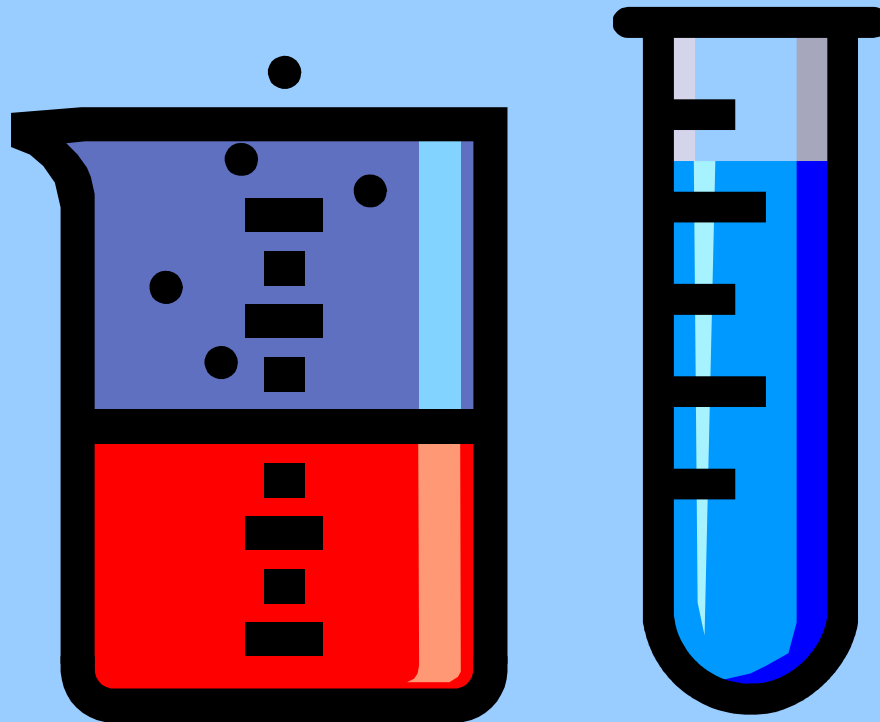


Introduction to Biological Warfare

Lesson topic 4.3



Enabling Objectives

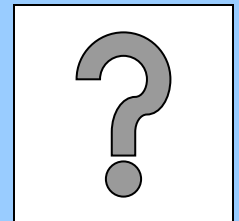
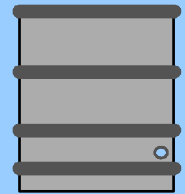
- ★ **Describe** the methods to disseminate, detect and provide defense against biological agents
- 🕒 **Describe** the general characteristics of biological warfare agents
- 🕒 **Select** definitions of pathogens and a toxin
- 🕒 **Describe** countermeasures necessary before, during and after a biological attack to minimize its effect
- 🕒 **State** the functional description of the following equipment: DFU/HHA
- 🕒 Describe the operational characteristics of the following equipment: DFU/HHA.

Biological Agents

⌘ Divided into 2 broad categories

☑ Pathogens

- ☑ Living disease producing organisms
- ☑ Bacteria (typhoid fever, meningitis & tuberculosis)
- ☑ Viruses (mumps, smallpox & influenza)
- ☑ Rickettsiae (rocky mountain spotted fever & typhus)
- ☑ Fungi (ringworm & athlete's foot)



Biological Agents



⌘ Toxins

- ☑ Poisonous, unstable compounds produced by microorganisms, plants & animals
- ☑ Not living
- ☑ Available in the environment in small amounts
- ☑ Actions of toxins may closely resemble those of CW

Toxins



⌘ Cause casualties in two ways

☑ Cytotoxins

☒ Cause cellular destruction & are called "cell death toxins"

☑ Neurotoxins

☒ Interfere with nerve impulse transmission & are called "nerve toxins"

☒ Affect the nervous system

Characteristic of pathogens



- ⌘ Low agent required
- ⌘ Delayed effect
- ⌘ Effects may be lethal or non-lethal
- ⌘ Pervasiveness Ability to penetrate objects
- ⌘ Enter body through inhalation, ingestion or wounds
- ⌘ Difficult to detect

Characteristic of pathogens



- ⌘ Cannot smell, see, taste, touch or hear
- ⌘ No instrument available to detect
- ⌘ Easy to produce & deliver
- ⌘ Nondestructive, only affect living things

Persistence of pathogens



- ⌘ Environmental conditions influence greatly
- ⌘ Need nutrients to remain alive
- ⌘ Some agents produce spores which are very resistant to weather conditions

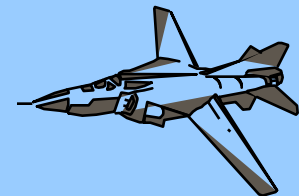
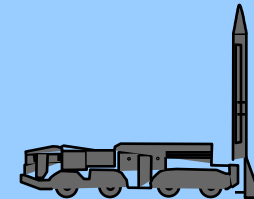
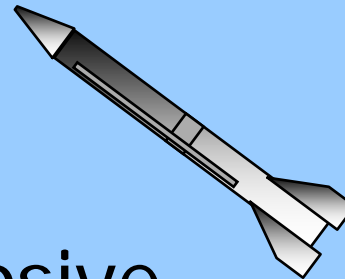
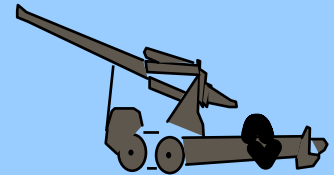
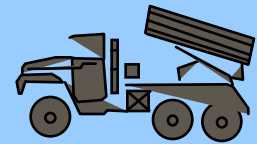
Characteristics of toxins



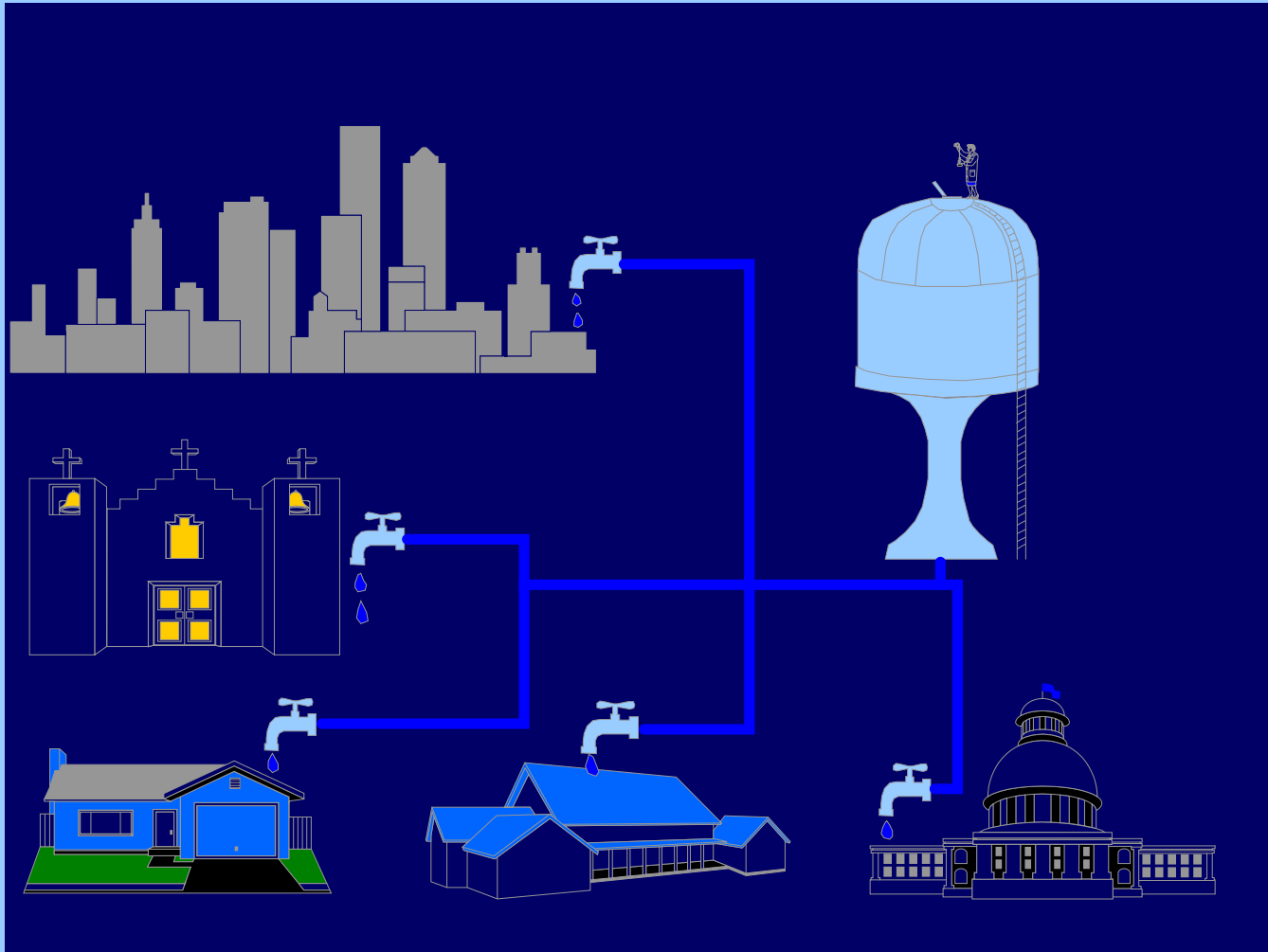
- ⌘ Low agent required
- ⌘ Delayed effect
- ⌘ Pervasiveness
- ⌘ Difficult to detect
- ⌘ Either persistent or non-persistent

Methods of Dissemination

- ⌘ Aerosol
- ⌘ Fog from smoke generator
- ⌘ Mist
- ⌘ Food and water
- ⌘ Munitions - Low explosive
- ⌘ Sabotage



Sabotage



Methods of Dissemination



⌘ Vectors (pathogens only)

- ☒ Animal carriers that transfer BW

- ☒ Mosquitoes (yellow fever/malaria), black horsefly (anthrax), dogs (rabies), fleas (plague)

⌘ Communicability, contagious (Pathogens only)

Methods of detection



- ⌘ Cannot see, smell, taste, touch or hear biological agents
- ⌘ Increased occurrence of illness
- ⌘ Interim Biological Agent Detection System (IBADS)
- ⌘ Intelligence
 - ☑ Knowing an enemy's capabilities

JOINT BIOLOGICAL DETECTION SYSTEM (JBDS)



Interim Biological Agent Detector (IBAD)



Interim Biological Agent Detector (IBAD)



The Interim Biological Agent Detector provides the Navy with a near-term detection capability aboard combatant ships. Within 20 minutes of activation, IBAD can detect, identify and warn of the presence of biological agents. IBAD is composed of a particle sizer/counter, particle wet cyclone sampler, manual identifier and an improved membrane colorimetric ticket (flow-through assay). IBAD links to visual and audible alarms located locally and in Damage Control Central (DCC) or in Combat Information Central (CIC).

DRY FILTER UNIT (DFU) 1000



Overview of DFU Capabilities



- **Air Sampler that Collect and Concentrates Particulates > 1 micron From Ambient Air**
- **Filters at ~ 1000 Liters/min**
- **Human Breathing Rate ~ 15 Liters/min (DFU “Breathes” ~ 67 X More Particles)**
- **Collection Time: 12 Hours**
- ***Presumptive* Identification of BW Agents using HHAs**
- **Portable unit weights 42 lbs, measures 13 x 13 x 15”.**
- **Uses 110/220 volts A/C at 50/60hz electrical power**
- **Simple to Operate and Maintain**

DFU Basis of Issue

Afloat:

- **Carriers and Large Deck Amphibs: 5 DFUs**
- **Small Boys: 2 or 3 DFUs**
- **1 DFU used as Spare and/or for Internal Monitoring**

Ashore:

- **Construction Battalions, Fleet Hospitals, NCW, Special Warfare, EMF, Bases: 3 – 7 DFUs**
- **1 - 2 DFUs used as Spare(s) and/or for Internal Monitoring**

Responsibility:

Afloat: DC Personnel

Ashore: Designated Force Protection or CBR Team Personnel

DFU Employment

All Ships:

- Quarterdeck Area in Foreign Port & During Transit of Straits/Rivers
- Flight Deck or Helo Hangar in Foreign Port or while at Sea
- Mail Room while Overseas
- Decon Stations
- CPS Fan Rooms

Amphibious Ships:

- Troop Passageways & Well Deck Areas during Marine & Materiel On-load
- NOTE:
- Different scenarios will call for the employment of the DFU to fit the situation. The ship must determine what area of employment provides the best protection.

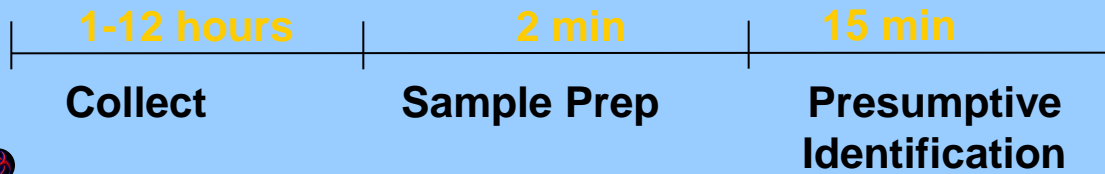
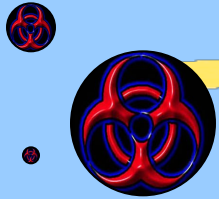
DFU Employment

- **Filters Replaced and Tested Every 1 to 12 Hours**

Minimum 15 minute run time before testing

- **Multiple DFUs = Staggered Collection Times**
 - **Example: 2 DFUs Deployed**
 - **Collect and Test Filters from DFU#1 @ 1200 and 2400**
 - **Collect and Test Filters from DFU#2 @ 0600 and 1800**
 - **Provides 6 hour Window for Obtaining Test Results**
- **NOTE: Exposure to excessive dirt, aircraft exhaust, or salt spray can cause false positive results**

Surveillance with DFUs

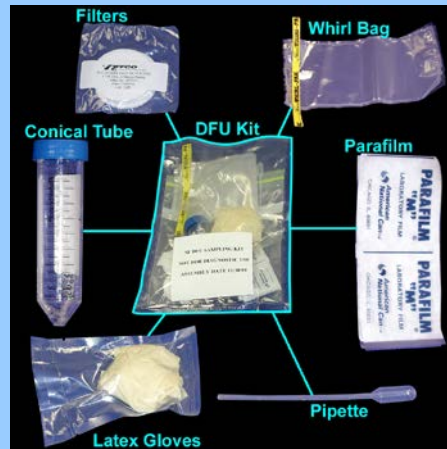


Transport
Sample to Lab

Confirmatory
Sample



DFU



DFU Kit

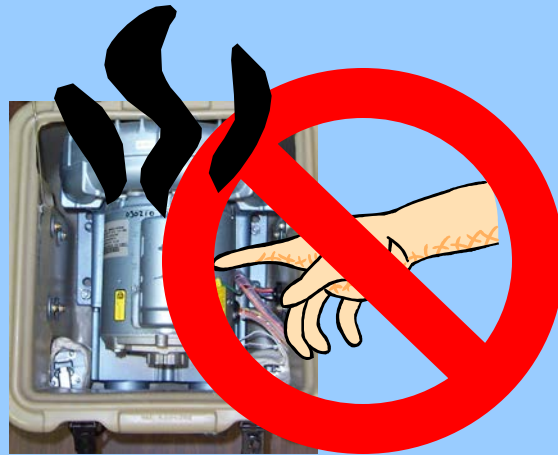
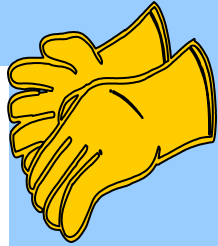


HHA

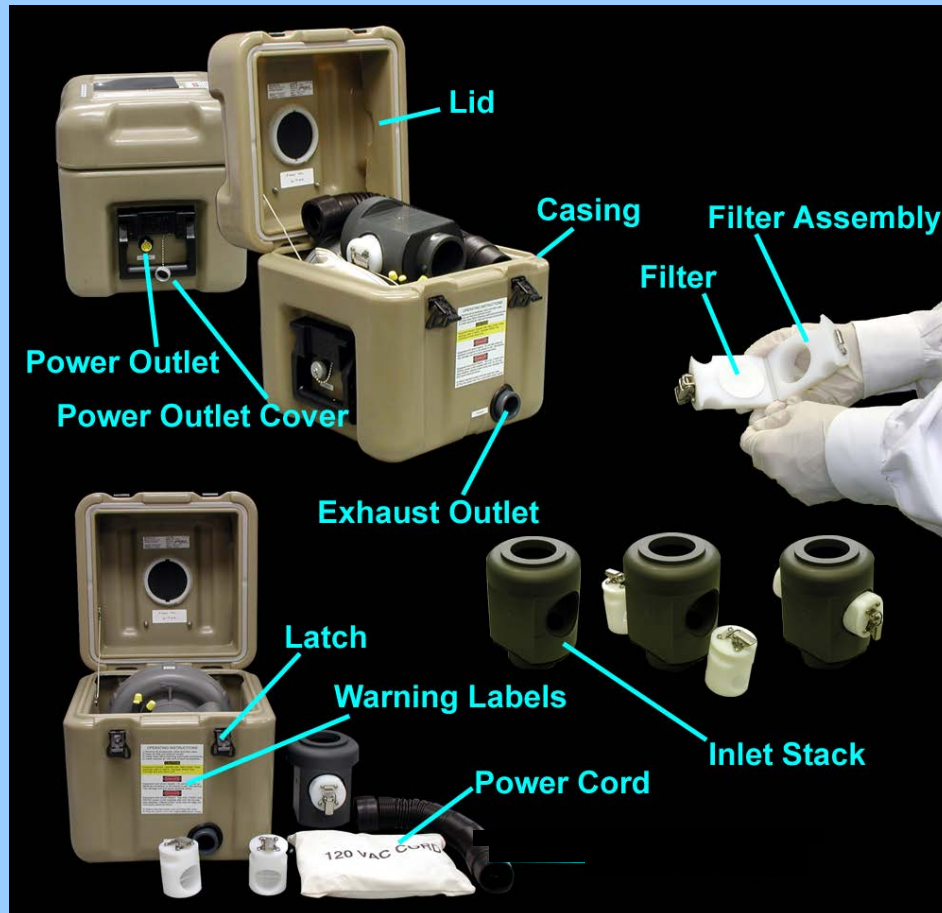


10 ml
sample

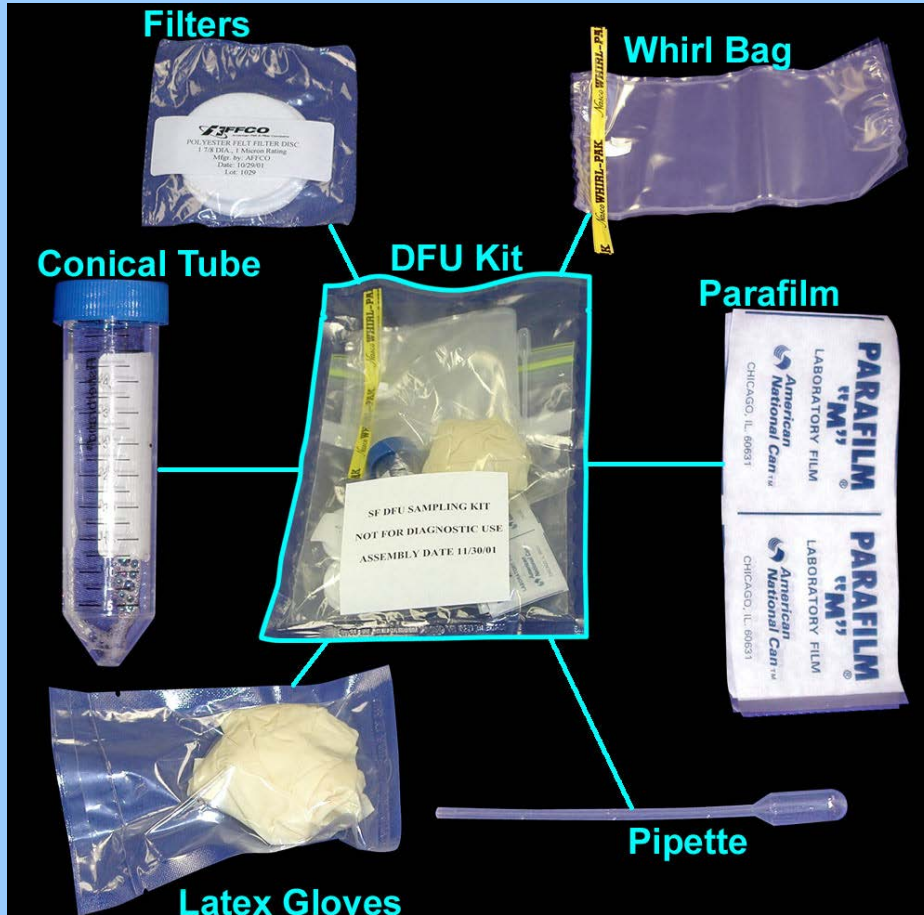
DFU Safety



DFU Major Components



DFU Kit & Major Components



DFU 1000 Operation

1.



3.



2.



4.

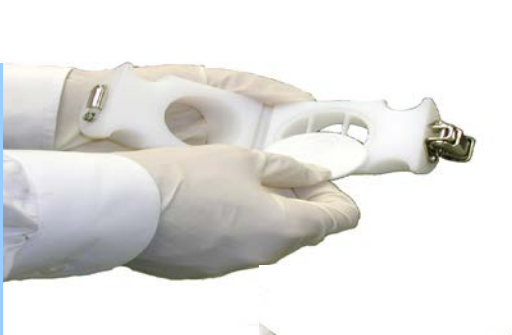


DFU 1000 Operation (cont.)

8.



9.



10.



Two Filters

11.



DFU 1000 Operation (cont.)

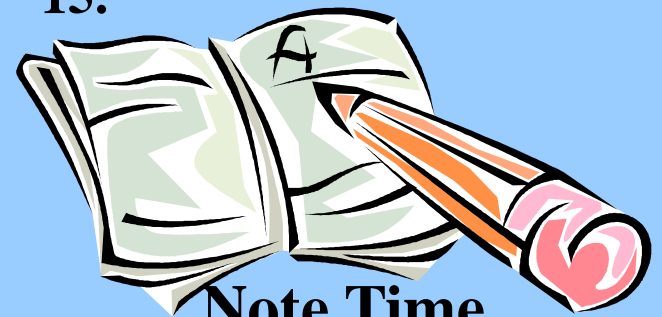
12.



13.



15.



**Note Time
Sampling Began
along with location
and DFU #**

14.



Remove Gloves

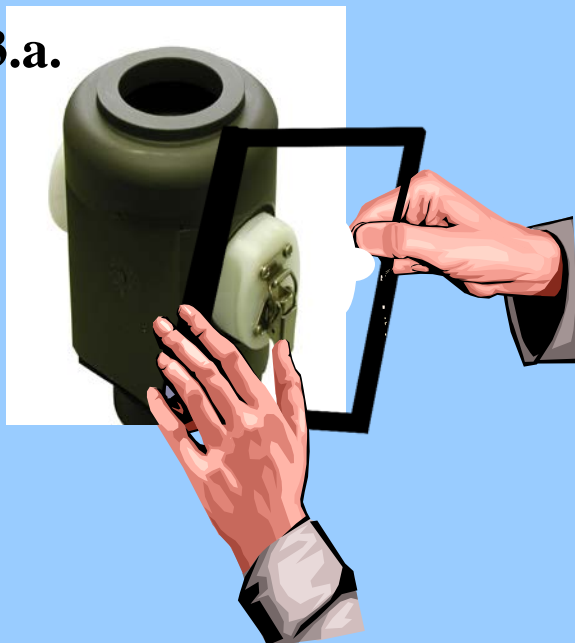
Collect DFU Filter Assemblies

1. Prepare New Filter Assemblies & Remove HHA's from Refrigerator

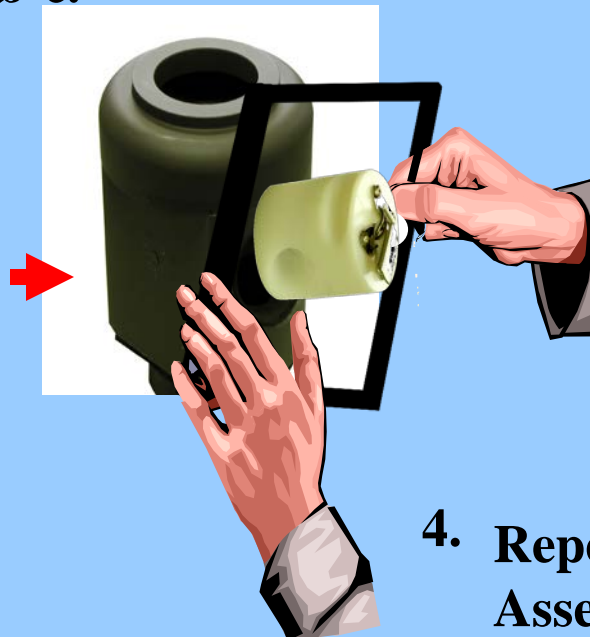
2. Don proper IPE



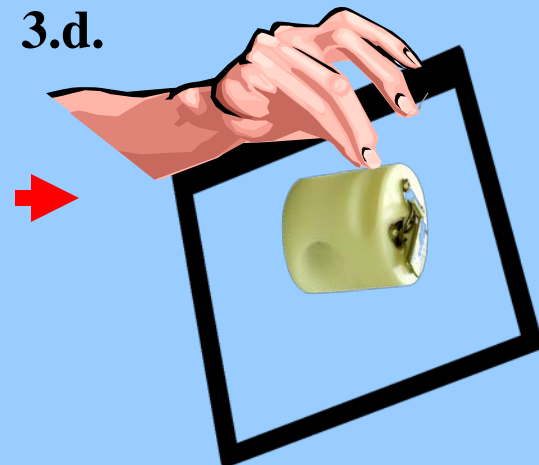
3.a.



3.b-c.



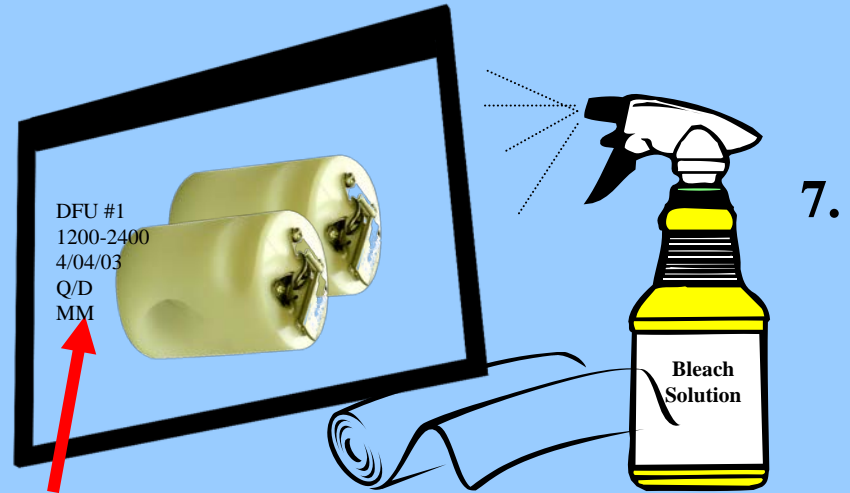
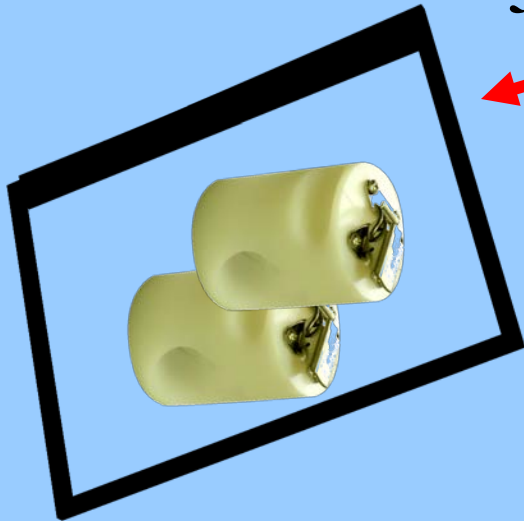
3.d.



4. Repeat for Other Filter Assembly

Collect DFU Filter Assemblies (cont.)

5. Seal Bag



DFU #1
1200-2400
4/04/03
Q/D
MM

6. Record sample ending time in log book



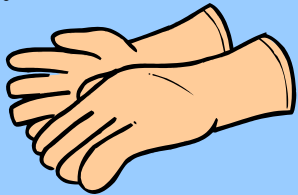
**Label with Marker,
DFU #, Start & Stop
times, Date, Location
& Initials**

0.5% BLEACH
SOLUTION

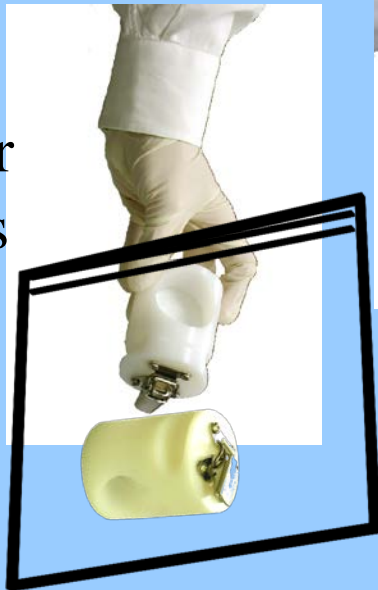
NOTE: 0.5% Bleach Solution: 1 Part Bleach to 9 Parts Water.
(HTH may be substituted for bleach) Refer to NSTM 470

Collect DFU Filter Assemblies (cont.)

9. Remove top layer



10. Clean Filter Assemblies with New Filters



11.



12.

Note new sampling start time along with location and DFU #



13. Return to Processing Area and Prepare Sample for Testing with HHAs

Sample Preparation

1. Proper IPE



2.



Flat, Level, with
Good Light

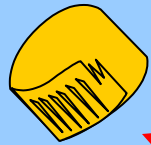
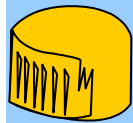
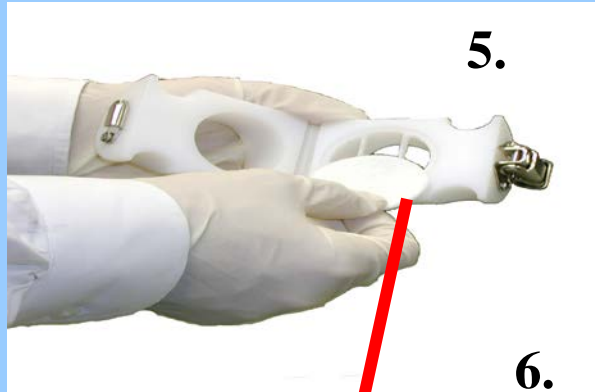


3.

Unlatch
Filter
Assembly



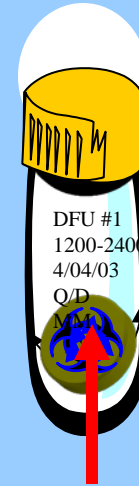
Sample Preparation (cont.)



7.

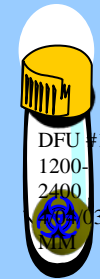


Label with Marker

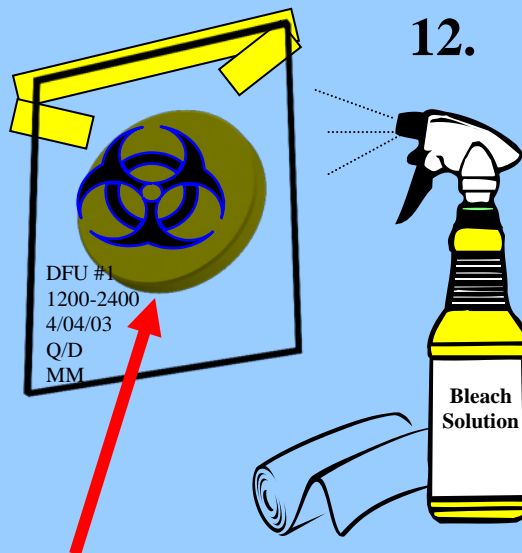
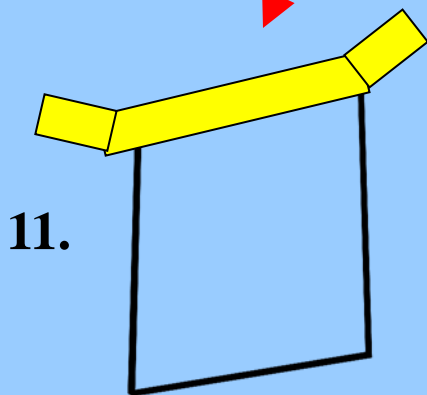
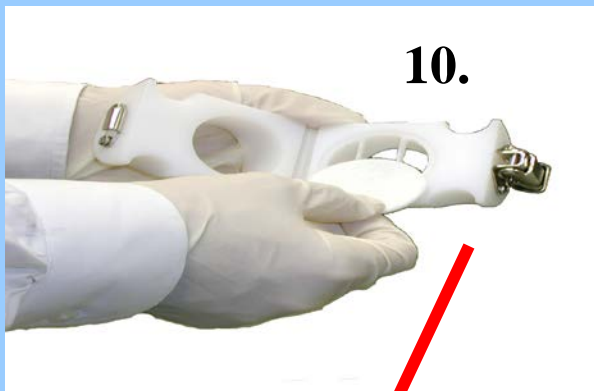


5% BLEACH SOLUTION

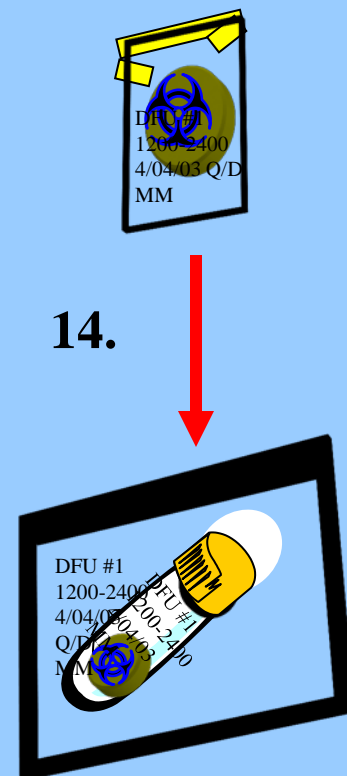
9.



Sample Preparation (cont.)



13. Label with Marker
If sample tested with HHA's is negative, maintain dry filter in Whirl-bag for 30 days.



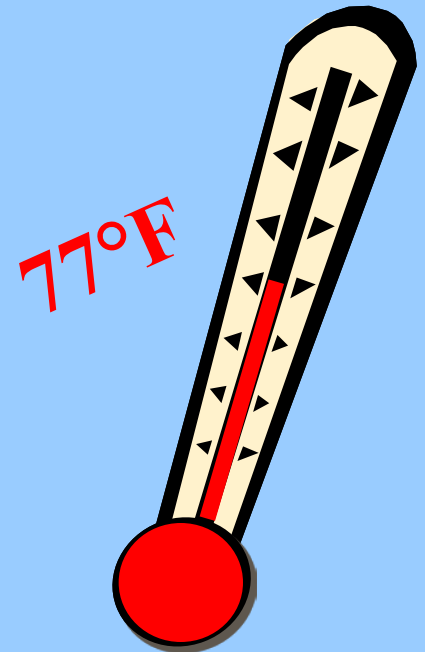
Hand Held Assay



TESTING DFU FILTERS WITH HHAs

PREPARATION FOR USE:

- **Level Work Area**
- **IPE**
- **HHA Panel**
 - **No Openings or Tears**
 - **Not Past Expiration Date**
 - **Room Temperature**



HHAs RULES OF USE

HHAs should never be frozen or exposed to temperatures above 122 degree's Fahrenheit

HHAs stored at refrigerated temperatures of 39 degree's have a shelf life of 2 years from manufacture date.

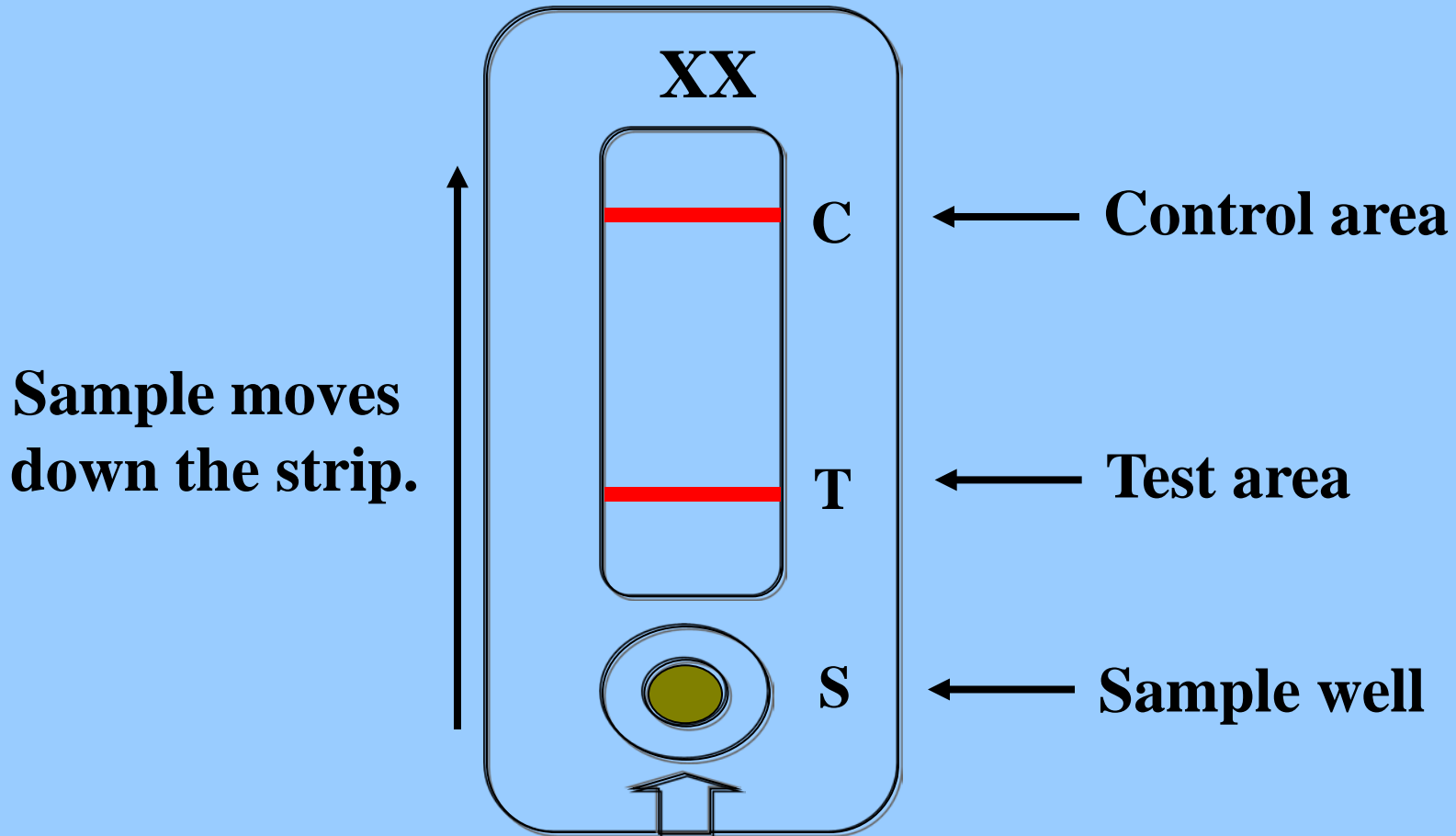
HHAs stored at room temperature of 77 degree's have a shelf life of 1 year from manufacture date.

HHAs must be brought to room temperature prior to use.

HHAs that are expired, have been frozen, exposed to rain or snow, exposed to temps above 122 degree's or used below room temperature may provide false negative or positive results and should not be relied upon.

•

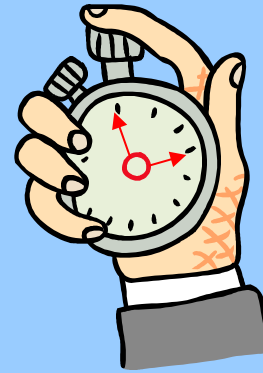
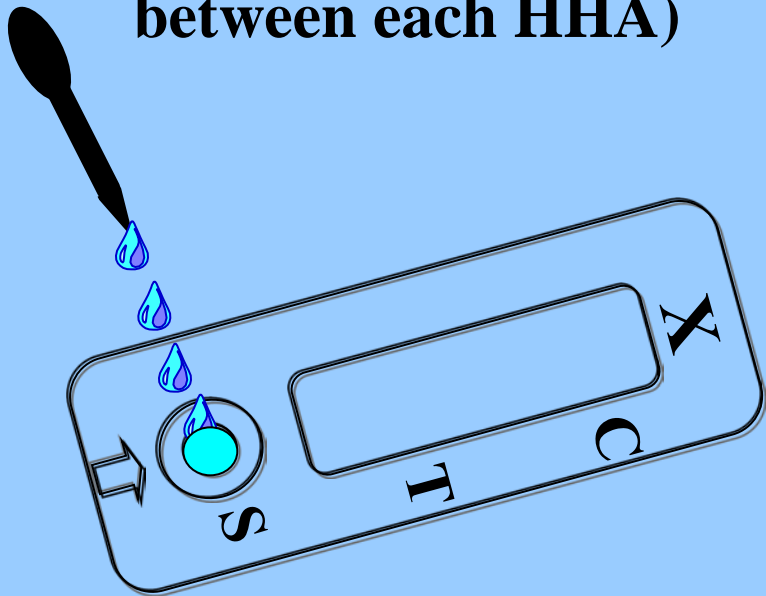
PRINCIPLES OF OPERATION



DFU FILTER TESTING (cont.)

USING HHAs:

1. Add 4 to 5 drops to “S” well
(Return to refill pipette
between each HHA)



2. Set Timer for 15 Minutes

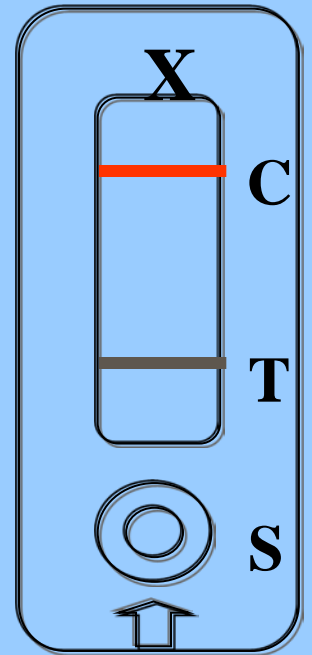
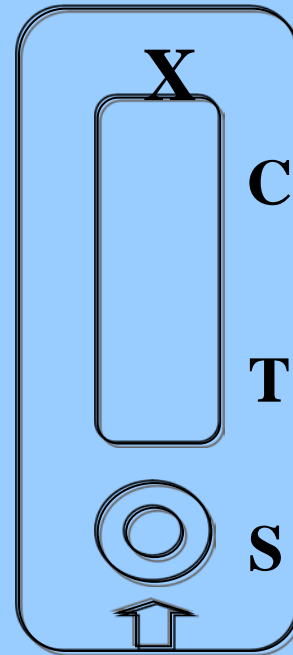
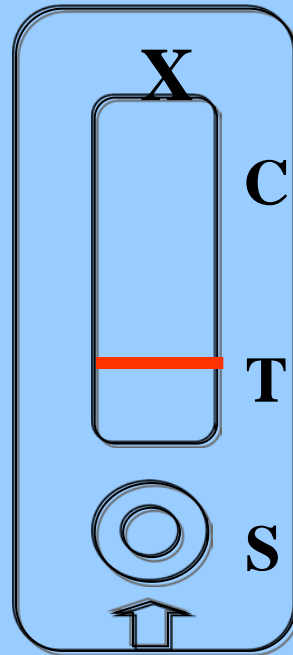
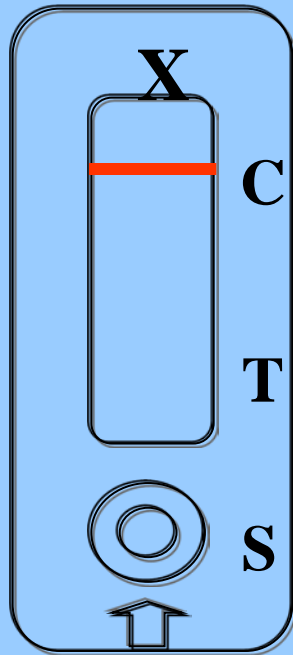
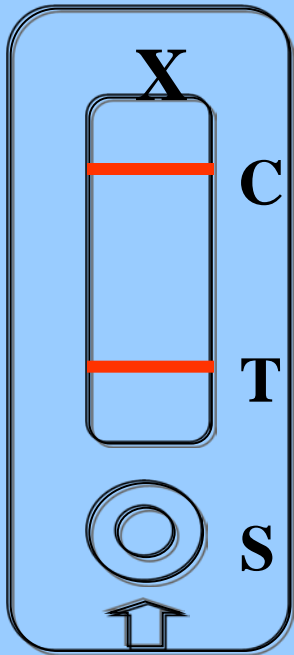
DFU FILTER TESTING (cont.)

INTERPRET HHAs:

POSITIVE

NEGATIVE

INCONCLUSIVE



*****COMPLETE HHA REPORT FORM*****

HHA Report

Hand Held Assay Report

Unit Identification Number: USS Gunston-Hall
Date and Time of Sample Collection: 24 May 2003; 1200-2400

Hand-Held Assay (HHA) Lot Number: N 207030; LE 202181; W 205071; XR 205090; UC 205061; UL 208204; AB 204290; OS 205020
HHA Expiration Date: 12/04

Dry Filter Unit (DFU) Location:
Midship quarterdeck portside – DFU#1

Sample ID Number:
LA030115002WAAZZZ2D

Filter description:
Filter is black/gray in color

Duration of filter in DFU:
12 hours

Other pertinent descriptive information:

Stores were loaded onto ship during the sample period

HHA Report (cont.)

ANALYSIS:

HHA Start Time: 2430 HHA Read Time: 2445

RESULTS (indicate Codes if Positive): Positive for XR

Additional Remarks:

Note color of line(s) at time HHA read: Red , Grey , Black , Other

*Note: all positive results must be confirmed by repeat HHA panel.

Collecting & Testing Surface Samples

- Level Work Surface
- Proper IPE
- Open DFU Kit & BRB
- HHA Panel
 - No Openings or Tears
 - Not Past Expiration Date
 - Room Temperature



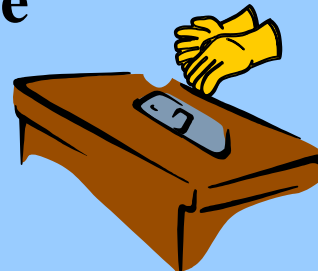
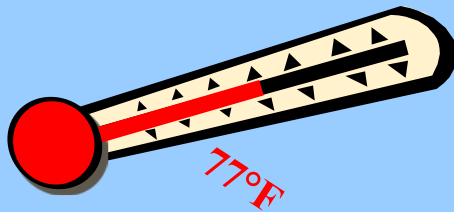
HHA Panel



DFU Kit



Biological Response Bag (BRB)
Blackhawk bag no longer issued.

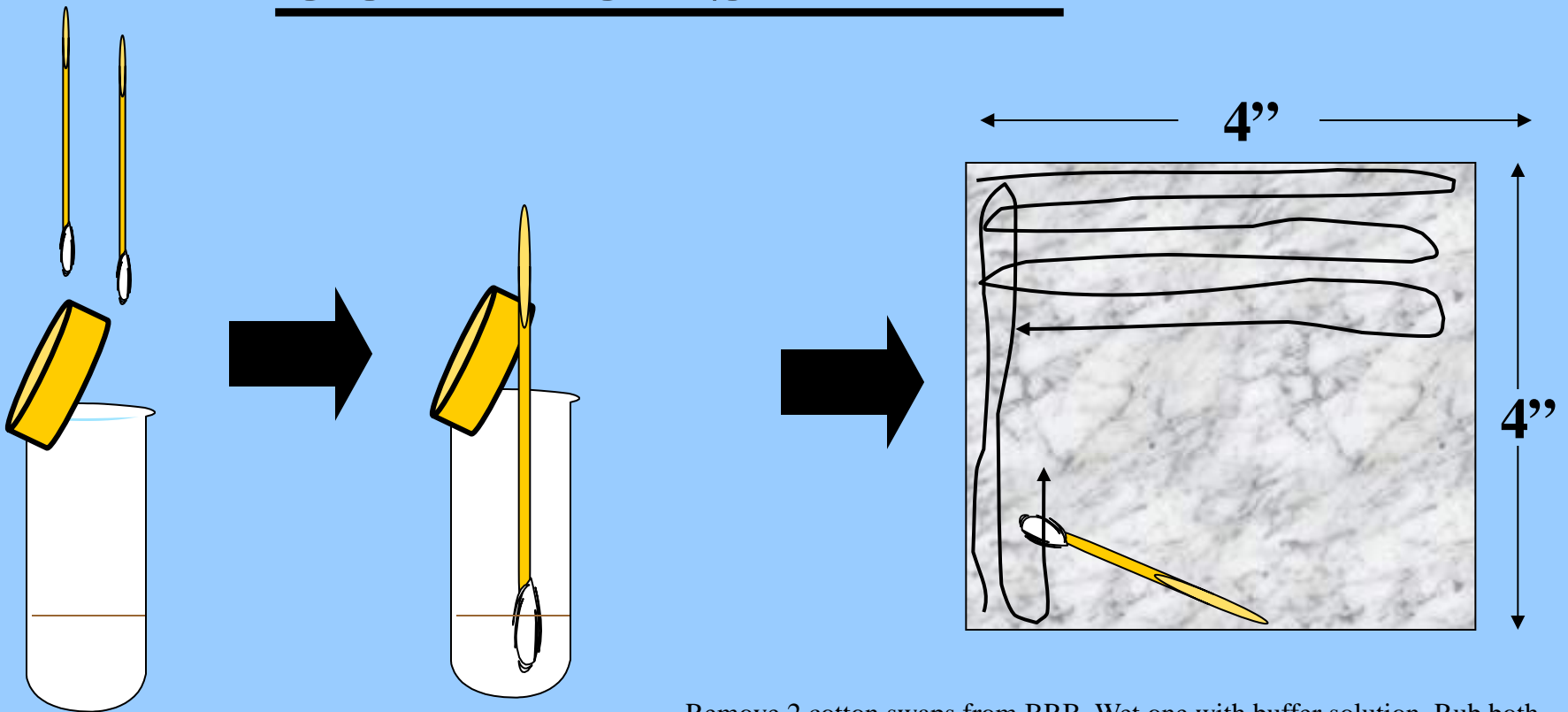


BIO RESPONSE BAG CONTENTS

*1 BAG	NSN 8460-00-606-8366
2 EA PEN, BALL-POINT	NSN 7520-00-935-7136
2 EA MARKER, PERMANENT SHARPIE FINE POINT	NSN
1 TIMER	NSN 4240-01-049-1024
1 LOG BOOK	NSN (Standard Green Log Book)
*20 EA BAG ZIPLOC SANDWICH	NSN 8105-00-837-7753
*20 EA BAG ZIPLOC 2 GAL	NSN 8105-01-387-5442
1 RO TAPE, TRANSPARENT	NSN
*2 PKG SWAP, TIP WOOD SHAFT	WWW.DAIGGER.COM EF220O8DA 1000
10 EA HYPE WIPES, BLEACH	NSN 7930-01-423-3699
*100 EA DFU KIT	NSN 6665-01-515-8343
*2EA SHIPPER, SAF-T-PAK	WWW.SAFTPAK.COM ST100
*4 EA LABEL, DANGER AIRCRAFT	WWW.SAFTPAK.COM STP806
*4 EA LABEL, CLASS 6.3 INF. SUB	WWW.SAFTPAK.COM STP802
*4 EA LABEL OVER PACK	WWW.SAFTPAK.COM STP805
*1 PD DECLARATION OF DANGEROUS GOODS	WWW.SAFTPAK.COM STP800
1 PR SCISSORS	NSN 6515-00-935-7138
5 EA LARGE PIPETTE	NSN
5 EA SAMPLE SPOON	NSN
5 EA SAMPLE CONTAINER	NSN

COLLECTING & TESTING SURFACE SAMPLES (cont.)

COLLECT SAMPLE:

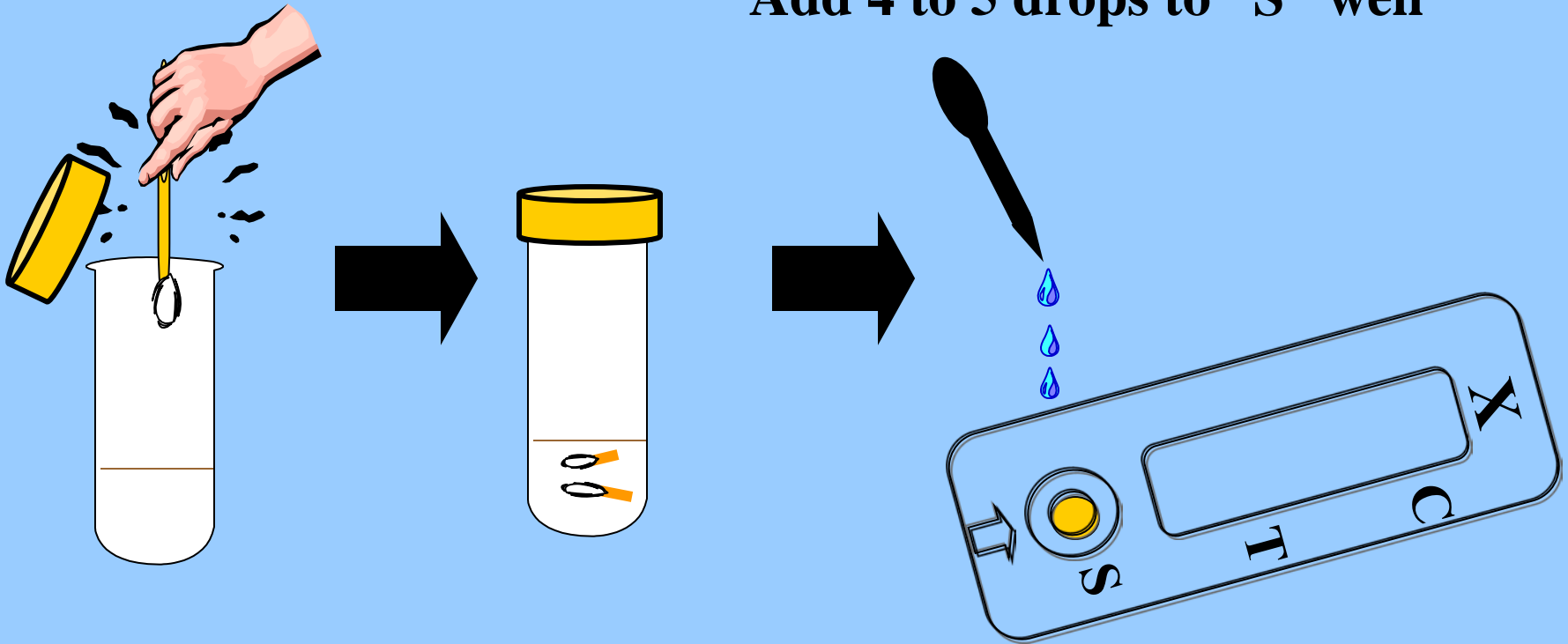


Remove 2 cotton swabs from BRB. Wet one with buffer solution. Rub both over contaminated area. Bag dry swap in whirl-bag. Put wet swap into conical tube, break off end, seal tube, prepare to test with HHA panel.

COLLECTING & TESTING SURFACE SAMPLES (cont.)

PERFORM THE HHA:

Add 4 to 5 drops to “S” well



COLLECTING & TESTING SURFACE SAMPLES (cont.)



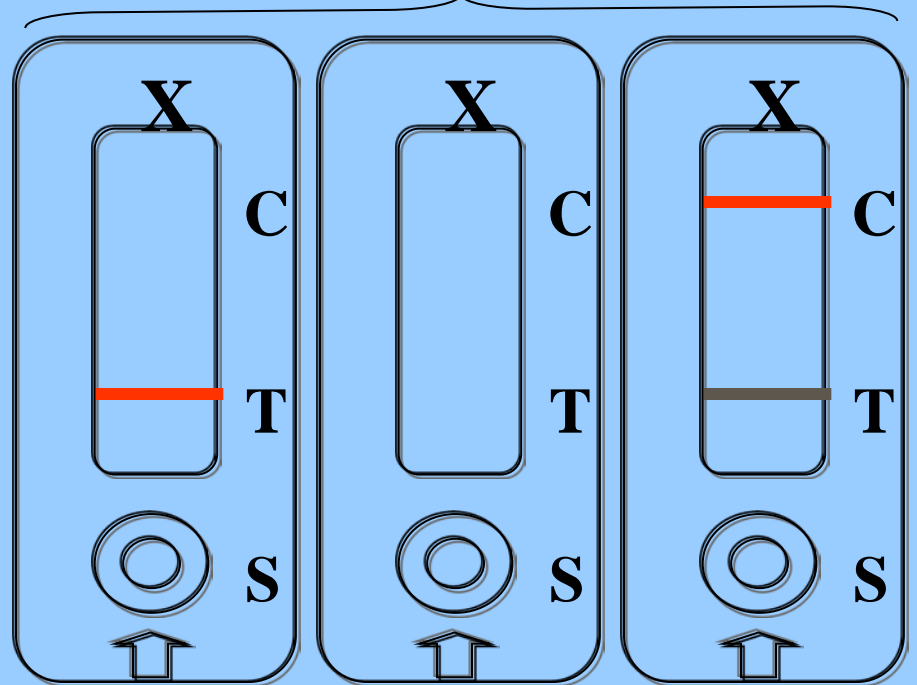
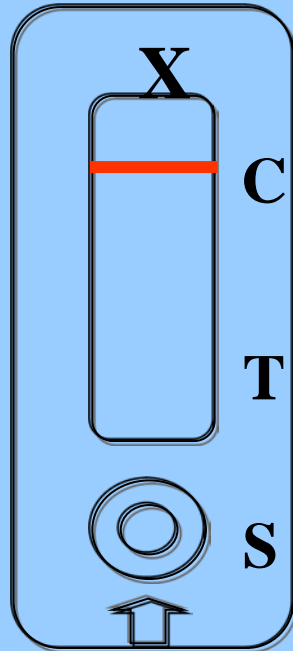
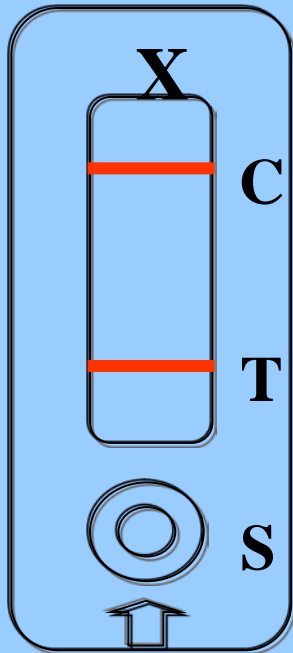
15 Minutes

INTERPRET:

INCONCLUSIVE

POSITIVE

NEGATIVE



*****COMPLETE HHA REPORT FORM*****

DISPOSITION OF USED HHA PANELS



- **Positive Results** – Notify Chain of Command of HHA results. Package HHA panel with positive results and send to confirmatory lab with sample.
- **Negative Results** – Destroy HHAs with bleach solution. Dispose of HHA panel as medical waste. Maintain dry sample (swap or cotton filter) in whirl bag for 30 days

Recovery of DFU



Has the DFU 1000 been exposed to a BW Agent?

YES



**Dispose of as Biological
Hazardous Waste
(Bag and tag)**

NO



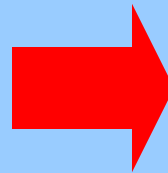
Recover the DFU

Recovery of DFU (cont.)

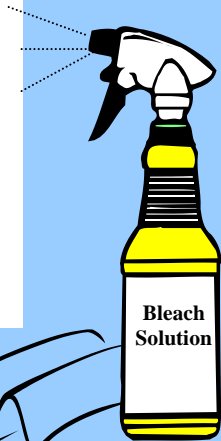
1. Proper IPE



2. – 6.



Recovery of DFU (cont.)



7. – 8.

0.5% Bleach Solution

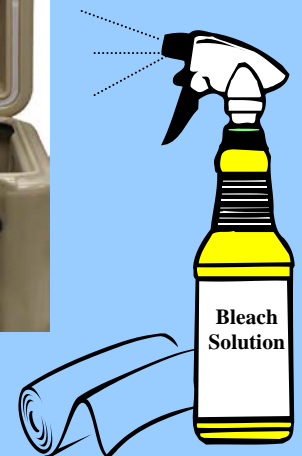


15 Minutes



Unlatch

9. – 10.



Recovery of DFU (cont.)



15 Minutes



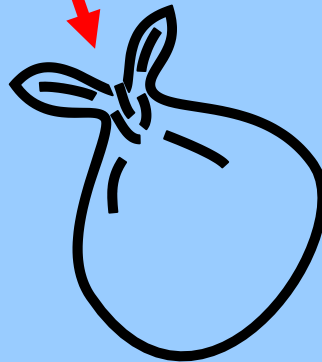
11.



12.



13.



14.



15.

POINTS OF CONTACT

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DFU CHECKSHEET CONT

Did the BRB contain the following:

*1 BAG

2 EA PEN, BALL-POINT

NSN 7520-00-935-7136

2 EA MARKER, PERMANENT SHARPIE FINE POINT

NSN

1 TIMER

NSN 4240-01-049-1024

1 LOG BOOK

NSN (Standard Green Log Book)

*20 EA BAG ZIPLOC SANDWICH

NSN 8105-00-837-7753

*20 EA BAG ZIPLOC 2 GAL

NSN 8105-01-387-5442

1 RO TAPE, TRANSPARENT

NSN

*2 PKG SWAP, TIP WOOD SHAFT

WWW.DAIGGER.COM EF22008DA 1000

10 EA HYPE WIPES, BLEACH

NSN 7930-01-423-3699

*100 EA DFU KIT

NSN 6665-01-515-8343

*2EA SHIPPER, SAF-T-PAK

WWW.SAFTPAK.COM ST100

*4 EA LABEL, DANGER AIRCRAFT

WWW.SAFTPAK.COM STP806

*4 EA LABEL, CLASS 6.3 INF. SUB

WWW.SAFTPAK.COM STP802

*4 EA LABEL OVER PACK

WWW.SAFTPAK.COM STP805

*1 PD DECLARATION OF DANGEROUS GOODS

WWW.SAFTPAK.COM STP800

1 PR SCISSORS

NSN 6515-00-935-7138

5 EA LARGE PIPETTE

NSN

5 EA SAMPLE SPOON

NSN

5 EA SAMPLE CONTAINER (5mm)

NSN

DFU INFO

APL: 46A030024

DFU NSN: 4240-01-510-8315

HHA NSN: 6665-01-504-8534

DFU KIT NSN: 6665-01-515-8343

TRAINING HHA: 6665-01-504-8535

DFU TECH MANUAL NUMBER:

SS200-AC-MMA-010

0910-LP-103-6070



Defense against a BIO Attack

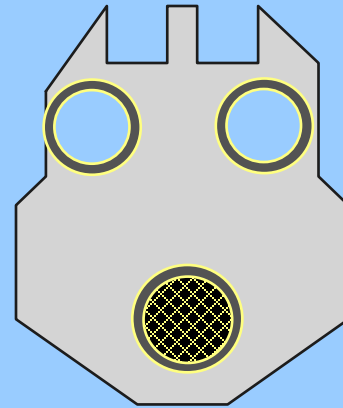


- ⌘ Active defense, Prevent attack
 - ☑ Destroy enemy's biological facilities
 - ☑ Intercept enemy's weapon system
- ⌘ Passive, Before attack
 - ☑ Personal hygiene
 - ☑ Area sanitation
 - ☑ Immunizations
 - ☑ MOPP levels

Defense

⌘ During attack

- ☑ Battle dress
- ☑ Protective mask



⌘ After attack

- ☑ Decontamination
- ☑ Quarantine

Departments responsible for BW defense



⌘ Medical

- ☑ Direct sampling procedures
- ☑ Clinical sampling
- ☑ Treatment of casualties

⌘ Damage Control

- ☑ Decontamination
- ☑ Conduct sampling when directed by medical

Summary and review

⌘ Characteristics of Biological Agents

- ☑ Pathogens

- ☑ Toxins

⌘ Methods of Dissemination & Detection

