NBC6 ROTA report (Figure H-11) will be used to provide specific information (in line GENTEXT) required to produce a more detailed ROTA hazard prediction.

a. Purpose. The purpose of the NBC6 ROTA report is to pass detailed information of a ROTA event.

b. Precedence. All other messages, after the initial NBC1 ROTA report has been sent, should be given a precedence, which reflects the operational value of the contents. Normally, IMMEDIATE would be appropriate.

c. Preparation. This report summarizes the information concerning a ROTA and is prepared by the reporting unit, service equivalent, or higher organization, but only if requested by higher HQ. It is used as an intelligence tool to help determine the enemy's future intentions.

d. Submission. The NBC6 ROTA report is submitted to the higher HQ. It is written in a narrative form with as much detail as possible.

NBC6 ROTA Report			
Line Item	**Description**	**Cond***	**Example**
ALFA	Strike serial number	O	ALFA/US/WEP/001/RN//
CHARLIE	DTG of report/observation and event end	O	CHARLIE/281530ZSEP1997/ 281545ZSEP1997//
FOXTROT	Location of attack or event	O	FOXTROT/32UNB058640/EE//
INDIA	Release information on CB agent attacks or ROTA events	O	INDIA/SURF/2978/-//
QUEBEC	Location and type reading/sample/ detection	O	QUEBEC/32VNJ481203/GAMMA//
ROMEO	Level of contamination, dose rate trend, and decay rate trend	O	
SIERRA	DTG of reading	O	SIERRA/282300ZSEP1997//
GENTEXT	General text	M	GENTEXT/CBRN INFO/HOSPITAL VEHICLE CARRYING RADIOACTIVE WASTE OVERTURNED ON ROUTE 25//
*The Cond column shows that each line item is operationally determined (O) or mandatory (M).			

Figure H-11. Sample NBC6 ROTA Report

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Table I-1. Line Items for STRIKWARN Messages

Line Item	Meaning
ALFAW	STRIKWARN target Identifier (Target number, nickname, or code word)
DELTAW	DTG of strike or strike cancelled (Multiple bursts: DTG attack will start, followed by DTG attack will end. Single Burst: DTG of attack, followed by DTG after which the attack will be cancelled.)
FOXONEW	MSD 1 (Multiple Bursts: UTM grid coordinates of MSD 1 box. Single Burst: MSD 2, three digits, in hundreds of meters, followed by MSD 2 box coordinates.)
FOXTWOW	MSD 2 (Multiple bursts: UTM grid coordinates of MSD 2 box. Single burst: MSD 2, three digits, in hundreds of meters, followed by MSD 1 box coordinates.)
HOTELW	Number of surface bursts (If one or more bursts have less than 99% assurance of being an airburst, or if it is a scheduled surface or subsurface burst, the number of surface bursts will be reported on this line.)
INDIAW	Number of bursts in a multiple strike (Not reported if only one)
AKNLDG	Acknowledge requirement

3. Zones of Warning and Protection Requirements

Zones of warning and protection signify various degrees of danger to US forces.

a. The MSD is equal to the radius of safety (RS) for the yield, plus a buffer distance (BD) related to the dispersion of the weapon system used. When surface bursts are used or an intended air burst having less than 99 percent assurance of no militarily significant fallout, the fallout hazard will be considered. Details will be transmitted in a subsequent NBC3 NUC message if fallout will be a hazard to friendly forces.

b. Commanders will be governed by the safety criteria in JP 3-12.2 or the specific service manual addressing nuclear safety.

c. If a unit commander is unable to evacuate Zone 1, he will immediately require the maximum protection and report through his next higher HQ to the releasing/executing commander.

d. Negligible risk should not normally be exceeded unless significant advantage will be gained.

e. Maximum protection for the ground forces denotes that personnel are in buttoned-up tanks or sheltered in foxholes with an overhead shielding.

f. Minimum protection for ground forces denotes that personnel are prone on open ground with all skin areas covered and with an overall thermal protection at least equal to that provided by a two-layer uniform.

g. Since the least separation distance (LSD) for light aircraft is exceeded by MSD 2, aircraft remaining beyond MSD 2 will avoid significant degradation of the aircraft or pilot performance (except Dazzle) severe enough to prevent mission accomplishment.

h. When a unit receives a STRIKWARN message, the first action is to plot it on the tactical (situation) map. This identifies GZ or DGZ and how far the MSDs extend. The commander can then determine what actions to take. Figure I-1 shows a plotted STRIKWARN for a single burst.

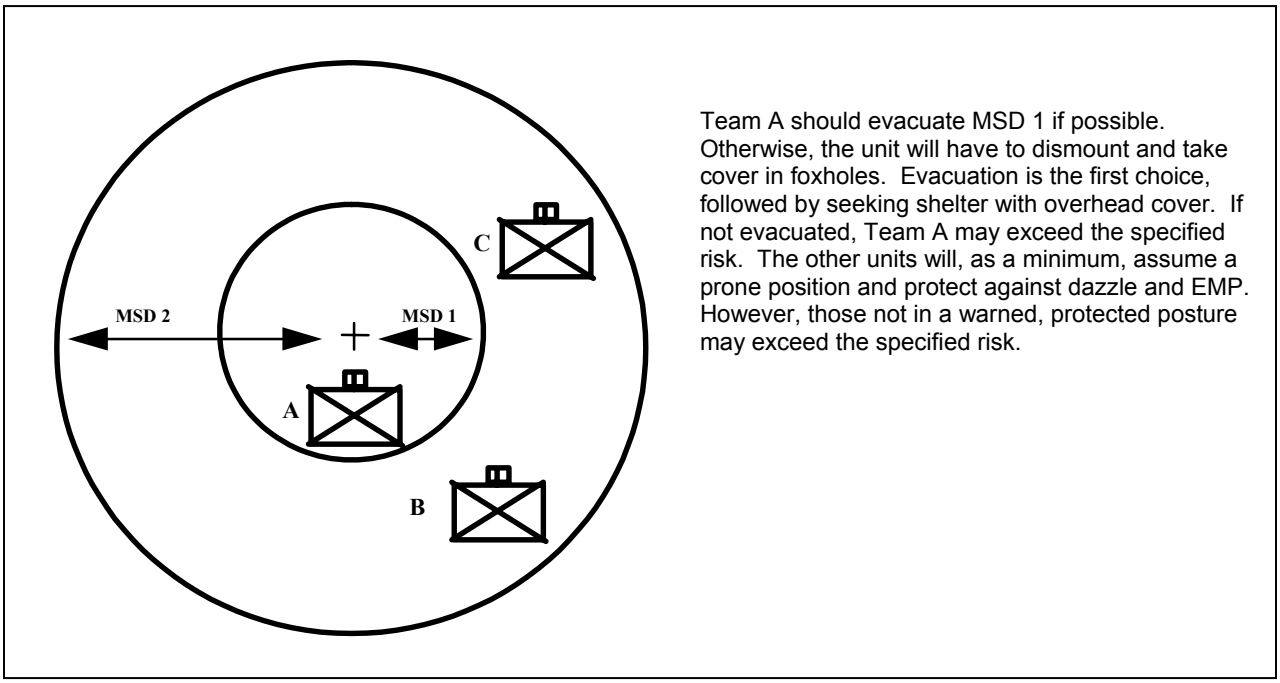

Figure I-1. STRIKWARN Plot Showing MSD 1 and MSD 2, Single-Burst

4. Plotting a STRIKWARN Message

Effectively plotting a STRIKEWARN message is paramount to establishing a unit's actions during a friendly nuclear attack.

a. Single Burst (Figure I-1).

(1) Step 1. Locate the GZ grid coordinates from line FOXTROT of the STRIKWARN message, and then plot GZ.

(2) Step 2. Draw MSD circles around GZ. The first 3 digits of line FOXTROT is the radius of the MSD.

(3) Step 3. Label the edge of the circles with the appropriate MSD.

(4) Step 4. Label the marginal information on the map sheet. Marginal information includes STRIKWARN message, NBC3 report, prepared-by unit, and map scale.

Appendix K

CALCULATIONS

This appendix provides a single reference location for CBRN hazard prediction-related calculations.

Downwind Travel Distance:

$d_1 = u_1 * t_1$
$d_2 = 2u_2$
$d_3 = u_3 * (4 - t_1)$

Total Downwind Distance:

$DA = d_1 + d_2 + d_3$

Leading and Trailing Edge:

DL = 1.5 * DA (Leading Edge, in km)
DT = 0.5 * DA (Training Edge, in km)

Initial Hazard Area (BIO only):

$H_1 = A + d_1$ or $A + (u_1 * t_1)$

The following are calculations contained in Appendix G for nuclear contamination avoidance TTP:

Polar Plot Method for Determining GZ:

0.35 kmps x time(s) = Distance to GZ, in km

M4A1 Calculator:

Covert degrees to mils (17.8 x degrees = mils)

Yield Estimation:

Yield 1 + yield 2 = sum yield / 2 = average yield

Time of Arrival of Fallout:

$$\frac{\text{distance from GZ (km)}}{\text{effective wind speed in (kph)}} = \text{time of arrival}$$

Detailed Fallout Prediction:

$$\text{Effective Wind Speed} = \frac{\text{Radial Line Distance From GZ to CB Height (KM)}}{\text{Time of Fall from CB (HR)}}$$

Time of Completion of Fallout:

$$T_{comp} = 1.25 \times T_{arrival} + \frac{2 \times Cloud\ radius}{Effective\ wind\ speed}$$

Measuring Nuclear Data:

$$Transmission\ Factor\ (TF) = \frac{Inside\ dose\ rate}{Outside\ dose\ rate}$$

Outside Dose Rate: $OD = ID/TF$

Correlation Factor: (CF) = $\frac{1}{TF} = \frac{OD}{ID}$

Air-Ground Correlation Factor (AGCF) = $\frac{\text{Ground dose rate}}{\text{Aerial dose rate}}$

Ground dose rate = Air dose rate x AGCF

Calculation of H Hour or TOB:

$$T_1 = \frac{Tb - Ta}{(Ra/Rb)^{1/n-1}}$$

Decay of Fallout:

$$R_1 \times t_1^{\,n} = R_2 \times t_2^{\,n}$$

Decay Rate

$$n = \frac{log(Ra/Rb)}{log(Tb/Ta)}$$

Period of Validity for the Decay Rate (n):

$$Tp = 3(Tb - Ta) + Tb$$

NBC3 REPORT TEMPLATES

NBC3 NUC Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial	Follow-up
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	M	
DELTA	DTG of Attack or Detonation and Attack End	M	
FOXTROT	Location of Attack or Event	M	
GOLF	Delivery and Quantity Information	O	
HOTEL	Type of Nuclear Burst	O	
NOVEMBER	Estimated Nuclear Yield in KT	O	
OSCAR	Reference DTG for Contour Lines	O	
PAPAB	Detailed Fallout Hazard Prediction Parameters	M	
PAPAC	Radar Determined External Contour of Radioactive Cloud	O	
PAPAD	Radar Determined Downwind Direction of Radioactive Cloud	O	
XRAYB**	Predicted Contour Information	C	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

** Line Item is repeatable up to 50 times to represent multiple contours
The "Cond" column in the examples shows that each set is operationally determined (O), conditional (C), or mandatory (M).

Note: XRAYB is prohibited if OSCAR is not used.

NBC3 CHEM/BIO Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	M	
DELTA	DTG of Attack or Detonation and Attack End	M	
FOXTROT	Location of Attack or Event	M	
GOLF	Delivery and Quantity Information	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	M	
OSCAR	Reference DTG for Contour Lines	O	
PAPAA	Predicted Attack/Release and Hazard Area	M	
PAPAX*	Hazard Area Location for Weather Period	M	
TANGO	Terrain/vegetation Information	O	
XRAYB**	Predicted Contour Information	C	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

* Line item is repeatable up to 3 times in order to describe three possible hazard areas corresponding to the time periods from the CDM. A hazard area for a following time period will always include the previous hazard area.

** Line item is repeatable up to 50 times to represent multiple contours. The "Cond" column in the examples shows that each set is operationally determined (O), conditional (C) or mandatory (M).

Note: XRAYB is prohibited if OSCAR is not used.

NBC3 ROTA Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	M	
CHARLIE	DTG of Report/observation and Event End	M	
FOXTROT	Location of Attack or Event	M	
GOLF	Delivery and Quantity Information	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	M	
MIKER	Description and Status of ROTA Event	O	
OSCAR	Reference DTG for Contour Lines	O	
PAPAA	Predicted Attack/Release and Hazard Area	M	
PAPAX*	Hazard Area Location for Weather Period	M	
TANGO	Terrain/Vegetation Information	O	
XRAYB**	Predicted Contour Information	C	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

* Line item is repeatable up to 3 times in order to describe three possible hazard areas corresponding to the time periods from the CDM. A hazard area for a following time period will always include the previous hazard area.

** Line item is repeatable up to 50 times to represent multiple contours
The "Cond" column in the examples shows that each set is operationally determined (O), conditional (C), or mandatory (M).

Note: XRAYB is prohibited if OSCAR is not used.

NBC4 REPORT TEMPLATES

NBC4 NUC Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
KILO	Crater Description	O	
QUEBEC*	Location of Reading/Sample/Detection and Type of Sample/Detection	M	
ROMEO*	Level of Contamination, Dose Rate Trend and Decay Rate Trend	M	
SIERRA*	DTG of Reading or Initial Detection of Contamination	M	
TANGO	Terrain/Vegetation Information	O	
WHISKEY	Sensor Information	O	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

* The "Cond" column in the examples shows that each line item is operationally determined (O) or mandatory (M).

* Line items QUEBEC, ROMEO, SIERRA, and TANGO are a segment. With exclusion of line item ROMEO, this segment is mandatory. Line items/segments are repeatable up to 20 times in order to describe multiple detection, monitoring, or survey points.

NBC4 CHEM/BIO Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	M	
QUEBEC*	Location of Reading/Sample/Detection and Type of Sample/Detection	M	
ROMEO*	Level of Contamination, Dose Rate Trend and Decay Rate Trend	O	
SIERRA*	DTG of Reading or Initial Detection of Contamination	M	
TANGO*	Terrain/Topography and Vegetation Description	M	
WHISKEY	Sensor Information	O	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

***** The "Cond" column in the examples shows that each line item is operationally determined (O) or mandatory (M).

***** Line items QUEBEC, ROMEO, SIERRA, and TANGO are a segment. With exclusion of line item ROMEO, this segment is mandatory. Line items/segments are repeatable up to 20 times in order to describe multiple detection, monitoring, or survey points.

NBC4 ROTA Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA events	M	
QUEBEC*	Location of Reading/Sample/Detection and Type of Sample/Detection	M	
ROMEO*	Level of Contamination, Dose Rate Trend and Decay Rate Trend	O	
SIERRA*	DTG of Reading or Initial Detection of Contamination	M	
TANGO*	Terrain/Topography and Vegetation Description	M	
WHISKEY	Sensor Information	O	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

* The "Cond" column in the examples shows that each line item is operationally determined (O) or, mandatory (M).

* Line items QUEBEC, ROMEO, SIERRA, and TANGO are a segment. With exclusion of line item ROMEO, this segment is mandatory. Line items/segments are repeatable up to 20 times in order to describe multiple detection, monitoring, or survey points.

NBC5 REPORT TEMPLATES

NBC5 NUC Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial	Follow-up
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
DELTA	DTG of Attack or Detonation and Attack End	O	
OSCAR	Reference DTG for Estimated Contour Lines	M	
XRAYA*	Actual Contour Information	M	
XRAYB*	Predicted Contour Information	O	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

The "Cond" column in the examples shows that each line item is operationally determined (O) or mandatory (M).

* Sets are repeatable up to 50 times to represent multiple contours.

NBC5 CHEM/BIO Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial	Follow-up
Line Item	Description	Cond.	Template
ALFA	Strike Serial Number	O	
DELTA	DTG of Attack or Detonation and Attack End	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	M	
OSCAR	Reference DTG for Estimated Contour Lines	M	
TANGO	Terrain/vegetation Information	O	
XRAYA*	Actual Contour Information	M	
XRAYB*	Predicted Contour Information	O	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

The "Cond." column in the examples shows that each line item is operationally determined (O) or mandatory (M).

* Sets are repeatable up to 50 times to represent multiple contours.

NBC5 ROTA Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
CHARLIE	DTG of Report/Observation and Event End	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	M	
OSCAR	Reference DTG for Estimated Contour Lines	M	
TANGO	Terrain/Vegetation Information	O	
XRAYA*	Actual Contour Information	M	
XRAYB*	Predicted Contour Information	O	
YANKEE	Downwind Direction and Downwind Speed	O	
ZULU	Actual Weather Conditions	O	
GENTEXT	General Text	O	

The "Cond." column in the examples shows that each line item is operationally determined (O) or mandatory (M).

* Sets are repeatable up to 50 times to represent multiple contours.

NBC6 REPORT TEMPLATES

NBC6 NUC Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial	Follow-up
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
DELTA	DTG of Attack or Detonation and Attack End	O	
FOXTROT	Location of Attack and Qualifier	O	
QUEBEC	Location and Type Reading/Sample/Detection	O	
ROMEO	Level of Contamination, Dose Rate Trend, and Decay Rate Trend	O	
SIERRA	DTG of Reading	O	
GENTEXT	General Text	M	

* The "Cond" column in the examples shows that each line item is operationally determined (O) or mandatory (M).

NBC6 CHEM/BIO Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial	Follow-up
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
DELTA	DTG of Attack or Detonation and Attack End	O	
FOXTROT	Location of Attack and Qualifier	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	O	
QUEBEC	Location and Type Reading/Sample/Detection	O	
ROMEO	Level of Contamination, Dose Rate Trend, and Decay Rate Trend	O	
SIERRA	DTG of Reading	O	
GENTEXT	General Text	M	

* The "Cond." column in the examples shows that each line item is operationally determined (O) or mandatory (M).

NBC6 ROTA Report			
From:		To:	
Precedence:		Security Classification:	
DTG Sent:		Category of Report: Initial Follow-up	
Line Item	Description	Cond	Template
ALFA	Strike Serial Number	O	
CHARLIE	DTG of Report /Observation and Event End	O	
FOXTROT	Location of Attack or Event	O	
INDIA	Release Information on Biological/Chemical Agent Attacks or ROTA Events	O	
QUEBEC	Location and Type Reading/Sample/Detection	O	
ROMEO	Level of Contamination, Dose Rate Trend, and Decay Rate Trend	O	
SIERRA	DTG of Reading	O	
GENTEXT	General Text	M	

* The "Cond" column in the examples shows that each line item is operationally determined (O) or mandatory (M).

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