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All Hazards Receipt Facility Screening Protocol

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Disclaimer

U.S. Environmental Protection Agency (EPA), through its Office of Research and Development and in support of the Department of Homeland Security (DHS) under IAG #HSHQDC-06-X-00430, collaborated with multiple state and federal agencies in the development of the screening protocol described here. Technical support was provided by Computer Sciences Corporation (CSC) under Contract EP-W-06-046. This document has been subjected to the Agency's review and has been approved for publication. Note that approval does not signify that the contents necessarily reflect the views of the Agency. DHS and EPA do not endorse the purchase or sale of any commercial products or services.

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Abbreviations and Acronyms

AC	Chemical agent symbol for hydrogen cyanide
AHRF	All Hazards Receipt Facility
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
APHL	The Association of Public Health Laboratories
CFR	Code of Federal Regulations
CG	Chemical agent symbol for phosgene
CGI	Combustible Gas Indicator
CK	Chemical agent symbol for cyanogen chloride
CL	Chemical agent symbol for chlorine gas
COC	Chain of Custody
CWAs	Chemical Warfare Agents
CX	Chemical agent symbol for phosgene oxime
DB-3	[4-(4' -nitrobenzyl)pyridine]
DHS	U.S. Department of Homeland Security
DNA	Deoxyribonucleic acid
DNT	Dinitrotoluene
DoD	U.S. Department of Defense
DOT	U.S. Department of Transportation
DP	Chemical agent symbol for diphosgene
DPM	Disintegrations per minute
EGDN	Ethylene glycol dinitrate
E.L.I.T.E.™	Brand of detection kits that screen for explosive materials
EPA	Environmental Protection Agency
FBI	Federal Bureau of Investigation
FSP	Flame Spectrophotometer
GA	Chemical agent symbol for tabun
GB	Chemical agent symbol for sarin
GD	Chemical agent symbol for soman
GF	Chemical agent symbol for cyclohexylsarin
H	Chemical agent symbol for mustard
HAZMAT	Hazardous Materials, used as an abbreviation for a hazardous materials response unit (e.g., contact HAZMAT for instruction)
HD	Chemical agent symbol for distilled (purified) mustard
HEPA	High Efficiency Particulate Air
HMTD	Hexamethylenetriperoxidediamine
HMTA	Hazardous Materials Transportation Act
HMTSA	Hazardous Materials Transportation Safety Act
HMX	Octogen
HN	Chemical agent symbol for nitrogen mustard
HT	Chemical agent symbol for a 60/40 mixture of HD and [[bis[2-(2-chloroethylthio)ethyl] ether]] (a related vesicant, sometimes referred to as “T”)
ID	Identification
IMS	Ion Mobility Spectrophotometer
IOP	Internal Operating Procedure
M256A1	Military code assigned to a type of detection kit for CWAs in air
M8	Military code assigned to a type of paper used for field screening of CWAs
NEG	Indicates a negative result
NIOSH	National Institute for Occupational Safety and Health

ORIA	U.S. EPA Office of Radiation and Indoor Air
OSHA	Occupational Safety and Health Administration
PETN	Pentaerythritol Tetranitrate
pH	Measurement of acidity or alkalinity of a solution dependent upon the concentration of hydrogen ions in solution, $pH = -\log[H^+]$
PID	Photo-Ionization Detector
POS	Indicates a positive result
PPE	Personal Protective Equipment
PS	Common symbol for chloropicrin
PVC	Polyvinyl chloride
R	Roentgen, a unit of measurement for ionizing radiation (e.g., microR or milliR)
RDX	Cyclonite
rem	Roentgen (R) equivalent in man, a unit of radiation dose
SCBA	Self-Contained Breathing Apparatus
SEI	Safety Equipment Institute
SOP	Standard Operating Procedure
TATP	Triacetone-triperoxide
TNB	Trinitrobenzene
TNT	Trinitrotoluene
USEPA	U.S. Environmental Protection Agency
VOCs	Volatile Organic Compounds
V	See Glossary
V-type	See Glossary
VX	Chemical agent symbol for S-2 [diisopropylamino] O-ethyl methylphosphonothioate
WMD	Weapons of Mass Destruction

1.0 Introduction

1.1 Scope and Application

The U.S. Department of Homeland Security (DHS), U.S. Environmental Protection Agency (USEPA), U.S. Department of Defense (DoD), Federal Bureau of Investigation (FBI), and the Association of Public Health Laboratories (APHL) have combined efforts to develop, construct, and implement All Hazards Receipt Facilities (AHRFs) for screening samples of unknown and potentially hazardous character prior to laboratory analysis. The effort was initiated in response to requests from state and federal agencies, particularly public health and environmental laboratories, to help protect laboratory facilities and staff. The AHRF Screening Protocol is a recommended approach to use when screening samples that have been presented to an AHRF.

This protocol is to be used as guide for screening samples for chemical, radiochemical, and explosive hazards prior to laboratory analysis. Implementation of this protocol may vary from one location to the next depending on the capabilities of the laboratory to which the AHRF unit is attached. The AHRF and the protocol should be adjusted to conform to the capabilities and goals of the particular location.

Suspicious packages or substances often generate a public safety/law enforcement response to determine whether the materials represent a risk to the general public or the environment. When possible, these materials are screened in the field to determine if they pose an imminent threat and, therefore, require special handling and transportation. Field screening procedures should include protocols for detecting potentially explosive devices, as well as radiological, flammable, explosive, and corrosive materials. It is not unusual, however, for suspicious materials to be transported directly to a laboratory without having been screened in the field. Moreover, it is often the case that laboratories are presented with samples for which the laboratory has unreliable information regarding field screening results. It is these situations that have led to requests for an AHRF where such unknown materials can be received and screened for the presence of hazards prior to their receipt at a laboratory.

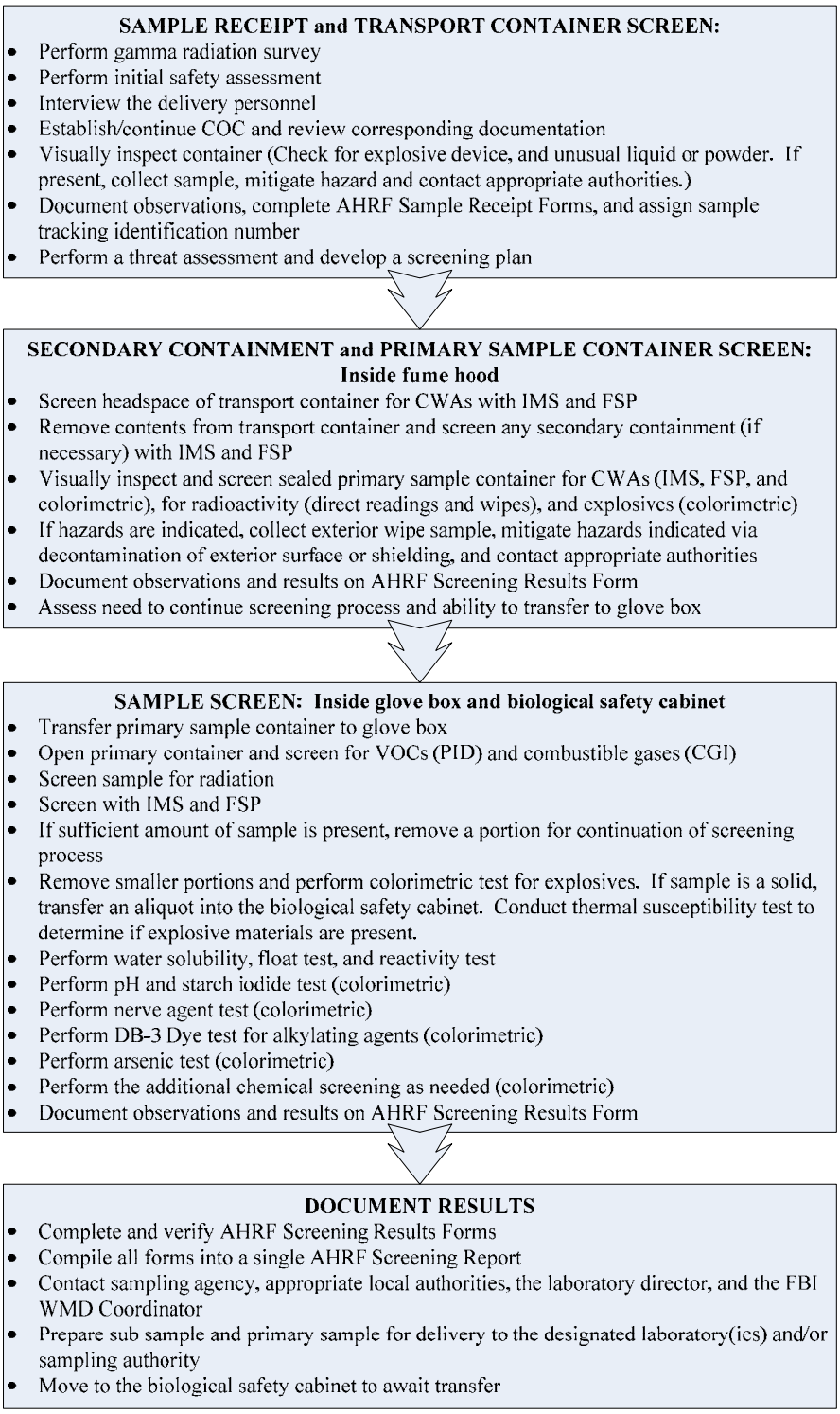
All samples received at an AHRF must be deemed a potential threat by local, state, or federal law enforcement before they are accepted at the AHRF. Samples brought to an AHRF by citizen "walk-ins" also must first be evaluated by a responsible government entity (e.g., a state or federal emergency response team) prior to being accepted at the AHRF. Samples containing hazardous materials might become evidence in criminal investigations, and the evidentiary nature of the sample and chain of custody (COC) must be preserved at all times. If possible, the inner and outer packaging, as well as the sample itself, should be photographed during the screening process to provide visual documentation. Supplemental documentation (e.g., details regarding what was sampled, who performed any sample screening, the procedures used, and the results) should accompany the sample, and the sample must be stored in a locked, limited access

container or area when not in the custody of the person or persons responsible for preserving the COC. If the unknown material might be dangerous, or if there is an accompanying threat or other evidence of a criminal act, the laboratory director, local FBI Weapons of Mass Destruction (WMD) Coordinator, and other appropriate local authorities must be informed immediately.

This AHRF protocol is to be used as a guide by laboratories that are considering or implementing an AHRF for dealing with these types of scenarios. The protocol is intended for in-process screening of samples of unknown chemical, explosive, and radiological hazard presented to an AHRF and to mitigate those hazards to protect laboratory facilities and staff from contamination and injury. The AHRFs are not intended to provide detailed or quantitative information regarding the identity and amount of hazardous materials, but instead provide initial screening results that can be used to determine whether a specific laboratory can or should be used for further sample analysis. *The protocol described in this document does not include specific biological screening procedures. Suspected biological samples should be referred to an appropriate receiving laboratory. The DHS and DoD are assessing potential "low tech" and low cost biological screening methods that may be added at a later date.*

Figure 1 summarizes the proposed AHRF protocol screening process.

Figure 1.
Summary of AHRF Screening Protocols



CGI- Combustible Gas Indicator
COC- Chain of Custody
CWA- Chemical Warfare Agent
FSP- Flame Spectrophotometer
IMS- Ion Mobility Spectrometer
PID- Photoionization Detector
VOC- Volatile Organic Compounds
WMD- Weapons of Mass Destruction

1.2 Assumptions

This protocol does not include information regarding standard operating procedures (SOPs) of the AHRFs or tasks and activities that will be performed by site management or safety and hygiene individuals. It is assumed that AHRF staff will be trained in Occupational Safety and Health Administration (OSHA) requirements for hazardous waste operations and emergency response at Title 29 of the Code of Federal Regulations (CFR) Section 1910.120 (Hazardous Waste Operations and Emergency Response) or 29 CFR 1926.65 (Safety and Health Regulations for Construction), and will be familiar with a Health and Safety Plan specific to the AHRF. In accordance with the OSHA Act, each laboratory operating an AHRF is responsible for having an established SOP for quality control activities to minimize the possibility of false positives and false negatives during screening tests. Each laboratory is also responsible for developing site-specific safety and health plans, ensuring that personnel are informed as to the potential hazards when working in an AHRF facility, and dictating the requirements for safely working in the area.

Each laboratory should determine the type of personal protective equipment (PPE) that should be worn. It should be noted that PPE is a secondary source of protection, while engineering controls are the first level of defense in preventing exposure to hazardous materials.

A list of PPE is provided in Attachment 1 of this document for informational purposes. The type of PPE used should be assessed and modified by the laboratory as necessary as samples are received. At a minimum, PPE for AHRF staff should include the following unless otherwise recommended in the laboratory SOP:

- Coveralls or laboratory coat
- 2 pairs of nitrile gloves (e.g., nitrile gloves compliant with 21 CFR, preferably at least 5 mil). Alternatively, if Chemical Warfare Agents (CWAs) are suspected to be present in a sample, 1 pair of non-standard butyl gloves should be used as outer gloves worn over a double pair of nitrile gloves.
- Safety glasses or chemical splash goggles (e.g., ANSI Z87.1-1989, SEI certified eye protection goggles or visor)
- Escape mask (close at hand)

It is also assumed that AHRF staff will be familiar with the U.S. Department of Transportation (DOT) Hazardous Materials Transportation Act (HMTA) and Hazardous Materials Transportation Safety Act (HMTSA) requirements at 49 CFR parts 171 through 177 for packaging and transporting hazardous materials. The screening process and results will be documented and recorded on sample receipt forms, COC forms, and screening results forms. Examples of these forms are provided in Attachments 2, 3, and 4, respectively. Each laboratory is responsible for developing guidelines for sample transportation, preservation, and storage once samples have been screened.

1.3 Target Hazards and Equipment

The types of compounds targeted by the AHRF equipment included in this protocol are listed in Table 1 below. The equipment can not be used to identify specific compounds, but can be used to indicate the presence of hazards such as those listed in Table 2. ***This protocol currently does not include specific biological screening. Suspected biological samples should be referred to an appropriate receiving laboratory. The DHS and DoD are assessing potential "low tech" and low cost biological screening methods that may be added at a later date.***

Table 1.
Classes of Compounds Targeted by the AHRF Screening Equipment

AHRF SCREENING EQUIPMENT		TARGET ANALYTES
Transport Container Survey (immediately upon receipt, outside the AHRF)		
Radiological Survey	Micro R Meter gamma scintillator (from a distance)	• Gamma Ray Emission
Transport Container Screen (inside the AHRF)		
Radiological Survey	Alpha, beta, gamma scintillator with data logger	• Alpha and Beta emitters (container surface) • Gamma Ray emitters (contact dose)
Chemical Screen	Wipe with M8 paper if any unusual contamination is visible	• Nerve agents (GA, GB, GD, VX) • Blister agents (H, HD, HN, HT and Lewisite) • Any organic liquid
Explosives Screen	Colorimetric Indicator	• Nitro aromatics, nitrate-esters, nitramines, inorganic nitrate compounds. (NOTE: See full list in Table 2)
Primary Sample Container Screen (in fume hood or equivalent)		
Radiological Survey	Alpha, beta, gamma scintillator with data logger	• Alpha and Beta emitters (container surface) • Gamma Ray emitters (contact dose)
Explosives Screen	Colorimetric Indicator	• Nitro aromatics, nitrate-esters, nitramines, inorganic nitrate compounds. (NOTE: See full list in Table 2)
Chemical Screen	Flame Spectrophotometer (FSP)	• Compounds containing phosphorous or sulfur • Nerve agents (GA, GB, GD, VX) • Blister agents (H, HD, HN, HT and Lewisite)
	Ion Mobility Spectrometer (IMS)	• Nerve agents (GA, GB, GD, VX) • Blister agents (HD, HN, Lewisite)
	M8 Paper	• Nerve agents (GA, GB, GD, VX) • Blister agents (H, HD, HN, HT and Lewisite) • Any organic liquid

Sample Screen (in glove box)		
Radiological Survey	Alpha, beta scintillator with data logger	• Alpha and Beta emitters (sample surface)
Explosives Screen	Colorimetric Indicator	• Nitro aromatics, nitrate-esters, nitramines, inorganic nitrate compounds. (NOTE: See full list in Table 2)
Explosives Screen	Thermal susceptibility test (to be performed in the biological safety cabinet outside of the glove box)	• Explosive materials • Energetic materials
Chemical Screen	Photoionization Detector (PID) and Combustible Gas Indicator (CGI)	• Most volatile organic compounds (VOCs). Does not identify or distinguish between VOCs. • Nerve agents (GA, GB, GD, VX) • Blood agents (CK, AC) • Blister agents (H, HD, HN, HT and Lewisite) • Choking agents (CG)
	FSP	• Compounds containing phosphorous or sulfur • Nerve agents (GA, GB, GD, VX) • Blister agents (H, HD, HN, HT and Lewisite)
	IMS	• Nerve agents (GA, GB, GD, VX) • Blister agents (HD, HN, Lewisite)
	Colorimetric paper tests: pH, starch iodide, DB-3	• Acidity/alkalinity, oxidizing compounds, alkylating agents (Mustard)
	Colorimetric enzyme test: CWA (nerve agent) detection kit	• Nerve agents (GA, GB, GD, VX)
	Colorimetric test for arsenic compounds	• Lewisite and other arsenic compounds

Table 2.
Specific Compounds and Materials Targeted by the AHRF Screening Equipment

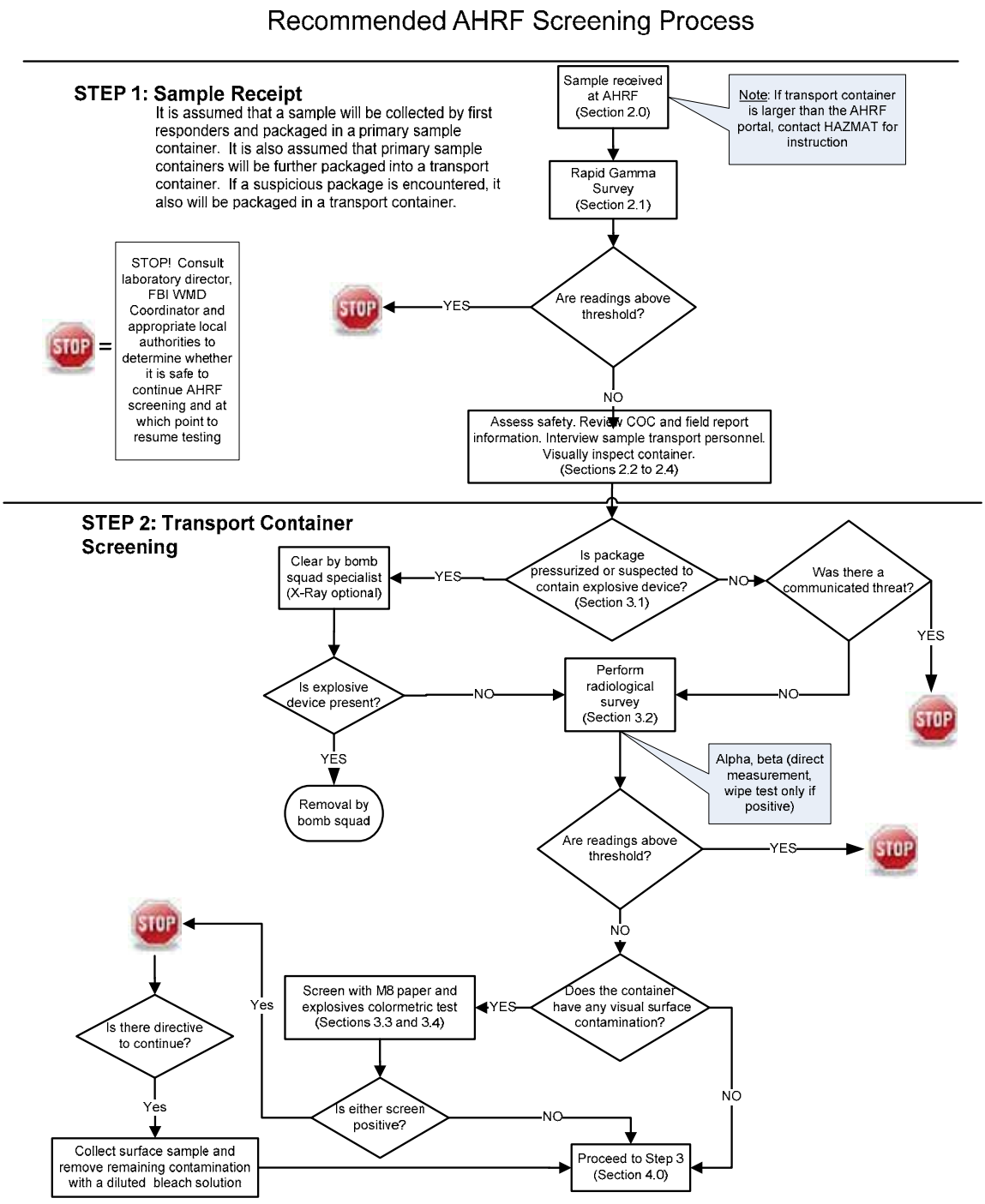
Chemical Warfare Agents Nerve: GA - Tabun GB - Sarin GD - Soman Organophosphate nerve agents VX Blister: H - Mustard agents HD - Distilled mustard HN - Nitrogen mustard HT - Sulfur mustard Lewisite Blood: AC - Hydrogen cyanide CK - Cyanogen chloride Choking: CG - Phosgene **Chemical compounds** Arsine Arsenic Chlorine Cyanide Fluoride Hydrocyanic acid Hydrogen sulfide Oxidizers	**Explosive Agents** Ammonium nitrate Barium nitrate Black Powder Bromides DNT - Dinitrotoluene EGDN - Ethylene glycol dinitrate HMTD - Hexamethylenetriperoxidediamine HMX - Octogen Lead styphnate Nitro cellulose Nitro glycerin PETN - Pentaerythritol tetranitrate Picric acid Potassium chlorate Potassium nitrate RDX - Cyclonite Semtex Smokeless powder Sodium chlorate Sodium nitrate TATP - Triacetone-triperoxide Tetryl TNB - Trinitrobenzene TNT - Trinitrotoluene Tri nitro naphthalene **Radiological Agents** Alpha and Beta particles Gamma ray emission

If screening tests indicate the presence of an explosive substance or device, radioactive material, or CWA, the local FBI WMD Coordinator, laboratory director, and appropriate local authorities should be consulted. This protocol does not include recommendations regarding which analyses should be performed on the sample after it has gone through the AHRF screening process. If the AHRF procedures do not detect a hazard, it does not necessarily mean that hazardous material is not present at any quantity. The laboratory director has the final authority as to whether a sample can enter the laboratory.

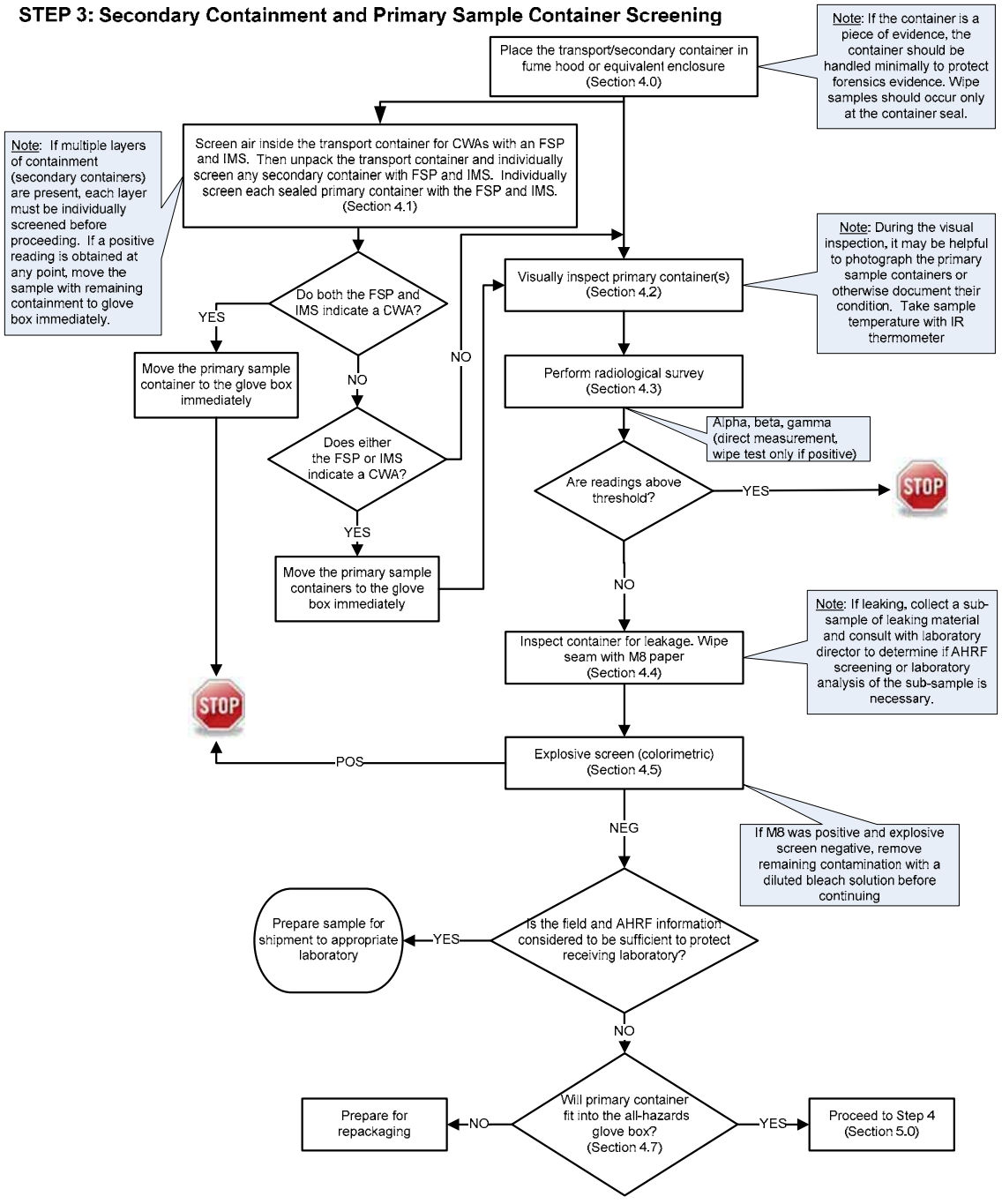
Many hazards can be minimized if the AHRF sends only a small quantity of the sample to the laboratory. For example, if a sample is suspected to contain a chemical, radiological, or explosive hazard, the laboratory manager may agree to accept a sample size of no more than a swab, 500 mg and/or 0.5 mL. This would be appropriate only for certain analyses where a small amount of sample is needed (e.g., some biological and radiological testing).

Figure 2 presents a flowchart of the AHRF protocol screening steps.

Figure 2.
AHRF Screening Protocols Flowchart

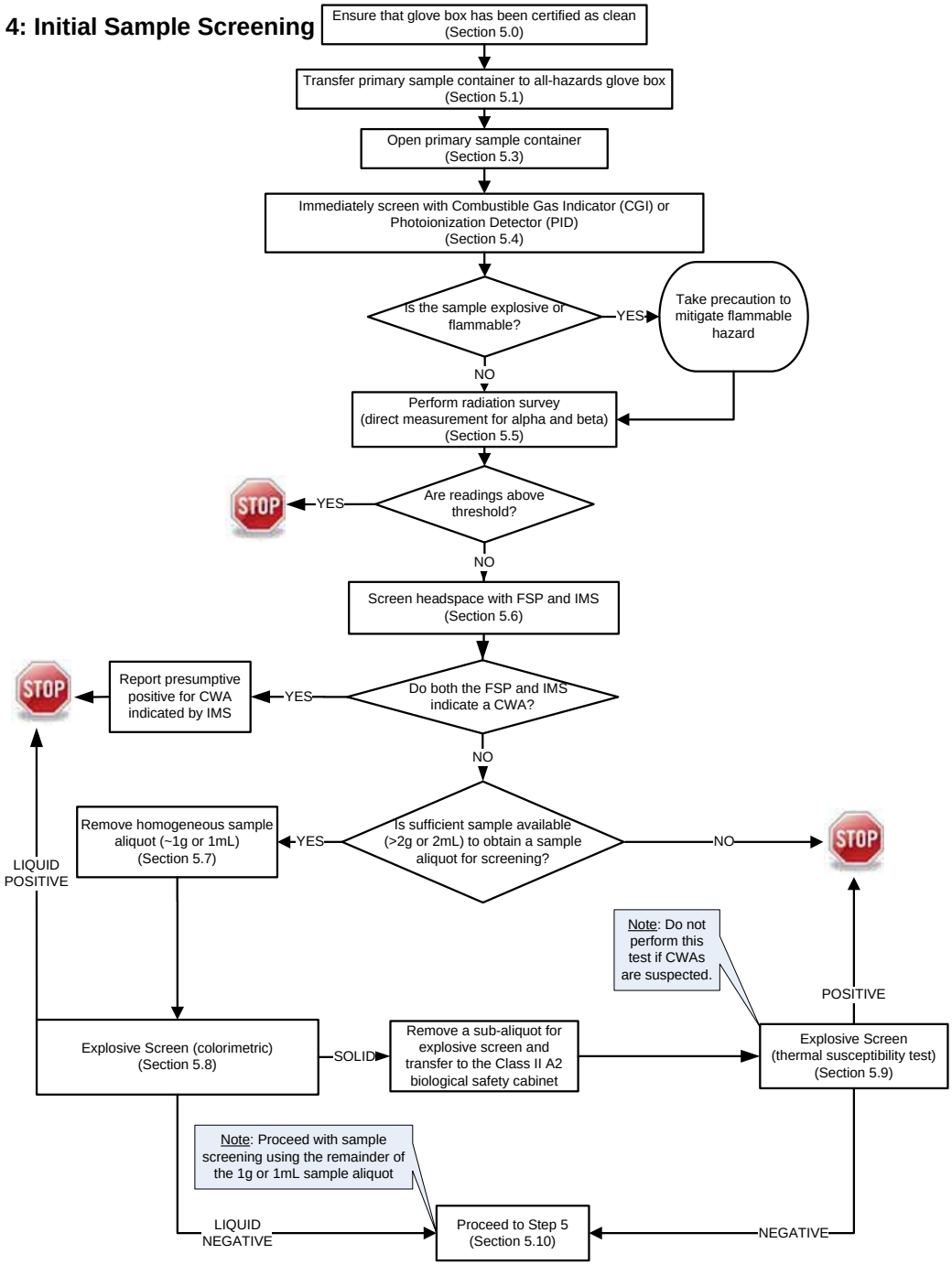


Recommended AHRF Screening Process (Continued)

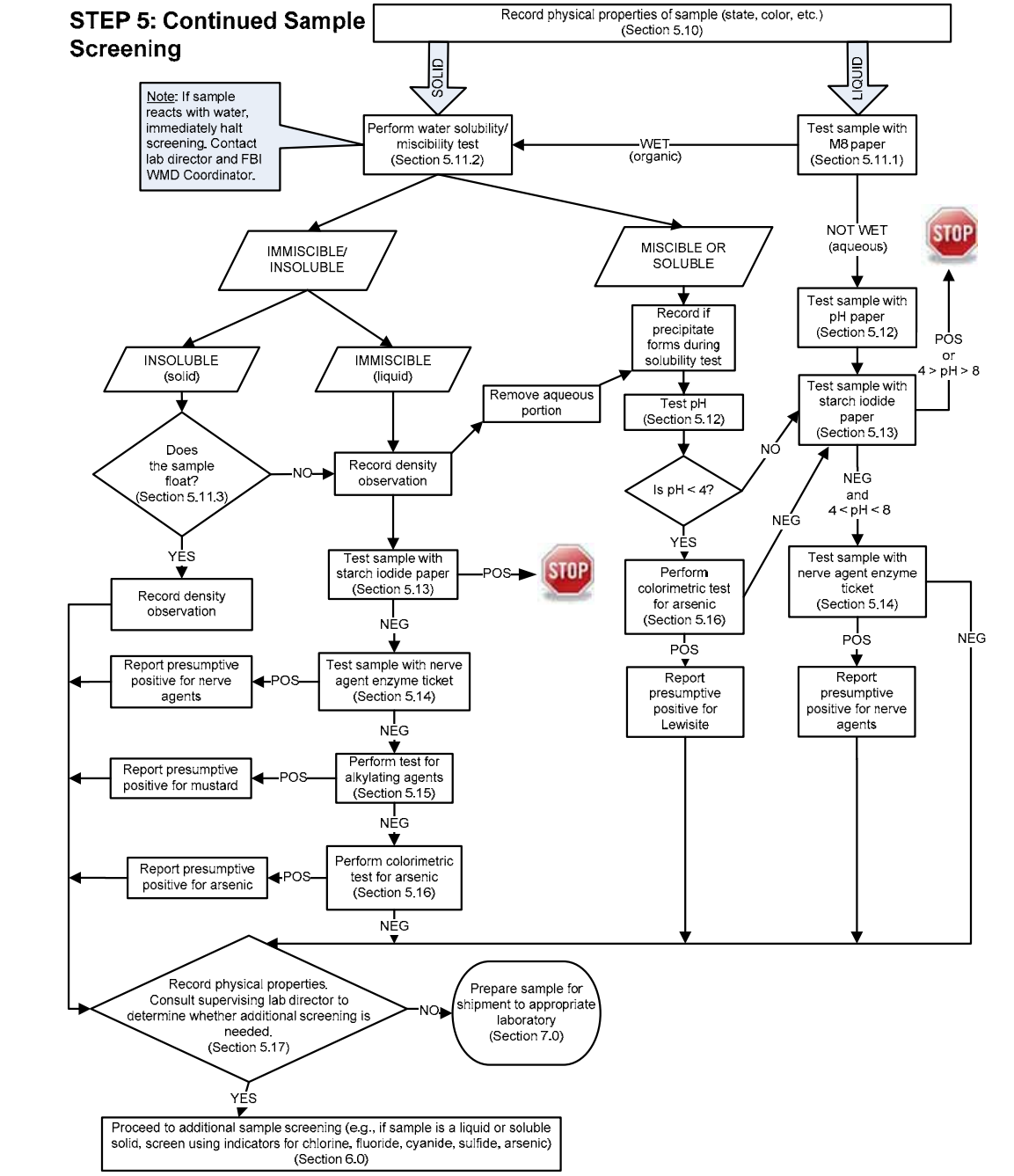


Recommended AHRF Screening Process (Continued)

STEP 4: Initial Sample Screening



Recommended AHRF Screening Process (Continued)



2.0 Sample Receipt

Prior to accepting a sample into the AHRF, a number of activities should be performed to ensure sample integrity, the validity of field screening results, and the safety of AHRF and laboratory personnel. AHRF staff performing these activities should use an AHRF Sample Receipt Form to document sample receipt activities. An example AHRF Sample Receipt Form is provided as Attachment 2.

The following procedures assume that samples will be packaged in multiple layers of containment. The primary sample container is the vessel that physically contains the unknown sample material. Once this layer of containment is breached, the sample is exposed. Primary sample containers consist of any type of material that physically encloses the sample. It can be provided by first responders collecting the sample or may be part of the evidence itself. In cases where the primary sample container might be part of the evidence itself, great care should be taken to preserve potential trace evidence (e.g. fingerprints, DNA, etc.) that may be present on the container. The primary sample container often will be placed in one or more secondary containment vessels to provide spill control and sample protection. Secondary containment may consist of a plastic bag or other larger container and should be packaged further into a transport container for shipment to the AHRF. The transport container may be a cooler or other suitable container with proper packaging to minimize breakage and leakage of the primary or secondary sample containers during transport. If a suspicious package (e.g., package from an unknown source, found unattended. or showing evidence of a threat) is encountered, the same general guidelines should be followed and the package should be placed into a transport container to protect the evidence and the sample during transport.

2.1 Rapid Gamma Survey

2.1.1 Prior to entering the AHRF, the sample transport container should be surveyed for gamma radiation to determine if an imminent threat to health and safety exists.

2.1.2 A gamma survey will provide an indication of the presence of gamma emitters in the sample or on the container. Depending on the container type, only high energy beta or gamma emitters will penetrate the sample transport container.

WARNING! Radiological surveys should be performed by personnel trained in, and familiar with, the equipment that is used. It is recommended that these procedures be performed by a radiation technician/professional trained to use the AHRF equipment and to perform the calculations that may be required to obtain survey results.

2.1.3 Gamma Radiation Survey Procedure

2.1.3.1 Perform a gamma dose rate survey of the sample transport container. When performing this survey, the technician should use As Low As Reasonably Achievable (ALARA) principles,

while pointing the detector at and around the container. If available, a remote sensing device can be used to perform this survey. [For the Micro-R meter, as with most gamma scintillators, the probe is located inside the front bottom edge of the meter.]

2.1.3.2 To avoid saturating the meter, start at the highest reading range (if equipment is manual ranging) and decrease the reading scale as needed.

2.1.3.3 Point the meter at the sample. Monitor dose rates at approximately 18 inches from the container surface and again as close as possible to the container. Static one-minute measurements should be collected at random locations for each distance. Record the highest level at each distance, noting the probe location relative to the container.

2.1.3.4 Record survey results on the AHRF Transport Container Screening Results Form (Attachment 4).

2.1.4 Gamma Radiation Survey Results

2.1.4.1 Typical background for gamma radiation is 5 to 20 micro R/hr (roughly 0.005 to 0.02 mR or mrem/hr).

2.1.4.2 The recommended maximum level of gamma radiation for acceptance into the AHRF is:

Gamma threshold: 0.1 mrem/hr (100 µR/hr for gamma radiation)

NOTE: This threshold is recommended by the USEPA Office of Radiation and Indoor Air (ORIA).

2.1.4.3 Each AHRF may either use the USEPA threshold or set a threshold based on AHRF background levels and capabilities for handling radioactive substances.

2.1.4.4 If survey results indicate a gamma dose rate greater than the threshold, the AHRF screening procedures should be halted and the following measures taken:

- Place the transport container in a steel- or lead- lined box, if available, or behind other appropriate shielding materials (e.g., cement bunker). Isolate the container in a secure, weather protected observable area away from the AHRF.
- Consult the laboratory director, appropriate local authorities, and the local FBI WMD Coordinator immediately to determine whether AHRF screening procedures should continue.
- If screening is stopped, the transport container should be prepared for transport to a radiological laboratory that can also receive samples with potential biological, explosive, or chemical hazards. NOTE: To comply with shipping

regulations, alpha, beta, and gamma scans and wipe samples may be necessary on the outermost shipping container. If wipe sample contamination is present, save the contaminated wipes for possible laboratory analysis, and contact a radiological hazardous waste transport professional to remove the transport container and wipes from the AHRF site.

2.2 Initial Safety Assessment Questions

Assess whether the sample poses an immediate potential threat to the AHRF staff and facility by asking the sample delivery personnel the following questions:

- Has the sample been screened for radioactivity and explosives?
- Does the package appear suspicious?
- Are there protruding wires, strange odors, crystallization, or apparent damage?
- Is the package rigid, bulky, stained, or does it have excessive tape or string?
- Has there been a communicated threat?

WARNING! If there was a communicated threat, or hazards or dangers posed by the sample are imminent, STOP and consult the laboratory director, local FBI WMD Coordinator, and appropriate local authorities to determine if it is safe to continue.

2.3 Interview Sample Delivery Personnel and Verify the COC and Field Documentation

It is important to interview the sample delivery personnel to ensure all the pertinent information regarding the sample's background is documented (e.g., collection, packaging, transport, handling, hazards). Each sample received at the AHRF should have a corresponding COC form. An example COC is provided as Attachment 3. The COC form should provide information regarding sample transfer, including documenting any occasion during which a sample may have been left unattended. Each sample that is delivered to the AHRF should have an accompanying sample field report or emergency sample form. The information provided in these documents should be reviewed and evaluated to assist in determining the type and extent of AHRF screening that will be performed, as well as the type and extent of personal protection and safety precautions that are necessary. This information also may be used by laboratories, along with AHRF screening results, to determine the type and extent of laboratory analysis and safety precautions necessary.

The COC and any accompanying forms should be reviewed to verify and evaluate sample transport information prior to bringing the sample into the AHRF.

2.3.1 Have the sample delivery personnel place the transport container on a stable surface in a sample receipt staging area (e.g., on a table, in a

weather protected area, outside the observation window). Immediately notify the AHRF staff that a sample has arrived.

WARNING! Do not shake or move the transport container unnecessarily. Do not sniff, touch, or show the container to others.

2.3.2 Request proof of identification (i.e., government-issued picture ID). Review the identification against the signature on the COC.

2.3.3 Interview the delivery personnel and check this information against the sample COC. Information obtained during this interview should include the following:

- List of known potential hazards or dangers posed by the sample

WARNING! If hazards or dangers posed by the sample are imminent, contact the laboratory director, FBI WMD Coordinator, and appropriate local authorities before continuing the sample receipt process. If the sample is suspected to contain a specific chemical hazard, or if field screening for explosives or radiation has not been performed, proceed to Section 3.1 for Explosives and 3.2 for Radiation.

- Information related to any unusual substance(s) on the outside of the transport container

WARNING! If an unusual substance is present on the outside of the transport container and no information is available regarding its identity, STOP and screen the container using the procedures described in Section 3.3.

- Date, time, and location where delivery personnel took possession of the sample
- Sample condition and/or containment when delivery personnel first got possession of the sample (e.g., is there a custody seal and is it broken?)
- Whether any of the containers are pieces of evidence and, if so, whether they have been placed in an appropriate containment bag
- How sample is contained (e.g., primary, secondary, transport container)
- Contacts or responsible parties
- Comments or observations regarding conditions of sample transport

2.3.4 Identify the sample by type and source. Sample type categories include the following:

- Water (e.g., ground water, drinking water, stream, reservoir, other water body)
- Soil (e.g., surface, sub-surface)
- Liquids (e.g., oils, leachate, detergent)
- Petroleum product or solvent based (e.g., car explosion, chemical leak)
- Solids (e.g., powder, chips scraped off of a surface)
- Wipes (e.g., cloth with or without a solvent)

- Air filters (e.g., filters from field sampling equipment, automotive vehicles or equipment operating in direct area)
- Suspicious packages
- Pressurized gas containers or cylinders

WARNING! The AHRF is not equipped to handle gas containers or cylinders that are under pressure. Handle these with extreme caution. Place the container in a blast box if one is available and move it as far away from people and buildings as possible, while still keeping it in a secure area. Immediately obtain the assistance of a bomb squad to remove it.

2.3.5 Identify samples by known and unknown sources.

- Known source: collected by a field technician or remote sensing/monitoring equipment and controlled in a sample container
- Unknown source: discovered unattended, source unidentified, placed in container at the scene

2.3.6 Segregate samples from known and unknown sources for screening. Samples from known sources may require less screening at the AHRF, depending on review of the field reports and first responder's knowledge of the sampling site and event impact.

2.3.7 Review the COC form.

2.3.7.1 At a minimum, the COC form should include the following information:

- Sample description
- Sample identification code or number
- Date, time, and location of sample collection
- Number of samples collected and transported
- Number of containers collected for each sample
- Identification of sample collector
- Contact information for a principal investigator, project manager, or project coordinator
- Names of any person(s) handling the sample
- Time and location of any transfer of sample possession
- If a sample has been left unattended, information regarding the location and conditions of sample storage (i.e., sample was stored in a locked compartment or container)

2.3.7.2 This COC form also may include information regarding the following:

- Sample containers used
- Sample container decontamination
- Transport containers used
- Type and conditions of transport

2.3.8 Review the Sample Field Report.

2.3.8.1 Check the sample field report for completeness and suspicious indicators; follow up as necessary.

2.3.8.2 At a minimum, this report should include the following information:

- Location, date, and time of sample collection
- Sample identification number
- If field tests have been performed, the field report should contain the types of tests performed (e.g., specific chemical, biological, radiation/radioactive contamination, explosives, field measurements), the testing equipment used (including make/model number, serial number, calibration date), date and time testing was performed, the results of the tests, and the person(s) performing each test
- Noted environmental and/or human health impacts
- Name(s) of field personnel collecting the sample and performing field tests

2.3.8.3 These reports also may include information regarding:

- Reason for sample collection
- Event description
- Risk assessment
- Number of people exposed, type of exposure, and symptoms (e.g., blistering, skin/eye/nose/mouth irritation, disorientation, respiratory problems, convulsions, death)
- Sample type (e.g., envelope, package, swab, swipe, air, water (and source of water), soil, petroleum product or solvent)
- Physical state of sample (e.g., solid, liquid, gas)
- Sample appearance (e.g., granular, powder, oily, color)
- Sample amount (approximate)
- Preservative or other chemical or material, if any, added to the sample
- Identification of person(s) who have been informed of the event

2.4 Visually Inspect the Sample Transport Container and Confirm Information

A visual inspection will allow the AHRF personnel to confirm the information provided by the sample delivery personnel and the corresponding documentation. In cases where a risk is known or expected as a result of field screening or site evaluation, a label or placard may be attached to the sample transport container providing information regarding associated risks (e.g., radioactive, explosive, corrosive, toxic, or flammable). As a precaution, AHRF personnel should assume that any unlabeled sample transport container contains hazards until the contents are further screened or evaluated. The possibility that containers may be mislabeled also should be considered. Record results of the following visual inspection on the AHRF Sample Receipt Form (Attachment 2).

WARNING! Sample transport containers should not be opened during any sample receipt activities, including visual inspection of the container.

2.4.1 Prior to transferring the sample transport container into the AHRF, use the radiological survey equipment that will be used to survey the transport container inside the fume hood (or equivalent environmental enclosure) to determine the average alpha and beta radioactivity inside the fume hood. Twice the established average background will be used as the alpha/beta thresholds during the direct reading radioactive survey of the transport container (Section 3.2.3) and primary/secondary containers (Section 4.3.3).

2.4.2 Have the sample delivery personnel place the transport container into the sample entrance air lock.

2.4.3 Don appropriate PPE. Move sample transport container into the fume hood or equivalent environmental enclosure.

2.4.4 Visually inspect the sample transport container.

2.4.4.1 Examine the sample transport container for suspicious indicators, including:

- Protruding wires
- Rigidness or bulkiness
- Strange odors (only obvious odors – DO NOT sniff the sample container)
- Oily stains, discoloration, or crystallization
- Excessive tape or string
- Unusual or unexpected contamination on the container (e.g., bright colored substances, crystalline deposits, liquids; not dirt, dust, dried mud, or any other contamination that might be expected from field sampling or exposure)
- Damaged, bulging, or discolored container

WARNING! If there has been a communicated threat, or if any of the suspicious indicators are present, mitigate imminent hazards, isolate the sample transport container and consult the appropriate authorities for assistance before further handling.

HINT: Post a call list in the AHRF that includes contact names and telephone numbers for responsible parties (e.g., laboratory director, local authorities, local FBI WMD Coordinator).

2.4.4.2 Inspect the sample transport container to ensure sample integrity. Check the following:

- Condition of transport container. Is it intact?
- Transport container seal. Is it properly sealed?

- Custody seal. Is it unbroken?
- Labels. Are they consistent with the information contained in the COC form and/or field report?
- Placards/labels that provide information regarding associated risks (e.g., radioactive, explosive, corrosive, toxic, or flammable). Does it match the documentation provided?

NOTE: Some transport containers may have a custody seal and will not have a label or vice versa. If the transport container does not contain a custody seal, the primary container(s) should be examined for seals once they are unpacked from the transport and/or secondary containment vessels (Section 4.2).

2.4.4.3 If possible, photograph the transport container and all labels, placards, seals, etc.

2.4.4.4 If the container is damaged, discolored, or leaking, place it in a larger container to control possible spillage prior to transferring the sample to the glove box. Ensure that no personnel have direct contact with the leaking substance. Increased PPE may be necessary, including respiratory protection (see Attachment 1). Proceed to Section 3.3.

2.5 Receive Sample and Assign Sample Tracking Identification Number

2.5.1 Transfer custody of the sample to AHRF personnel.

2.5.1.1 Document sample receipt and release using signature, date, time, and location of the transfer. NOTE: Each person accepting custody of a sample accepts the responsibility for ensuring the integrity and security of that sample.

2.5.1.2 Have delivery personnel sign the AHRF Sample Receipt Form (Attachment 2) and sample COC (Attachment 3). Ensure they include their printed name, affiliation, date and time along with their signature.

2.5.2 Enter an AHRF sample tracking identification number on the sample label, container, or containment bag. NOTE: This number may be identical to the sample identification number used on the COC.

2.5.3 Enter sample tracking identification number on the COC and field report forms.

2.5.4 If possible, make a copy of the completed COC form, custody seals, and any other documentation and maintain them in the AHRF records.

2.5.5 Seal the completed, original COC form, along with any other accompanying documentation, in a resealable plastic bag and include it

with the sample report and tracking forms (Section 2.6 and Attachment 4) that accompany each sample through the AHRF screening process.

2.6 Prepare the AHRF Sample Screening Forms Packet

2.6.1 Compile the forms that will accompany the sample through the AHRF screening process. Forms that accompany each sample should include:

- The original sample COC form (Attachment 3)
- The original field report
- AHRF Sample Receipt Form (Attachment 2)
- AHRF Screening Results Forms (Attachment 4)
  - Transport Container Screening Results
  - Primary/Secondary Sample Container Screening Results
  - Sample Screening Results

2.6.2 Enter sample tracking identification number on the AHRF Screening Results Forms (Attachment 4).

2.6.2.1 The results of all AHRF screening procedures should be recorded on the AHRF Screening Results Forms (see Attachment 4) as well as the signatures of screening technicians and the date and time of each screening test.

2.7 Threat Assessment: Review the Results and Determine the AHRF Screening Plan

Results and observations noted during sample receipt should be reviewed and evaluated to maximize sample screening efficiency and personnel protection.

2.7.1 Personal Protective Equipment

2.7.1.1 Information obtained during the sample receipt process can be used to make decisions regarding the level of protection needed and to ensure that AHRF staff are properly protected.

2.7.1.2 The minimal amount of PPE that is considered necessary for performing AHRF screening activities includes two pairs of nitrile gloves, eye protection, and protective clothes covering. Escape masks also should be easily accessible. A summary of PPE that should be considered for the AHRF is provided in Attachment 1.

CAUTION: If CWAs are suspected to be present in a sample, one pair of non-standard butyl gloves should be used as outer gloves worn over a single pair of nitrile gloves. Nitrile gloves should be replaced between every sample or every five minutes, whichever comes first. Information regarding PPE that should be available at the AHRF is included in Attachment 1.

2.7.1.3 Equipment also should be available so that AHRF personnel can increase PPE if desired or needed. It is possible, for

example, that AHRF staff may choose to use Level B or C protection when moving and/or screening suspicious packages for which there is no available field screening information.

2.7.1.4 If information in the field report indicates an immediate threat or health risk (e.g., exposure resulted in blistering, disorientation, respiratory problems, convulsions, and/or death), AHRF staff should increase the level of PPE.

HINTS: (1) Positioning of wall clocks and timers throughout the AHRF aids in monitoring glove change times and assists in the timing of tests. (2) Use of two different colors for inner and outer gloves allows for easier monitoring of proper glove use.

2.7.2 AHRF screening plan

2.7.2.1 AHRF staff, including the laboratory director, should use best professional judgment to evaluate the field information provided during sample receipt. The AHRF staff should determine the extent of AHRF screening that is required to expeditiously and accurately provide the information needed to protect the laboratory. Example decisions include the following:

- If the sample transport container is suspected to contain an explosive device, or explosive or shock-sensitive material as determined by visual inspection (i.e., protruding wires, rigidness or bulkiness, excessive tape or string), seek bomb squad assistance before further handling.
- Immediately obtain expert assistance in removing pressurized gas containers or cylinders from the AHRF. If possible, place the container in a secure, protected (e.g., behind a cement bunker or in a blast box, if available) location as far away from people and buildings as possible.
- Samples that have been identified as coming from a known source (e.g., drinking water) with no indication that the sample may contain an explosive device should not require an explosives device screen.
- If the sample is identified as a suspicious powder, and there is indication of an intentional threat, AHRF screening should focus on protecting biological laboratories and increasing the level of PPE used by AHRF personnel.
- If the receiving laboratory is equipped to handle samples containing hazardous chemicals (e.g., arsenic, cyanide, organic vapors), AHRF screening should focus on radioactivity, explosives, and chemical warfare agents.

2.7.2.2 If a hazard has been identified or ruled out in the field with certainty, screening steps that target the hazard may not be necessary at the AHRF.

3.0 Sample Transport Container Screening

The sample transport container is screened for explosive devices, radioactivity, and hazardous chemicals, prior to screening any secondary containment, primary sample container(s), or the sample itself. If possible, and if explosive devices are suspected, the sample transport container is screened for explosive devices in a staging area outside of the AHRF. Ideally, any sample suspected of containing explosive devices would have been screened before arriving at the AHRF site.

WARNING! Do not open sample transport containers during the transport container screening process. Transport containers should be moved into the chemical/biological fume hood inside the AHRF prior to removal and screening of secondary containment and/or primary sample container(s).

CAUTION: The presence of solvents or testing solutions near screening equipment can result in false readings. Marker pens may contain solvents which can affect equipment.

3.1 Sample Transport Container Screen for Explosive Device

3.1.1 Explosive Device Screening Procedures

3.1.1.1 Inspect the container to determine if any suspicious indicators are present such as the following:

- Protruding wires
- Rigidness or bulkiness
- Excessive tape or string

3.1.1.2 If the AHRF has the available equipment, perform an X-ray screen of the transport container. X-ray screening must be performed by persons trained by the equipment manufacturer. X-ray screening of containers suspected to contain an explosive device must be performed by a bomb specialist or person trained by a bomb specialist.

3.1.1.3 If a container is suspected to contain an explosive device, isolate the container and notify a bomb squad immediately. Place the container in a secure, protected (e.g., behind a cement bunker or in a blast box, if available) location as far away from people and buildings as possible.

WARNING! Samples that are suspected to contain an explosive device should be cleared by a bomb squad prior to continuing screening.

3.1.1.4 Record the results of the X-ray screen on the AHRF Transport Container Screening Results Form (Attachment 4). NOTE: Ensure copies are maintained in the AHRF files.

3.1.1.5 If it is determined that explosive devices are not present, proceed to Section 3.2.

3.2 Sample Transport Container Radiological Survey

3.2.1 Radiological Survey

An alpha/beta survey will provide an indication of the presence of any radioactive contamination on the outside of the transport container, or of gamma radiation that is in the sample.

WARNING! Radiological surveys should be performed by personnel trained in, and familiar with, the equipment that is used. It is recommended that these procedures be performed by a radiation technician/professional trained to use the AHRF equipment and to perform the calculations that may be required to obtain survey results.

3.2.2 Direct Reading Radiological Survey Procedures

3.2.2.1 Focusing on the areas of the container that are most likely to be contaminated (e.g., bottom of the container, lid opening, handles, and container seams), perform a direct reading survey of the sample transport container.

3.2.2.2 Scan the container as close to its surface as possible (e.g., ¼ inch from the surface of the container), without allowing the instrumentation to come in contact with the surface. Move the meter slowly over the surface of the container.

3.2.2.3 Convert the alpha and beta counts to disintegrations per minute (dpm), if necessary, and record alpha, beta, and gamma results on the AHRF Transport Container Screening Results Form (Attachment 4).

3.2.3 Direct Reading Radiological Survey Results

3.2.3.1 The recommended thresholds are:

Alpha threshold: 2 x average background (see Section 2.4.1) Beta threshold: 2 x average background (see Section 2.4.1) Gamma threshold: 100 µR/hr

NOTE: These thresholds are recommended by the USEPA ORIA.

3.2.3.3 If levels are above the thresholds, proceed to Section 3.2.4 and perform a wipe test on the outside of the sample transport container to determine if removable contamination is present.

3.2.3.4 If levels are below the thresholds, proceed to Section 3.3 and continue with container screening for CWAs.

3.2.4 Wipe Alpha and Beta Removable Surface Contamination Survey Procedures

WARNING! It is important to note that an AHRF may receive suspicious packages or containers that should be considered and handled as evidence. Suspicious packages should be handled as little as possible, taking care to maintain the integrity of any potential evidence the package may provide (e.g., finger prints, container or material manufacturer, physical particles). Package handling should be minimized, and wipe samples should be collected only from target areas, such as the seam of the container and lid.

3.2.4.1 Wipe an adequate number of locations to ensure that the transport container is thoroughly evaluated for loose contamination.

3.2.4.2 The wipe locations should focus on the areas of the container that are most likely to be contaminated (e.g., bottom of the container, lid opening, handles, and container seams).

3.2.4.3 Place wipe samples on planchets and count (see Table 1 for AHRF equipment list).

3.2.4.4 Most instruments read individual counts for alpha and beta particles simultaneously. The counts are converted to counts per minute, then to dpm, by applying instrument efficiency factors. The results are then divided by the area (cm^2) of the surface wiped.

3.2.4.5 Convert and record the alpha and beta counts as dpm/cm^2 on the AHRF Transport Container Screening Results Form (Attachment 4).

3.2.5 Wipe Alpha and Beta Surface Contamination Survey Results

3.2.5.1 The recommended alpha and beta wipe thresholds are:

Alpha threshold: 2.2 dpm/cm^2 Beta threshold: 22 dpm/cm^2

NOTE: These thresholds are taken from 49 CFR 173.443 and are recommended by the USEPA ORIA.

3.2.5.3 If the results of the wipe sample are less than the thresholds, proceed to Section 4.0 (unless there is an unusual substance present on the transport container as discussed in Section 2.4; if so proceed to Section 3.3.1, M8 Paper Screen).

3.2.5.4 If the wipe is above the thresholds (Section 3.2.5.1), attempt to decontaminate the container using a wet cloth. Save the cleaning materials and contaminated wipes for laboratory analysis along with the sample.

WARNING! If the sample transport container is considered to be a piece of evidence, this process will destroy any classical forensic evidence that may be on the outside of the container. Evaluate the risks before decontaminating the container.

3.2.5.5 Rewipe the surface of the container and count the wipes following the procedure above (Section 3.2.4).

3.2.5.6 Evaluate the results against the established thresholds (Section 3.2.5.1). If results are below the thresholds, proceed to Section 4.0 (unless there is an unusual substance present on the transport container as discussed in Section 2.4; if so proceed to Section 3.3.1, M8 Paper Screen).

3.2.5.7 If the results are still above the thresholds, the container cannot be easily decontaminated. STOP screening procedures.

- Wrap the container in plastic or other appropriate shielding material. Isolate the transport container in a secure, weather protected observable area away from the AHRF.
- Consult the laboratory director, appropriate local authorities, and the local FBI WMD Coordinator immediately to determine whether AHRF screening procedures should continue.
- If screening cannot continue, the transport container and wipes should be prepared for transport to a radiological laboratory that can receive samples with potential biological, explosive, or chemical hazards.
- Contact a radioactive materials shipping professional to remove the sample from the AHRF.

3.3 Sample Transport Container Screen for Chemical Warfare Agents

3.3.1 M8 Paper Screen Procedures

3.3.1.1 Inspect the container to determine if any unusual material or substances are present, such as the following:

- Strange odors (only obvious odors – DO NOT sniff the transport container)
- Oily stains, discoloration, or crystallization
- Unusual powders (not dirt, dust, dried mud, or any other contamination that might be expected from field sampling)

3.3.1.2 If no unusual material is present, proceed to Section 4.0.

3.3.1.3 If unusual material is present, follow procedures outlined below:

3.3.1.3.1 Collect a sample of the material from the transport container with M8 paper.

3.3.1.3.2 Observe the reaction with the paper.

3.3.1.3.3 Record the results on the AHRF Transport Container Screening Results Form (Attachment 4).

3.3.1.3.4 If positive, collect a sample of the material for potential laboratory analysis and wash the outside of the container with a 10% bleach solution, followed by reagent grade water.

WARNING! If the sample transport container is considered to be a piece of evidence, the container cleaning and decontamination process will destroy any classical forensic evidence that may be on the outside of the container. Evaluate the risks before washing the container with bleach and water.

3.3.1.3.5 If negative, proceed to Section 3.4.

HINT: Plastic tongs are recommended for disposal of screening and decontamination waste into the bleach container. Metal tongs can discolor and possibly contaminate the work area.

3.3.2 M8 Paper Screen Results

3.3.2.1 M8 paper is a chemically-treated, dye-impregnated indicator paper. Interaction between the indicator dyes and an organic liquid produces a pH-dependent color change.

3.3.2.2 M8 paper was designed to change color to indicate the presence of non-persistent G-type nerve agent (yellow), V-type nerve agent (dark green), or blister agents (red). It should be noted, however, that all organic liquids will be absorbed by M8 paper and produce some color change.

3.3.2.3 For purposes of this screening test, any wetting of the M8 paper and subsequent color change is a positive indicator of sample leakage and appropriate precautions must be taken, including increasing the level of PPE.

3.3.2.4 If the M8 screen is positive, STOP and consult the laboratory director, local FBI WMD Coordinator, and appropriate local authorities to determine whether it is safe to continue.

3.4 Sample Transport Container Screen for Explosives

3.4.1 Perform an explosive screen using a colorimetric test kit. There are commercially available colorimetric test kits (such as the E.L.I.T.E.™ test or equivalent) that use multiple reagents to indicate the presence and identification of different types of explosive compounds. These kits usually require collection of one or two wipe samples, which are then exposed to a series of reagents. If a color change occurs after exposure to a reagent, it indicates that a certain type of explosive compound is present.

WARNING! It is important to note that an AHRF may receive suspicious packages or containers that should be considered and handled as evidence. Suspicious packages should be handled as little as possible, taking care to maintain the integrity of any potential evidence the package may provide (e.g., finger prints, container or material manufacturer, physical particles). Package handling should be minimized, and wipe samples should be collected only from target areas, such as the seam between the container and lid.

3.4.2 Collect a wipe sample from a representative area (e.g., 2x2 inch, depending on container size) of the container on all sides (top, bottom, right, left, front, and back). Include the area near the container lid and the seam between the container and lid. Make sure that a sufficient area of each side remains unwiped for any additional surface wipe testing that may be required.

3.4.3 Follow the manufacturer's instructions and place one to two drops of liquid from a selected reagent bottle on the collection paper.

3.4.4 Observe and record the color change.

3.4.5 Continue to add other reagents or take additional wipe samples as needed.

3.4.6 Mark all results on the AHRF Sample Transport Container Screening Results Form (see Attachment 4).

3.4.7 If the colorimetric screen is positive, STOP and consult the laboratory director, local FBI WMD Coordinator, and appropriate local authorities to determine whether it is safe to continue. If both the M8 and explosives screen are negative, proceed to Section 4.0.

HINT: In the E.L.I.T.E.™ test kit, a positive colorimetric test for explosives results in a vivid reddish color. Other colors, or very faint pink, are considered negative and may result from contaminants or interferences.

4.0 Secondary and Primary Sample Container Screening

This part of the screening is performed in the fume hood or equivalent environmental enclosure.

WARNING! It is important to note that an AHRF may receive suspicious packages or containers that should be considered and handled as evidence. Suspicious packages should be handled as little as possible, taking care to maintain the integrity of any potential evidence the package may provide (e.g., finger prints, container or material manufacturer, physical particles). Package handling should be minimized, and wipe samples should be collected only from target areas, such as the seam of the container and lid.

4.1 Ion Mobility Spectrophotometer (IMS) and Flame Spectrophotometer (FSP) Screening and Unpacking the Transport Container

4.1.1 IMS and FSP Background

4.1.1.1 Refer to the manufacturer's user manual and be aware of the results produced by, and limitations of, the equipment used.

4.1.1.2 IMS instruments contain a library of specific compounds. If the library includes CWAs, the IMS will identify any corresponding CWA that is detected. Since the results are based on time of flight of an ion, similar ions from related compounds may produce false positives.

- In addition, IMS screening is influenced by changes in ambient conditions (temperature, humidity, etc.), which could produce anomalous results. All results from IMS screening should be treated as presumptive and should be considered only within the context of other screening results.
- If more than one CWA is programmed into the IMS or if the IMS detects more than one CWA, the detector will identify only the class of any CWA(s) detected (i.e., nerve, blister, irritant).
- Any substance containing phosphorous or sulfur will cause the FSP to respond, whether the substance is a CWA or a relatively harmless compound.
- The numeric value assigned to an IMS reading does not correspond to a specific concentration. The IMS will identify the compound and give a relative reading.
- If an IMS becomes saturated with a high concentration of a chemical, it will go into back flush mode to prevent damage to the detector. In this mode, the instrument cannot be used. If the back flush mode is indicated during a sample screen, the sample is suspected to contain significant quantities of CWAs.

4.1.1.3 The FSP is capable of detecting the presence of specific elements produced during the thermal decomposition of vapor and aerosol samples. The specific elements detected are based on the types of filters installed in the unit. For the purposes of general CWA screening in the AHRF, the AHRF FSP should be equipped with filters for sulfur and phosphorus.

- Sulfur is generally associated with blister agents; the FSP display indicates the presence of sulfur-bearing compounds as bars of H, with the number of bars indicating the degree of contamination.
- Phosphorus is generally associated with nerve agents; the FSP display indicates the presence of phosphorus-bearing compounds as bars of G.
- V-type nerve agents contain both sulfur and phosphorus; the FSP will display bars of H and G when they are present.

WARNING! When screening for sulfur and phosphorus, the FSP will detect any volatile compounds that contain these elements.

4.1.2 IMS and FSP Screening Procedures

4.1.2.1 Prior to opening the transport container, screen the container with the FSP and IMS by holding the end of the FSP or IMS at the seam of the container and lid.

4.1.2.2 Open the transport container approximately 2 to 3 inches and hold the front ends of the FSP and the IMS in the container opening. Wait at least 5 seconds for the FSP and 60 seconds for the IMS to see if there is a response.

4.1.2.3 Remove the transport container lid and slowly scan the tops of each secondary/primary container with the FSP.

WARNING! The primary container(s) should not be opened, or the sample(s) otherwise exposed, until after they have been transferred into the AHRF glove box (Section 5.0). If there is any suspicion that a primary sample container has been breached or an unusual liquid is on the outside of the container, adjust the level of PPE as necessary, and follow the procedures outlined in Section 4.4.1.

4.1.2.4 Remove each primary/secondary container from the sample transport container one at a time and run each through the AHRF screening procedures before removing the next container.

4.1.2.5 All secondary containment must be tested (layer by layer, if necessary) before removing the primary sample container.

4.1.2.6 Use blunt, round-tip scissors for removal of sample packaging and container materials.

4.1.2.7 Hold the FSP or IMS next to the seal of each container (5 seconds for the FSP and 60 seconds for the IMS).

4.1.3 IMS and FSP Screening Results

4.1.3.1 If results of both the FSP and IMS screens are negative, proceed to Section 4.2.

4.1.3.2 If results of either the FSP or IMS screen indicate the presence of a CWA, move the container to the glove box immediately, prior to proceeding with Section 4.2 procedures.

4.1.3.2 If both the FSP and IMS screen indicate that CWAs may be present at any point during this screening, make sure all primary containers remain inside the transport container, re-secure the transport container, move the container to the glove box and immediately notify the laboratory director, local FBI WMD Coordinator, and appropriate authorities.

WARNING! At any point during this screening, if both the FSP and IMS screen indicate that CWAs may be present, make sure all primary containers remain inside the transport container, re-secure the transport container, move the container to the glove box, and immediately notify the laboratory director, local FBI WMD Coordinator, and appropriate authorities. If CWAs are indicated by either the FSP or IMS, immediately transfer the containers to the glove box before continuing screening.

4.2 Visual Inspection of the Primary Sample Container

4.2.1 Visually inspect the sample container to ensure sample integrity.

4.2.2 Check the container type; make sure the container label matches the COC (Section 2.4.4.2).

4.2.3 If the primary sample container appears to contain a suspicious powder (e.g., not dirt, dust, or any other contamination that might be expected from field sampling or exposure), special precautions should be taken immediately.

4.2.3.1 Notify the laboratory director, local FBI WMD Coordinator, and appropriate local authorities.

4.2.3.2 Place the container in an additional layer of containment (e.g., resealable plastic bag or container).

4.2.3.3 Transfer the container to the glove box and await further instructions.

4.2.4 Check for damage, bulging, discoloration, or leakage. If the container is damaged, bulging, discolored, or leaking, place it into a secondary container or spill tray/tub to control possible spillage.

4.2.5 If it is possible to see the sample through the primary sample container, record a description of the sample. Note color, presence of foreign material or objects, approximate volume, size, or weight.

4.2.6 Check if there is any unusual or unexpected field contamination on the container (e.g., bright colored substances, crystalline deposits, liquid – not dirt, dust, or any other contamination that might be expected from field sampling or exposure).

4.2.7 Using an infrared thermometer, take sample temperature.

4.2.8 Photograph the container(s). Place the container next to a ruler or other size indicator and take as many pictures as deemed appropriate to clearly and accurately document the sample.

4.3 Primary Sample Container Radiological Survey

4.3.1 Radiological Survey
An alpha/beta survey will provide an indication of the presence of any radioactive contamination on the outside of the primary sample container, or of any gamma or high energy beta radiation that is in the sample.

WARNING! Radiological surveys should be performed by personnel trained in, and familiar with, the equipment that is used. It is recommended that these procedures be performed by a radiation technician/professional trained to use the AHRF equipment and to perform the calculations that may be required to obtain survey results.

4.3.2 Direct Reading Radiological Survey Procedures

4.3.2.1 Focusing on the areas of the container that are most likely to be contaminated (e.g., bottom of the container, lid opening, handles, and container seams), perform a direct reading survey of the primary sample container.

4.3.2.2 Scan the container as close to its surface as possible (e.g., ¼ inch from the surface of the container), without allowing the instrument to come in contact with the surface. Move the meter slowly over the surface of the container.

4.3.2.3 Convert the alpha and beta counts as disintegrations per minute (dpm), if necessary, and record alpha, beta, and gamma results on the Primary Sample Container Screening Results Form (Attachment 4).

4.3.3 Direct Reading Radiological Survey Results

4.3.3.1 The recommended thresholds are:

Alpha threshold: 2 x average background (see Section 2.4.1)
Beta threshold: 2 x average background (see Section 2.4.1)
Gamma threshold: 500 µR/hr

NOTE: These thresholds are recommended by the USEPA ORIA.

4.3.3.2 If levels are above the lowest threshold, proceed to Section 4.3.4 and perform a wipe test on the outside of the primary sample container to determine if removable contamination is present.

4.3.3.3 If levels are below the thresholds, proceed to Section 4.4 and continue with container screening for CWAs.

4.3.4 Wipe Alpha and Beta Surface Contamination Survey Procedures

WARNING! It is important to note that an AHRF may receive suspicious packages or containers. These packages or containers should be considered evidence and handled as such. Suspicious packages should be handled as little as possible, taking care to maintain the integrity of any potential evidence the package may provide (e.g., fingerprints, container or material manufacturer, physical particles). Package handling should be minimized and wipe samples should be collected only from target areas, such as the seam of the container and lid.

4.3.4.1 Wipe an adequate number of locations along the surface of the secondary or primary sample container(s) to ensure that the container is thoroughly evaluated for loose contamination.

4.3.4.2 The wipe locations should focus on the areas of the container that are most likely to be contaminated (e.g., bottom of the container, lid opening, handles, and container seams).

4.3.4.3 Place wipe samples on planchets and count (see Table 1 for AHRF equipment list).

4.3.4.4 Most instruments read individual counts for alpha and beta particles simultaneously. The counts are converted to counts per minute, then to dpm, by applying instrument efficiency factors. The results are then divided by the area (cm^2) of the surface wiped.

4.3.4.5 Convert and record the alpha and beta counts as dpm/cm^2 on the Primary Sample Container Screening Results Form (Attachment 4).

4.3.5 Wipe Alpha and Beta Surface Contamination Survey Results

4.3.5.1 The recommended alpha and beta wipe thresholds are:

Alpha threshold: 2.2 dpm/cm^2 Beta threshold: 22 dpm/cm^2

NOTE: These thresholds are taken from 49 CFR 173.443 and are recommended by the USEPA ORIA.

4.3.5.2 If the results of the wipe sample are less than the thresholds (Section 4.3.5.1), proceed to Section 4.4.

4.3.5.3 If the wipe is above the thresholds (Section 4.3.5.1), attempt to decontaminate the container using a wet cloth. Save the

cleaning materials and contaminated wipes for laboratory analysis along with the sample.

WARNING! If the container is considered to be a piece of evidence, this process will destroy any classical forensic evidence that may be on the outside of the container. Evaluate the risks before decontaminating the container.

4.3.5.4 Rewipe the surface of the container and count the wipes following the procedure above (Section 4.3.4).

4.3.5.5 Evaluate the results against the established thresholds (Section 4.3.5.1). If results are below the thresholds, proceed to Section 4.4.

4.3.5.6 If the results are still above the thresholds, the container cannot be easily decontaminated. STOP screening procedures.

- Wrap the container in plastic or other appropriate shielding material and isolate the sample in a secure area.
- Consult the laboratory director, appropriate local authorities, and the local FBI WMD Coordinator immediately to determine whether AHRF screening procedures should continue.
- If screening cannot continue, the containers and wipes should be prepared for transport to a radiological laboratory that can also receive samples with potential biological, explosive, or chemical hazards.
- Contact a radioactive materials shipping professional to remove the sample from the AHRF.

4.4 Primary Sample Container Screen for Chemical Warfare Agents

4.4.1 M8 Paper Screen Procedures

4.4.1.1 Inspect the container to determine if there are any visual signs of leaking. If there are visible signs of leaking, collect a wipe sample of the leaking material and place the wipe in a container for possible laboratory analysis. Consult with laboratory director to determine if laboratory analysis of the material is needed.

4.4.1.2 If there are no signs of leaking, follow the procedures outlined below:

4.4.1.2.1 Wipe around the seal between the container and lid and on the outside of the container using M8 paper.

WARNING! If the sample container is considered to be a piece of evidence, wipe only the seam between the container and its lid. Wipe the portion of the seam that was not wiped during the radiation screen (Section 4.3).

4.4.1.2.2 Observe the reaction with the paper.

4.4.1.2.3 Record the results on the AHRF Primary Sample Container Screening Results Form (Attachment 4).

4.4.1.2.4 If positive (Section 4.4.2), collect sample for explosives screen (Section 4.5) and wash the outside of the container with a 10% bleach solution, followed by reagent grade water.

WARNING! If the sample container is considered to be a piece of evidence, this process will destroy any classical forensic evidence that may be on the outside of the primary sample container. Evaluate the risks before washing the container with bleach and water.

4.4.1.2.5 If negative (Section 4.4.2), proceed to Section 4.5.

4.4.1.3 If there are signs of leaking, follow procedures outlined below:

4.4.1.3.1 Wipe the contaminated area(s) with M8 paper.

4.4.1.3.2 Observe the reaction with the paper.

4.4.1.3.3 Record the results on the AHRF Primary Sample Container Screening Results Form (Attachment 4).

4.4.1.3.4 If positive (Section 4.4.2), collect a sample of the leaking material and consult with the laboratory director to determine if AHRF screening or laboratory analysis of the material is necessary. Wash the outside of the container with a 10% bleach solution, followed by reagent grade water.

WARNING! If the sample container is considered to be a piece of evidence, this process will destroy any classical forensic evidence that may be on the outside of the primary sample container. Evaluate the risks before washing the container with bleach and water.

4.4.1.3.5 If negative (Section 4.4.2), proceed to Section 4.5.

4.4.2 M8 Paper Screen Results

4.4.2.1 M8 paper is a chemically-treated, dye-impregnated indicator paper. Interaction between the indicator dyes and an organic liquid produces a pH-dependent color change.

4.4.2.2 M8 paper was designed to change color to indicate the presence of non-persistent G-type nerve agent (yellow), V-type nerve agent (dark green), or blister agents (red). It should be noted, however, that all organic liquids will be absorbed by M8 paper and produce some color change.

4.4.2.3 For purposes of this screening test, any wetting of the M8 paper and subsequent color change is a positive indicator of container leakage and appropriate precautions must be taken, including increasing the level of PPE.

4.4.2.4 Proceed to Section 4.5 for both positive and negative results.

4.5 Primary Sample Container Screen for Explosives

4.5.1 Perform an explosive screen using a colorimetric test kit (such as E.L.I.T.E.™ test or equivalent) with wipe samples. If a color change occurs after exposure to a reagent, it indicates that a certain type of explosive compound is present.

4.5.2 Collect a wipe sample from a representative area (e.g., 2x2 inch, depending on container size) of the container on all sides (top, bottom, right, left, front, and back). Include the seam between the container and lid. Make sure that a sufficient area of each side remains unwiped for any additional surface wipe testing that may be required.

WARNING! If the sample container is considered to be a piece of evidence, wipe only the seam between the container and its lid.

4.5.3 Following the manufacturer's instructions, place one to two drops of liquid from a selected reagent bottle on the collection paper.

4.5.4 Observe and record the color change.

4.5.6 Continue to add other reagents or take additional wipe samples as needed.

4.5.7 Record all results on the AHRF Sample Transport Container Screening Results Form (see Attachment 4).

HINT: In the E.L.I.T.E.™ test kit, a positive colorimetric test for explosives results in a vivid reddish color. Other colors or very faint pink are considered negative and may result from contaminants or interferences.

4.5.8 If any of the colorimetric explosives screens are positive, check the area where the container was wiped for crystallization. If crystallization is present, professional help from a bomb squad should be sought before opening the container. If possible, place the container in a secure, protected (e.g., behind a cement bunker or in a blast box, if available) location as far away from people and buildings as possible.

4.6 Assessment for Continuation of Screening Procedures

4.6.1 If explosive screens are negative and the sample is not leaking, consult with the laboratory director to determine whether the information provided in the sample COC, field report, and AHRF Screening Results Forms is sufficient to provide an assessment of risk to the laboratory.

4.6.2 If information is considered to be sufficient, prepare the sample, field report, COC, AHRF Sample Receipt Form, and AHRF Screening Results Forms for transport to the laboratory.

4.6.3 If additional screening is needed or requested, proceed with Section 4.7 to screen the sample directly.

4.7 Evaluation of Sample Container for Transfer to Glove Box

4.7.1 Determine whether the sample container is a size that will allow it to be transferred to the all hazards glove box for sample screening. Sample containers that are too large to pass through the fume hood into the glove box may not be suitable for direct sample screening.

4.7.2 If there is only a small amount of sample available (< 2 grams or 2 mLs), skip the sample screening procedures described in Sections 5.0 and 6.0. These procedures will consume too much of the sample. In this case, the sample should proceed directly to the receiving laboratory for analysis.

4.7.3 The AHRF is not equipped to handle gas containers or cylinders that are under pressure. Handle these with extreme caution. Immediately obtain the assistance of a bomb squad to remove it from the AHRF.

5.0 Initial Direct Screening of the Sample

Prior to transferring primary sample containers into the all hazards glove box, the glove box should be decontaminated to ensure that samples and sample screening results are not compromised.

- Collect an aggregate wipe sample on the inside of the glove box. This wipe sample should be analyzed on site or labeled so that it is easily traceable to the sample container that enters the glove box next. This wipe sample will function as a decontamination blank for that sample.

- Run a photoionization detector (PID) and combustible gas indicator (CGI) to test the ambient air in the glove box. Use these results to check that there is no background contamination.

- Determine the average background alpha and beta radiation levels, using the radiological survey instrument that will be used to survey the sample (Section 5.5). Twice the established average background will be used as the alpha/beta thresholds during the direct reading radioactive survey of the sample (Section 5.5.3).

HINT: AHRF staff may want to prepare sample screening kits that contain the disposable pieces of screening equipment that will be used for direct sample screening (e.g., one or two strips of pH, starch iodide, and colorimetric indicator paper, an extra containment bag, a disposable spatula, or any other screening equipment used to test most samples). These kits can enter and exit the glove box with each sample, and help prevent overcrowding and cross contamination.

5.1 Movement of Primary Sample Container(s) into Glove Box

5.1.1 Prior to opening the primary sample container for direct screening of the sample, transfer the container from the fume hood through the double lock doors into a glove box that contains High Efficiency Particulate Air (HEPA) and carbon filtration.

5.2 Initial Sample Processing

5.2.1 Review the AHRF Screening Results Forms to ensure that all required screening of the primary sample container(s) has been performed and recorded (Section 4.0). If any screening procedures have not been performed, perform these screens either in the glove box or move the container back into the fume hood to complete screening.

5.3 Opening the Primary Sample Container

5.3.1 Carefully open the container to expose the sample for screening. Use blunt, round-tip scissors to remove packaging and other materials.

5.4 Sample Screen for Volatile Organic Compounds (VOCs) and Combustible Gases

5.4.1 CGI and PID Screening Background

5.4.1.1 CGI and PID instruments allow the sample to be screened for volatile organic compounds (VOCs) and combustible gases using a multi-gas detector.

5.4.1.2 These instruments typically contain multiple detectors, including a PID to detect VOCs, a CGI, and an oxygen detector, which can be used simultaneously.

5.4.1.3 Many of these instruments can be upgraded to include toxic gas sensors that are specific to common industrial hazards (carbon dioxide, hydrogen cyanide, etc.).

5.4.2 CGI and PID Screening Procedures

5.4.2.1 In order to obtain the most sensitive PID and CGI reading, the reading should be taken on the headspace inside the primary container immediately after the primary container is opened.

5.4.2.2 Shut off all vents in the glove box to minimize air movement and exchange.

5.4.2.3 Hold the end of the detector inside the container, approximately ½ inch from the sample. Observe the instrument readout for at least 5 seconds. Do not touch the sample or sample container with the detector or the instrument may become contaminated.

5.4.2.4 If the primary sample container is enclosed inside a secondary container or bag, open the secondary containment just enough to insert the detector. Close the secondary containment as much as possible, while holding the detector close to the opening of the primary sample container. The secondary containment should trap airborne VOCs and combustible gases from the sample. Observe the readings for a few minutes and record the highest reading.

5.4.2.5 If the primary sample container is not inside a secondary container or bag, place it inside a containment bag and insert the detector through the opening or, alternatively, through a small hole in the bag. Close the bag around the detector as much as possible, while holding the detector close to the opening of the primary sample container. The bag will trap any airborne VOCs and combustible gases from the sample. Observe the readings for a few minutes and record the highest reading.

5.4.2.6 Hold the detector in the same location until the results remain constant and record the reading on the AHRF Sample Screening Results Form.

5.4.2.7 Re-open the glove box vents.

5.4.3 CGI and PID Screening Results

5.4.3.1 CGI and PID results indicate only the pressure of elevated levels of combustible gases or VOCs in the sample and do not identify specific threats. In addition, the CGI and PID screening tools are influenced by changes in environmental conditions (e.g., temperature, humidity) that could produce anomalous results. Positive results may indicate the presence of flammable, explosive, or toxic hazards, and the sample must be treated appropriately.

5.5 Sample Survey for Radiation

WARNING! Radiation surveys should be performed by personnel trained in, and familiar with, the equipment that is used. It is recommended that these procedures be performed by a radiation technician trained to use the AHRF equipment and to perform the calculations that may be required to obtain survey results.

5.5.1 Radiation Survey

5.5.1.1 A direct reading alpha/beta survey, using an alpha, beta scintillator with data logger will be performed on the sample.

5.5.1.2 The test measures alpha/beta radiation on the surface of the sample without the shielding that may have been provided by the primary or transport sample containers. This survey will detect only contamination on the surface of the sample, and will not detect an immediate external dose threat. Alpha readings are particularly questionable for water or liquid samples.

5.5.1.3 This test is a direct measurement and does not consume any sample material.

5.5.2 Direct Reading Alpha and Beta Radiation Survey Procedures

5.5.2.1 Open the primary container and perform a direct read alpha/beta scan of the sample.

5.5.2.2 Scan the sample as close to its surface as possible (e.g., ¼ inch from the surface), without allowing the instrumentation to come in contact with the sample. If a large sample area is exposed, move the probe slowly over the sample surface.

5.5.2.3 Convert and record the alpha and beta counts to disintegrations per minute (dpm), if necessary, and record the results on the Sample Screening Results Form (Attachment 4).

5.5.3 Direct Reading Alpha and Beta Radiation Survey Results

5.5.3.1 The recommended alpha and beta thresholds are:

Alpha threshold: 2 x average background (see Section 5.0)
Beta threshold: 2 x average background (see Section 5.0)

NOTE: These thresholds are recommended by the USEPA ORIA.

5.5.3.2 If survey results indicate alpha and/or beta dose rates greater than the thresholds (Section 5.5.3.1), STOP screening procedures.

- Close the sample container and wrap the container in plastic or other appropriate shielding material. Isolate the sample in a secure area.
- Consult the laboratory director, appropriate local authorities, and the local FBI WMD Coordinator immediately to determine whether AHRF screening procedures should continue.
- If screening cannot continue, the sample should be prepared for transport to a radiological laboratory that can also receive samples with potential biological, explosive, or chemical hazards.
- Contact a radioactive materials shipping professional to remove the sample from the AHRF.

5.6 Sample Screen using IMS and FSP

5.6.1 IMS and FSP Screening Procedures

5.6.1.1 Refer to Section 4.1 for a description of the IMS and FSP, and follow the procedures described in Section 4.1.2 to screen the headspace inside the primary sample container(s) using these instruments.

5.6.1.3 Observe and record all results on an AHRF Sample Screening Results Form.

5.6.2 IMS Results

5.6.2.1 IMS instruments contain a library of specific compounds. If the library includes CWAs, the IMS will identify any corresponding CWA that is detected. Since the results are based on time of flight of an ion, similar ions from related compounds may produce false positives.

5.6.2.2 In addition, IMS screening is influenced by changes in ambient conditions (temperature, humidity, etc.), which could produce anomalous results. All results from IMS screening should be treated as presumptive and should be considered only within the context of other screening results.

5.6.2.3 If more than one CWA is programmed into the IMS or if the IMS detects more than one CWA, the detector will identify only the class of any CWA(s) detected (i.e., nerve, blister, or irritant).

5.6.2.4 Any substance containing phosphorous or sulfur will cause the FSP to respond, whether the substance is a CWA or a relatively harmless compound.

5.6.2.5 The numeric value assigned to an IMS reading does not correspond to a specific concentration. The IMS will identify the compound and give a relative reading.

5.6.2.6 If an IMS becomes saturated with a high concentration of a chemical, it will go into back flush mode to prevent damage to the detector. In this mode, the instrument cannot be used. If the back flush mode is indicated during a sample screen, the sample is suspected to contain significant quantities of CWAs.

5.6.3 FSP Results

5.6.3.1 The FSP is capable of detecting the presence of specific elements produced during the thermal decomposition of vapor and aerosol samples. The specific elements detected are based on the types of filters installed in the unit. For the purposes of general CWA screening in the AHRF, the AHRF FSP should be equipped with filters for sulfur and phosphorus.

5.6.3.2 Sulfur is associated with blister agents; the FSP indicates the presence of sulfur-bearing compounds as bars of H, with the number of bars indicating the degree of contamination.

5.6.3.3 Phosphorus is associated with nerve agents; the FSP indicates the presence of phosphorus-bearing compounds as bars of G.

5.6.3.4 V-type nerve agents contain both sulfur and phosphorus; the FSP will display bars of H and G when they are present.

WARNING! When screening for sulfur and phosphorus, the FSP will detect any volatile compounds that contain these elements.

5.6.4 If both the IMS and FSP indicate the presence of a CWA, immediately STOP sample screening and consult supervising laboratory director, FBI WMD Coordinator, and appropriate local authorities to determine whether it is safe to continue screening.

HINT: If additional information is needed and the FSP instrument is equipped with a scraper accessory, an aliquot of sample can be removed to a Class II (Type A or B) biological safety cabinet for screening using the FSP. Follow the manufacturer's directions for calibration. Apply a small amount of sample directly to the scraper.

5.7 Sample Splitting for Additional AHRF Testing

5.7.1 In order to ensure that sufficient sample is available for laboratory testing and to protect forensics information, an aliquot of sample should be removed for any further sample screening at the AHRF.

5.7.2 Determine if there is sufficient sample available to obtain an aliquot for further testing.

5.7.2.1 There must be a minimum of either 2 mL or 2 grams of sample to allow approximately 1 mL or 1 gram of sample to be removed for additional AHRF screening. If there is less than 2 mL or 2 grams of sample available, halt sample screening and consult the local FBI WMD Coordinator and laboratory director for further direction.

5.7.2.2 If at least 2 mL or 2 grams of sample is available, proceed with Step 5.7.3 to obtain a sample aliquot.

5.7.3 A representative and homogeneous sample aliquot of approximately 1 mL (or 1 gram) must be obtained for all additional AHRF sample screening.

5.7.3.1 If the sample is composed of a single matrix, an aliquot should be obtained that is as homogeneous as possible with minimal sample disturbance.

5.7.3.2 If multiple phases are present, an aliquot should be collected from each phase.

5.7.3.3 If the sample is composed of multiple liquids, each liquid will be screened separately. Use a clean syringe or pipette to remove a separate aliquot from each liquid. Place each liquid aliquot into a separate vial or other container.

5.7.3.4 If the sample is composed of a heterogeneous solid (e.g., multiple colored particles, both oily and dry solids), mix the sample as little as possible while trying to obtain a homogeneous and representative aliquot.

5.7.3.5 If the sample is composed of both a liquid and solid phase, immediately halt sample screening and contact the laboratory director and local FBI WMD Coordinator for further instruction.

5.7.4 Once an aliquot has been removed, the remaining sample is retained in the original sample container and packaged for transfer to a laboratory.

5.8 Sample Screen for Explosives

5.8.1 Perform an explosive screen using a colorimetric test kit (such as E.L.I.T.E.™ test or equivalent) using a small amount of sample. If a color change occurs after exposure to a reagent, it indicates that a certain type of explosive compound is present.

5.8.2 Following the manufacturer's instructions, place one to two drops of liquid sample or a small amount of solid sample onto the test paper.

5.8.3 Place one to two drops of liquid from the first reagent bottle on the collection paper.

5.8.4 Observe and record the color change.

5.8.5 Continue to add other reagents as needed and observe the color change.

5.8.5 Record the results on the AHRF Sample Screening Results Form (see Attachment 4).

5.8.6 If the sample is a liquid and the colorimetric explosives screen is positive, immediately STOP sample processing and report the results to the laboratory director, local FBI WMD Coordinator, and appropriate local authorities.

5.8.7 If the sample is a liquid and the colorimetric explosives screen is negative, proceed to Section 5.10.

5.8.8 If the sample is a solid, proceed to Step 5.9.

5.9 Thermal Susceptibility Test (Solids)

CAUTION: The thermal susceptibility test should be performed only by personnel who have specialized training handling explosives, such as a certified bomb technician. Training should include instructions regarding safety precautions related to testing potentially energetic materials, as well as interpretation of test results.

5.9.1 Thermal Susceptibility Test Background

5.9.1.1 The thermal susceptibility test determines whether the sample contains explosive or energetic materials. The test involves holding a small amount of sample to a flame and observing the reaction.

5.9.1.2 This test should not be performed if CWAs are suspected (e.g., positive IMS or FSP screen).

5.9.2 Thermal Susceptibility Test Procedures

5.9.2.1 Place the smallest visible amount of sample possible on the end of a platinum wire loop.

5.9.2.2 To avoid sample ignition from possible back flash, transfer the sample portion to a Class II biological safety cabinet to perform this test.

5.9.2.3 Insert the sample into the flame of a small hand-held gas lighter. A high quality butane lighter is recommended for a cleaner burn and improved observation (e.g., butane grill lighter with an extended reach).

5.9.2.4 Observe the reaction (Section 5.9.3) and record the results on the AHRF Sample Screening Results Form (Attachment 4).

5.9.3 Thermal Susceptibility Test Results

5.9.3.1 If a small explosion, rapid burning (deflagration), or energy release is observed, it is strong evidence that explosive materials may be present. STOP sample screening and contact the laboratory director, the local FBI WMD Coordinator, and appropriate local authorities.

WARNING! Some secondary explosives are very stable (e.g., ammonium nitrate) and will not show any reaction to the thermal susceptibility test. However, ammonium nitrate is sometimes mixed with an accelerant such as diesel fuel, which will screen positive for organic vapor during the PID screening.

5.9.3.2 If no response is observed, proceed to Section 5.10.

5.10 Visual Inspection of the Sample

5.10.1 Record the physical properties of the sample (e.g., color, texture, composition) on the AHRF Sample Screening Results Form (Attachment 4).

5.11 Water Solubility, Miscibility, and Reactivity Tests

5.11.1 M8 Paper Test Procedures and Results (Liquid Samples)

5.11.1.1 If the sample is a liquid, place one drop of the sample onto a piece of M8 paper. Observe and record the results. NOTE: M8 paper is hydrophobic; it will not be wetted by aqueous materials.

- M8 Chemical Agent Detection Paper is a chemically-treated, dye-impregnated indicator paper. The paper is hydrophobic, allowing only organic liquids to be absorbed and interact with the indicator dyes. Interaction between the indicator dyes and a CWA produces a pH-dependent color change.
- M8 Paper is designed to change color in the presence of G-type nerve agent (yellow), V-type nerve agent (dark green), or blister agents (red). It should be noted that all organic liquids will be absorbed by M8 paper and produce some color change. Therefore, results of this test should be interpreted primarily as an indication of whether or not a liquid is aqueous.
- Organic liquids will be absorbed into the paper; aqueous solutions will bead on its surface. Although all nerve and blister agents are organic liquids and will be adsorbed by M8 paper if neat, nerve agents also are soluble in water. Therefore, if a solution beads up on the paper (i.e., is aqueous), it does not rule out the presence of a CWA.

5.11.1.2 If the results indicate an organic liquid, proceed with the water solubility/miscibility test (Section 5.11.2). If the results

indicate an aqueous solution, proceed with pH paper screening (Section 5.12).

5.11.2 Water Solubility, Miscibility and Reactivity Test Procedures (Solid and Non Aqueous Liquid Samples)

5.11.2.1 Place a small amount of sample (~5 drops if a liquid or a micro spatula amount if solid) into a 2-mL conical centrifuge tube containing ~0.5 mL of water.

5.11.2.2 Observe and record the results on an AHRF Sample Screening Results Form (Attachment 4).

5.11.2.3 If the sample reacts with water (e.g., increases the water's temperature, produces fumes, or causes the water to bubble) immediately STOP sample screening and contact the laboratory director, appropriate local authorities, and local FBI WMD Coordinator.

5.11.2.4 If the sample does not react with water as described in Section 5.11.2.3, determine whether the sample dissolves or is miscible in the water.

5.11.2.5 If the sample forms a precipitate, record a description of the precipitate on the AHRF Sample Screening Results Form.

5.11.2.6 Note the density of the sample (i.e., does it sink or float?). NOTE: Although a float test is not considered a biological screen, weaponized powders for biological agents typically float, therefore such results should be noted.

HINT: Sufficient sample must be added to the water to observe formation of discrete layers. If unclear, add a few more drops of sample.

5.11.3 Water Solubility and Reactivity Results

5.11.3.1 The solubility, miscibility, and reactivity of a sample in water provide potential indicators of the class of CWA that may be present in a sample. Knowledge of the physical properties of CWAs or classes of CWA is helpful in interpreting the results of water solubility/miscibility testing.

5.11.3.2 Generally, G-type nerve agents are miscible in water, while V-type nerve agents are moderately water soluble. If the sample is an organic liquid that is soluble or miscible in water but not reactive, proceed with pH paper screening (Section 5.12). All follow-on screening tests are performed using the aqueous sample solution.

5.11.3.3 Lewisite is soluble in, and mildly reactive with, water. As Lewisite is hydrolyzed, it forms Lewisite oxide, a white precipitate that may form during the water solubility/ miscibility test. If a precipitate is formed, test the pH of the sample solution; the hydrolysis of Lewisite will make the pH of the solution acidic (pH < 4).

- If results of solubility/miscibility testing indicate a mildly reactive sample that produces a precipitate and an acidic solution, report a presumptive positive for Lewisite.
- If the pH of the sample solution is between 4 and 8, proceed with potassium iodide-starch paper screening.
- If the results indicate that the pH is greater than 8, record the physical properties of the sample and assess how to proceed with additional screening.

5.11.3.4 Blister agents are generally poorly soluble or insoluble in water, with the exception of Lewisite and phosgene oxime (CX). Mustard is denser than water and will settle to the bottom of the container used for this test. If the sample is an insoluble organic liquid that is denser than water, the sample may contain mustard. Proceed with the DB-3 dye test (Section 5.15) for alkylating agents.

5.11.3.5 If the sample reacts violently when added to water, screening should be stopped, and the laboratory director, local FBI WMD Coordinator, and appropriate local authorities should be contacted for direction.

5.11.3.6 If the sample dissolves or is miscible in water, perform the additional sample screening procedures described in Sections 5.12 to 5.16 (pH, starch iodide, enzyme kit, and arsenic test).

5.11.3.7 If the sample is not soluble or miscible in water, the pH, starch iodide paper, and enzyme tests cannot be performed on that phase. Record the physical properties of the sample, as described in Section 5.17.

5.11.3.8 Continue testing all phases created in the water solubility test, as hazardous materials may have been extracted from the insoluble/immiscible sample.

5.11.4 Following the water solubility, miscibility and reactivity tests described in Sections 5.11.1 through 5.11.3, **each phase of the sample should be screened as indicated in Step 5 of Figure 2, using the test procedures described below**.

5.12 pH Paper Test (Water Miscible and Aqueous Liquids, Water Soluble Solids, Aqueous Solutions)

5.12.1 pH Paper Test Procedures

5.12.1.1 pH paper can only be used on aqueous solutions.

5.12.1.2 If the sample is aqueous, place one drop of the sample onto pH paper. Observe and record the results.

5.12.1.3 If the sample is a miscible or soluble liquid or solid, place one drop of the miscibility/solubility solution (Section 5.11) onto pH paper. Observe and record the results on an AHRF Sample Screening Results Form (Attachment 4).

5.12.2 pH Paper Test Results

5.12.2.1 Generally, a pH outside the range of 4 - 8 indicates that CWAs are not present. However, this is not definitive since the processes that are used to produce or purify CWAs may influence the pH.

5.12.2.2 If the pH is between 4 and 8, proceed with starch iodide paper screening (Section 5.13).

5.12.2.3 If the pH is less than 4 or greater than 8, proceed with the starch iodide paper test in Section 5.13. Note that the enzyme test described in Section 5.15 will not be accurate for samples outside the pH range of 4-8.

5.13 Starch Iodide Paper Test (Water Miscible and Aqueous Liquids, Water Soluble Solids, Aqueous Solutions)

5.13.1 Starch Iodide Paper Test Background

5.13.1.1 Starch iodide paper is used to test for the presence of oxidizing compounds, which convert the iodide ions to elemental iodine to form triiodide and pentaiodide ions. These ions react with the starch to produce a blue complex. Development of a blue/purple color upon introduction of the sample indicates the presence of oxidizers.

5.13.2 Starch Iodide Paper Test Procedures

5.13.2.1 Starch iodide paper is used on aqueous samples or solutions.

5.13.2.2 If the sample is aqueous, place one drop of the sample onto the starch iodide paper. Observe and record the results.

5.13.2.3 If the sample is a liquid or a solid and is miscible/soluble in water, place one drop of the miscibility/solubility solution (Section 5.11) onto the paper. Observe and record the results on an AHRF Sample Screening Results Form (Attachment 4).

5.13.3 Starch Iodide Paper Test Results

5.13.3.1 If the results of the starch iodide paper test are negative (no color change), proceed with the nerve agent enzyme ticket screening (Section 5.14).

5.13.3.2 If the paper develops a blue/purple color, the result is positive and indicates that an oxidizer is present.

5.13.3.3 Since oxidizers such as bleach are often used to decontaminate CWAs, a positive result reduces the possibility that the sample contains a CWA. However, the presence of strong oxidizers may still present a hazard that needs to be assessed prior to release of the sample to a fixed laboratory.

5.13.3.4 Strong oxidizers may cause rapid breakdown of the blue complex formed by the iodide ions and starch. This bleaching

of the test paper can lead to false negative results if the test is not read quickly. As the sample wicks up the paper, watch the leading edge of the liquid for a color change. If color change occurs, record as a positive result.

5.13.3.5 If results of the starch iodide paper are positive, do not perform the nerve agent enzyme ticket screening because the presence of a strong oxidizer in solution will invalidate the results of the nerve agent enzyme ticket screening. Instead proceed to the visual inspection of the sample (Section 5.17).

5.14 Sample Screen for Nerve Agents (Water Miscible and Aqueous Liquids, Water Soluble Solids, Aqueous Solutions)

5.14.1 Nerve Agent Test Background

5.14.1.1 Screen the sample for nerve agents using a chemical and enzymatic indicator test kit (such as M256A1 kit or equivalent).

5.14.1.2 Enzyme and chemical impregnated papers used in these kits will change color (typically to blue or green) in the absence of nerve agents.

5.14.1.3 Be sure to follow the manufacturer's instructions.

WARNING! If analyses require direct physical contact of test materials with the sample or sample consumption, be sure to remove the amount of sample needed from the sample container. Do not introduce any foreign objects or materials into the sample container. Some of these kits contain chemicals that could contaminate the sample. Some of the equipment used also could introduce contaminants that could compromise or complicate future analyses.

5.14.1.4 Observe and record all results on an AHRF Sample Screening Results Form (Attachment 4).

5.14.2 Nerve Agent Screen Procedures for Aqueous Samples or Solutions

5.14.2.1 Place the smallest amount of sample or solubility/miscibility solution (Section 5.11) needed to wet the entire surface of the paper onto the enzyme impregnated paper contained in the detector.

5.14.2.2 Follow the manufacturer's instructions for the test kit.

5.14.2.3 A change in the color of the paper indicates that nerve agents are not present.

5.14.3 Nerve Agent Screen Procedures for Sample Vapors

5.14.3.1 Moisten the enzyme-impregnated paper with reagent water.

5.14.3.2 Place the paper into the opening of the sample container without touching the paper to any container surfaces.

5.14.3.3 Follow the specific instructions for the test kit.

5.14.3.4 A change in the color of the paper, in the area of direct sample contact with the paper, indicates that nerve agents are not present.

CAUTIONS: (1) False positives (no color change) can result from very acidic or basic sample inhibiting the reaction. (2) A very faint blue ring may appear at the edges of the contact between the sample and the test paper. This does not denote a negative result. The color change must occur in the entire area of direct sample contact with the paper.

5.14.4 Nerve Agent Screening Results

5.14.4.1 Nerve agent enzyme tickets use an enzyme system to detect the presence of nerve agents. The test reagents consist of acetylcholinesterase enzyme immobilized on a filter paper spot and the substrate indoxyl acetate. Nerve agents compete with the substrate for the active site of the enzyme. In the absence of nerve agent, acetylcholinesterase converts indoxyl acetate into 3-hydroxyindole, a compound that is blue in color. If either G or V agent is present, it will tie up the enzyme, which is then unavailable to react with indoxyl acetate. Thus, no blue color is formed.

5.14.4.2 Since the performance of the nerve agent enzyme ticket depends on the activity of acetylcholinesterase, strong oxidizers, low or high pH, organo-phosphate pesticides, and other acetylcholinesterase inhibitors may produce false positive results. For this reason, aqueous samples for which previous screening results indicate a pH outside the range of 4-8 or the presence of strong oxidizers should not be screened with the nerve agent enzyme ticket.

5.14.4.3 If the nerve agent enzyme ticket results indicate that an acetylcholinesterase inhibitor is present in the sample (no color), a presumptive positive for nerve agent should be reported. If the results indicate that nerve agent is not present in the sample (color change to blue), record the physical properties of the sample and assess how to proceed with additional screening (see Step 5 in Figure 2).

5.15 DB-3 Dye Test for Alkylating Agents (Immiscible/Insoluble Liquids and Solids)

5.15.1 DB-3 Dye Test Procedures

5.15.1.1 Mix reagents

- Reagent 1: Prepare a solution containing 4-(4-nitrobenzyl) pyridine (11.25 mg/mL) in methanol.
- Reagent 2: Prepare a solution of potassium carbonate (600 mg/mL) in water.

5.15.1.2 Test Sample

5.15.1.2.1 Wet a piece of chromatography grade silica gel paper with ~ 5 drops of Reagent 1.

5.15.1.2.2 Place the silica gel paper on a hot plate for 2 minutes.

HINT: Adjust hot plate setting to a temperature just high enough to heat the sample. Very hot temperatures can scorch the test paper and/or melt the plastic used in these test kits.

5.15.1.2.3 Remove silica gel paper from the hot plate and wet it with 3 - 5 drops of the sample.

5.15.1.2.4 Return the silica gel paper with the sample to the hot plate for 1 minute.

5.15.1.2.5 Remove the silica gel paper from the hot plate and wet it with ~10 drops of Reagent 2.

5.15.1.2.5 Observe and document any color change on an AHRF Sample Screening Results Form (Attachment 4).

5.15.2 DB-3 Dye Test Results

5.15.2.1 Mustard gas (H) can be detected because of its reaction with a methanolic solution of DB-3 [4-(4' -nitrobenzyl)pyridine] in the presence of a catalyst (mercuric cyanide and/or heat). The product of this reaction reacts with potassium carbonate to form an intense blue-purple color. The reaction rate increases at elevated temperatures. Since the DB-3 dye test is used as a general test for alkylating agents, any alkylating agent will produce a positive result.

5.15.2.2 If DB-3 dye test results indicate that an alkylating agent is present in the sample, a presumptive positive for mustard should be reported.

5.15.2.3 If results indicate alkylating agents are not present in the sample, record the sample's physical properties and assess how to proceed with additional screening (see Step 5 in Figure 2).

HINT: A positive test will result in an **intense** blue-purple-black color. Any other color change is not a positive result.

5.16 Sample Screen for Arsenic (Colorimetric)

5.16.1 Colorimetric Arsenic Test Background

5.16.1.1 Screen the sample for arsenic compounds using a test strip from a colorimetric test kit (such as M256A1 kit or equivalent), following the manufacturer's instructions.

5.16.1.2 A chemical reaction will convert arsenic compounds (mostly inorganic) into arsine gas. The arsine gas reacts with the color impregnated paper to produce a color change.

5.16.2 Test Procedure for Arsenic Detection

5.16.2.1 Follow the manufacturer's instructions.

5.16.2.2 Look closely for a difference in color between the two marks on the paper. NOTE: The color change may be very slight.

5.16.2.3 For the arsenic test strip from the N256A1 kit, a change to olive green, yellow, or brown indicates the presence of arsenic. A tan color indicates the absence of arsenic.

NOTE: A positive result from this test, along with either low pH readings or precipitation during the water solubility test, would be a strong indication of the presence of Lewisite.

5.17 Visual Inspection of the Sample

5.17.1 Record additional information of the physical properties of the sample (e.g., density, reactivity, miscibility) on the AHRF Sample Screening Results Form (Attachment 4).

5.18 Review Results and Documentation of Initial Screening

5.18.1 Review the AHRF Sample Screening Results Form (Attachment 4) to ensure that all screening results have been reported.

5.18.2 Consult with the receiving laboratory to determine whether the information provided by the sample COC, field report, and AHRF screening is considered sufficient to provide an assessment of risk to the receiving laboratory. If the information is considered to be sufficient, prepare the sample, field report, COC, and AHRF screening report forms for transport to the laboratory. Except in cases where a container is considered to be a piece of evidence (see WARNING in Section 4.4.1.3), the outside of all sample containers should be decontaminated with a 10% bleach solution and rinsed with deionized or distilled water before leaving the glove box. Samples that are removed from the glove box should be stored in a biological safety cabinet until they are shipped from the AHRF.

5.18.3 If additional screening is needed or requested, proceed with Section 6.0.

6.0 Additional Chemical Screening of the Sample

An example of additional screening that might be performed at the AHRF is outlined in this section. Ultimately, the supervising laboratory director and AHRF personnel will determine what, if any, additional screening is needed at the AHRF, based on results obtained using the procedures presented in Figure 2 and described in Sections 2 through 5 of this protocol.

Screen the sample for CWAs and chemical compounds using colorimetric chemical indicator paper. Colorimetric chemical indicator paper can be obtained commercially in single patches of eight small squares that change color when they come into contact with their target chemical. One of the indicator papers should be M8 paper to detect the presence of nerve or blister (V, G, and H) agents. The other indicator papers should identify chlorine, pH, fluoride, cyanide, sulfide, arsenic, and oxidizers. Draeger-Tubes also may be used as an option for assessing sample headspace for target chemical agents and compounds.

6.1 Liquid or Aqueous Samples

6.1.1 Place one drop of sample onto each of the colorimetric indicator papers. To avoid spillage, the indicator papers may be placed inside a small container (e.g., petri dish, concave observation dish, wide beaker). The reaction time necessary to produce a color change if a target compound is present should be instantaneous.

6.1.2 Observe the color of the indicator papers and record results on the AHRF Sample Screening Results Form (Attachment 4).

6.2 Solid Samples

6.2.1 Hold each colorimetric indicator paper inside a sealed containment bag near the open end of the sample container for approximately one minute. Do not allow the paper to come into contact with the sample.

6.2.2 Remove the indicator paper from the bag. Observe the color and record results on the AHRF Sample Screening Results Form (Attachment 4).

6.2.3 If no color change occurs, place the smallest visible amount of the solid sample onto each paper that did not undergo a color change. To avoid spillage, the indicator paper may be placed inside a small container (e.g., petri dish, concave observation dish, wide beaker).

6.2.4 Observe if any color change occurred. If the indicator paper does not change color, wet the sample on top of the paper with a few drops of reagent grade water. Wait approximately one minute. Observe the color of the indicator paper and record results on the AHRF Sample Screening Results Form (Attachment 4).

7.0 Shipment to the Receiving Laboratory

7.1 AHRF Screening Results Forms Review

7.1.1 Review the AHRF Screening Results Forms from all phases of the AHRF screening.

7.1.1.1 All results should be legible, verifiable, and contain appropriate measurement units.

7.1.1.2 Ensure that the results of all AHRF screening procedures have been recorded and signed by the appropriate screening technician.

7.1.2 Compile finalized forms into a single AHRF Screening Report.

7.1.3 Ensure that all screening technicians and the AHRF Coordinator sign the final report, including date and time of signature.

7.2 Contacting Authorities/Receiving Laboratory

7.2.1 Consult the agency that has ownership of the sample (e.g., police or fire department, other emergency responders), appropriate local authorities, and the local FBI WMD Coordinator to determine fate of the sample based on the AHRF screening results. **NOTE: The AHRF does not screen for specific biological hazards.** Thus, samples cannot be sent to a laboratory that is not prepared to receive samples that may contain a biological hazard unless the sample has been deemed to be safe by a biological laboratory. If field or AHRF screening indicates the presence of a hazard that a biological laboratory is not capable of receiving, the hazard (chemical, radiological, or explosive) might be mitigated by transporting a small aliquot of the sample. If the biological laboratory director agrees, a small sample aliquot (e.g., 0.5 mL or 500 mg) and/or a sample swab may be sent to the laboratory even if it contains a chemical, radiological, or explosive hazard.

7.2.1.1 If samples are to be transported to a receiving laboratory for further analysis, AHRF staff should contact the receiving laboratory to ensure the laboratory is capable of receiving samples that contain hazards that have been identified during field and AHRF screening. Sample reports and screening results forms should be delivered to the receiving laboratory and the laboratory manager consulted prior to sample shipment.

7.2.1.2 If the samples do not need any further analysis, AHRF staff should contact the agency with ownership of the sample to coordinate destruction or transfer of the sample back to that agency.

7.3 Package Preparation and Shipment

7.3.1 Decontaminate the outside of the sample containers with a 10% bleach solution, rinse with deionized or distilled water, and provide a final rinse with ethanol or isopropyl alcohol before moving the samples from the glove box to the biological safety cabinet.

WARNING! If the sample container is considered to be a piece of evidence, this process will destroy any classical forensic evidence that may be on the outside of the primary sample container. Evaluate the risks before washing the container with bleach and water.

7.3.2 Package samples for shipment to the receiving laboratory according to U.S. Department of Transportation Hazardous Materials Transportation Act and Hazardous Materials Transportation Safety Act requirements at 49 CFR parts 171 through 177.

7.3.3 Place AHRF Sample Receipt and Screening Report Forms, sample COC, and the sample field report into a transparent protective wrap. Adhere the package to the sample transport container. Prepare a copy of these documents, and ship the copies to the receiving laboratory.

7.3.4 Store the packaged samples in the biological safety cabinet or sample exit interlock until they are shipped from the AHRF.

7.3.5 Prior to relinquishing custody of the sample to the transporting courier, ensure courier credentials are carefully established, confirmed, and documented.

8.0 Glossary of Terms

Alpha Radiation, Emission, or Particles: Alpha radiation is made up of positively charged particles composed of two neutrons and two protons. It is easily blocked by clothing, skin, or even significant quantities of air. Alpha emitters are generally only hazardous to humans when inhaled or ingested.

Beta Radiation, Emission, or Particles: Beta radiation is made up of negatively charged particles equivalent to an electron. These particles can be blocked by fairly thin (a few millimeters) shielding, such as thin metal, wallboard, or heavy clothing. Beta particles are generally hazardous when inhaled, ingested, or when in direct contact with the skin or eyes.

Bleaching Station: Chemical fume hood or equivalent environmental enclosure HEPA and carbon filters designed for use with CWAs.

Blister Agents (also referred to as mustard agents): The wounds caused by these agents resemble burns and blisters. Blistering agents cause severe damage to the eyes, respiratory system, and internal organs. Common blistering agents are sulfur mustard (HD), nitrogen mustards (HN-1, HN-2, HN-3), and Lewisite (L).

Blood Agents: Cyanide-based agents that inhibit the metal-containing enzymes, most notably iron in the blood (hemoglobin), preventing cell respiration from occurring. Common examples are hydrogen cyanide and cyanogen chloride.

Biological Safety Cabinet: Minimum Class II Type A2 with HEPA and carbon filters designed for use with CWAs.

Chemical Warfare Agents (CWAs): The United Nations (UN) Chemical Weapons Convention defines a CWA as "... any chemical which, through its chemical effect on living processes, may cause death, temporary loss of performance, or permanent injury to people and animals." Nerve agents and blister agents are the two classes of CWAs that have been most widely manufactured and used for military purposes.

Choking Agents: Chemical agents that attack lung tissue, primarily causing pulmonary edema. Common choking agents are chloropicrin (PS), chlorine gas (CL), phosgene (CG), and diphosgene (DP).

Colorimetric Indicator: A colorimetric indicator is a detector that changes color when it comes in contact with a substance it was designed to detect. These indicators typically require a minimum amount of the material to change color. They are usually not capable of determining the quantity or concentration of the substance present. Some colorimetric indicators are prone to false positives and non-detects. Some colorimetric indicators are embedded into a strip of paper, and are often referred to as indicator papers.

Combustible Gas Indicator (CGI): Detects and measures concentrations of combustible gases or vapors in the air. These instruments typically can be used in the immediate environment or,

with sampling lines and probes, draw samples from remote areas.

Containment Bag: An airtight sealable bag that encloses a sample container.

Direct Read: A direct read instrument is an instrument that provides a measurement, either as a meter needle deflection or numerical readout, that is instantly usable. The measurement does not require any calculations or conversions, but may require the use of a scale factor multiplying the reading as determined by a selector switch position. For example, the micro R meter reads directly in μR/hr. The meter face is from 0 to 5 and the switch settings are x1, x10, x100, and x1000, thus providing readings from 0 - 5 μR/hr to 0 - 5000 μR/hr.

Flame Spectrophotometer (FSP): A flame spectrophotometer uses a burner (often a hydrogen source) to heat a sample, allowing the elements to produce their characteristic spectral emissions for detection. FSPs used for chemical warfare agents are set to detect the emissions of sulfur and phosphorous. This instrument provides a rapid analysis in a few seconds. It will detect any compound containing sulfur or phosphorous, in addition to chemical warfare agents.

Fume Hood: Chemical fume hood with HEPA and carbon filters designed for use with CWAs.

G Agents: A series of organo-phosphorous nerve agents that were labeled "G" because they were first manufactured in Germany. The common G agents are GA (Tabun), GB (Sarin), GD (Soman), GE, and GF (Cyclohexylsarin).

Gamma Radiation, Emission, or Rays: Gamma radiation is electromagnetic energy from the decay of an isotope. This energy can be partially blocked with dense material (e.g., lead or dense concrete). Excessive or prolonged elevated exposure to gamma rays is known to cause cancer, and extreme exposure can cause death. High levels of gamma radiation can be detected through a sample container or a series of containers and overpack materials.

Glove Box: Class III biological safety cabinet with HEPA and carbon filters designed for use with CWAs.

H Agents: A class of chlorinated blister agents. H agents include sulfur mustard (HD) and nitrogen mustards (HN-1, HN-2, and HN-3).

Indicator Paper: Indicator paper is a strip of paper that contains reagents that cause the paper to change color when it comes into contact with the substance it was designed to detect. There are many different types of indicators. Some indicator papers can change to many different shades of a particular color that can be used to determine a very rough concentration of a target substance. M8 paper is used to detect the presence of nerve or blister (V, G, and H) agents.

Ion Mobility Spectrometer (IMS): An ion mobility spectrometer determines the presence of a substance by placing a positive charge on each molecule that enters the IMS, and then measuring its molecular mass-to-charge ratio. An IMS will identify molecules that have a corresponding mass-to-charge ratio programmed into the instrument's database. This instrument can identify specific compounds, but it is unable to quantify the amount present.

Lewisite (L): A chemical warfare blister agent that contains arsenic.

Nerve Agents: Nerve agents affect the transmission of nerve impulses in the nervous system. Most nerve agents are organo-phosphorous compounds. These compounds are stable, easily dispersed, and have highly toxic and rapid effects with inhalation or skin contact. Common nerve agents are Tabun (GA), Sarin (GB), Soman (GD), Cyclohexylsarin (GF), and VX.

Non-Standard Butyl Gloves: Butyl rubber gloves that are 7 mil thick.

Personal Protective Equipment (PPE): Equipment that protects the human body from hazards (e.g., chemical, biological, radiological, explosive, or physical). Gloves, safety goggles, steel-toed boots, aprons, Tyvek suits, face shields, and respirators are examples of different types of PPE.

Photoionization Detector (PID): A PID detects, but cannot differentiate between, most organic compounds. A high energy bulb knocks electrons off of molecules that enter the PID, making them positively charged. These positively charged molecules are then pumped towards a detector. The movement of the positively charged molecules creates a current. The more charged molecules that are present, the larger the current. A measurement of the current determines the magnitude of the reading. These instruments are typically sensitive, but not selective. The readout is usually in parts per billion, but the reading is often inaccurate.

Primary Sample Container: The primary sample container holds and comes into direct contact with the sample. A primary container never holds more that one sample.

Secondary Containment: Secondary containment includes any layer of containment between the primary sample container and the transport container. Often, for potentially hazardous samples, multiple layers of secondary containment are used and may consist of plastic bags, boxes or jars into which the primary sample container is placed.

Transport Container: The sample transport container is the outermost container that is received from the carrier at the AHRF. Some government agencies refer to this as the "overpack" or "strong-tight containers." Often it is in the form of a cooler or trunk. A single transport container may hold multiple samples.

V Agents: V agents are one set of persistent nerve agents (several days are required for decomposition). The first V agent was synthesized in 1954 by the British. VX, VE, VG, VM, and V-gas are the most common V agents.

Volatile Organic Compounds (VOCs): Organic molecules with low boiling points that will spontaneously evaporate in the air. This evaporation may not necessarily be rapid.

Wipe Sample: A sample that is made up of material that is wiped over a substance or surface to be sampled removing a loose layer of material. This is most often used to sample visible or non-visible film or particulates covering a surface.

9.0 Attachments

9.1 Attachment 1: Personal Protective Equipment (PPE)

All Hazards Receipt Facility (AHRF) staff should be trained in Occupational Safety and Health Administration (OSHA) requirements for hazardous waste operations and emergency response at 29 CFR 1910.120 or 29 CFR 1926.65, and should be familiar with a Health and Safety Plan that is specific for the AHRF. AHRF staff also should be familiar with U.S. Department of Transportation Hazardous Materials Transportation Act and Hazardous Materials Transportation Safety Act requirements at 49 CFR parts 171 through 177 for packaging and transporting hazardous materials.

Information obtained during the AHRF sample receipt and screening processes can be used to make decisions regarding the level of protection needed and to ensure AHRF staff has proper PPE. PPE that will protect employees from the hazards and potential hazards they are likely to encounter as identified during sample receipt and screening should be selected and used. OSHA standards at 29 CFR 1910.120 include the following:

- PPE selection is based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.
- The level of protection provided by PPE shall be increased when additional information on site conditions indicates that increased protection is necessary to reduce employee exposures below permissible exposure limits and published exposure levels for hazardous substances and health hazards.
- The level of employee protection provided may be decreased when additional information or site conditions show that decreased protection will not result in hazardous exposures to employees.

Specific information regarding selection of PPE is provided in Appendix B of 29 CFR 1910.120. The minimal amount of PPE that is considered to be necessary for performing AHRF activities includes two pairs of nitrile gloves, eye protection, face mask, and coveralls. Equipment also should be available such that AHRF personnel can increase the PPE, if necessary. Information regarding AHRF PPE is listed below. Information regarding the hazards of contaminants that AHRF personnel may encounter and additional resources that should be consulted also are provided.

9.1.1 Minimum PPE that Should Be Used by All Hazards Receipt Facility Personnel (Level D)

Level D protection is used when the atmosphere contains no known hazard, and work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals. Although Level D lists the use of hard hats and face shields, it

is anticipated that these will not be needed during routine AHRF operations.

- Coveralls (e.g., 20 Mil Vinyl PVC Apron) or lab coat
- 2 pairs of nitrile gloves (e.g., Nitrile Gloves compliant with 21 CFR, preferably at least 15 Mil)
- Boots/shoes (Chemical-resistant steel toe and shank, and disposable outer boot/shoe covers
- Safety glasses or chemical splash goggles (e.g., ANSI Z87.1-1989, SEI certified eye protection goggles or visor)
- Escape mask - close at hand

Nitrile gloves should be changed in between each sample or every five minutes of sample handling, whichever occurs first.

9.1.2 Additional PPE for Potential Use at the All Hazards Receipt Facility

Level C

- Full-face or half-mask, air purifying respirators (National Institute for Occupational Safety and Health (NIOSH)-approved)
- Hooded chemical-resistant clothing (overalls, two-piece chemical-splash suit, disposable chemical-resistant overalls)
- Level D protection

Level B

- Positive pressure, full face piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH-approved)
- Level C protection

9.1.3 Potential Hazards that May Be Encountered by All Hazards Receipt Facility Personnel

Information regarding potential hazardous exposures is taken from the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, prepared by NIOSH, OSHA, U.S. Coast Guard, and USEPA.

9.1.3.1 Radiation

Radioactive materials can emit one or more of four types of harmful radiation: alpha, beta, neutron, and gamma. Neutron radiation is not addressed in this document. Alpha radiation has limited penetration ability and is usually stopped by clothing and the outer layers of the skin. Alpha radiation poses little threat outside the body, but can be hazardous if materials that emit alpha radiation are inhaled or ingested. Beta radiation can cause harmful "beta burns" to the skin and damage the subsurface blood system.

Beta radiation is also hazardous if materials that emit beta radiation are inhaled or ingested. Use of protective clothing, coupled with scrupulous personal hygiene and decontamination, affords good protection against alpha and beta radiation.

Gamma radiation easily passes through clothing and human tissue and can cause serious permanent damage to the body. Chemical-protective clothing affords no protection against gamma radiation itself; however, use of respiratory and other protective equipment can help keep radiation-emitting materials from entering the body.

9.1.3.2 Explosion and Fire

There are many potential causes of explosions and fires, including:

- Chemical reactions
- Ignition of explosive or flammable chemicals
- Ignition of materials due to oxygen enrichment
- Agitation of shock- or friction- sensitive compounds
- Sudden release of materials under pressure

Explosions and fires may arise spontaneously. However, more commonly, they result from site activities, such as moving drums, accidentally mixing incompatible chemicals, or introducing an ignition source (such as a spark from equipment) into an explosive or flammable environment. Explosions and fires not only pose the obvious hazards of intense heat, open flame, smoke inhalation, and flying objects, but may also cause the release of toxic chemicals. Keep all potential ignition sources away from an explosive or flammable environment; use non-sparking, explosion-proof equipment. Follow safe practices when performing any task that might result in the agitation or release of chemicals.

9.1.3.3 Chemical Exposure

Hazardous chemicals can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systemically, causing a toxic effect at a part of the body distant from the point of initial contact.

For either chronic (low concentrations over a long period of time) or acute (high concentrations over a short period of time) exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or

respiratory disease may not manifest for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

An important exposure route of concern at a hazardous waste site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through the lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (e.g., they may be colorless and their toxic effects may not produce immediate symptoms). Respiratory protection is, therefore, extremely important if there is a possibility that the work site may contain such hazardous substances.

Direct contact of the skin and eyes by hazardous substances is another route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

9.1.3.4 Biological Hazards

Like chemical hazards, etiologic agents may be dispersed in the environment via water and wind. Protective clothing and respiratory equipment can help reduce the chances of exposure. Thorough washing of any exposed body parts and equipment will help protect against infection.

9.2 Attachment 2: Example AHRF Sample Receipt Form

A Sample Receipt Form creates an accurate written record of the information gained through the interview process with the courier. An example Sample Receipt Form is provided in this attachment. This form is supplied as an example only. Each AHRF may opt to create their own Sample Receipt Form and Questionnaire based on their specific operating procedures and concerns.

Example AHRF Sample Receipt Form

Name of Sample Receipt Personnel _____

Date: _____ (mm/dd/yyyy) **Time:** _____ **A.M. / P.M.**

Rapid Gamma Survey

Direct Gamma Radiation Survey Performed? Instrument Model: S/N:	YES	NO	**Results:**	Above Threshold	Below Threshold

WARNING! If Sample exceeds threshold, STOP. Instruct Sample Delivery Personnel to place container in a steel or lead-lined box, if one is available, or other appropriate shielding materials and isolate the sample in a secure area away from the building. Immediately contact supervising lab director and the local FBI WMD Coordinator.

Ask Initial Safety Assessment Questions to Sample Delivery Personnel

Has the sample been surveyed for radioactivity and explosives?	YES	NO
Does the package appear suspicious?	YES	NO
Are there protruding wires, strange odors, crystallization or apparent damage?	YES	NO
Is it rigid, bulky, or stained? Is there excessive tape or string?	YES	NO
Has there been a communicated threat?	YES	NO

WARNING! If suspected of being an explosive, pressurized or dispersal device, STOP, and contact qualified bomb specialist. If sample is suspected to contain an explosive device or shock sensitive waste as determined by visual inspection, seek specialized assistance before further handling.

Does the sample have a corresponding Chain of Custody (COC) form?	YES	NO
Does the sample have a corresponding field report or emergency sample form?	YES	NO

Comments

_____

_____

Government Agency Performing Field Evaluation? _____

1. Interview Technician Delivering Sample

a) Technician Name: _____
(please print)

b) Government Agency Affiliation (NOTE: if unknown, contact approving official): _____

c) Date of Delivery: _____ Time: _____ A.M. / P.M.
(mm/dd/yyyy)

d) Technician Signature: _____

e) Check the technician's government-issued picture ID against signature

f) Did the technician sign the Chain of Custody (COC) form?

YES	NO	Comments:

- Technician first received possession of the sample on _____ at _____ A.M. / P.M.
Date (mm/dd/yyyy) Time

- Location where technician first obtained possession of sample: _____

g) Sample condition and/or containment when technician first had possession of the sample: _____

h) Report Results To (provide 24/7 contact information): _____ _____
Name Phone Number

i) Comments or observations regarding environmental conditions or sample transport: _____

_____

j) Does the above information match the information in the COC form?

YES	NO	Comments:

2. Identify Sample by Type

Identify sample by known and unknown sources (check one):

Known Source: ☐
(collected by a field technician or remote sensing/monitoring equipment and controlled in sample container)

Unknown Source: ☐
(discovered unattended, source unidentified, placed in container at the scene)

If the source is known, was sampling equipment or primary collection container supplied by field collector or appropriate government agency? YES NO

Identify sample type (check only one):

		Comments
• Water (e.g., groundwater, drinking water, stream, reservoir, other water body)	☐	
• Soil (e.g., surface, sub-surface)	☐	
• Liquids (e.g., oils, leachate, detergent)	☐	
• Petroleum products or solvent based (e.g., car explosion, chemical leak)	☐	
• Solids (e.g., powders, chips scraped off of a surface)	☐	
• Wipes (e.g., cloth with or without a solvent)	☐	
• Air filters (e.g., filters from field sampling equipment, automotive vehicles or equipment operating in direct area)	☐	
• Suspicious packages	☐	
• Pressurized gas containers or cylinders	☐	

3. Review, Verify, and Update the COC

Does the COC contain the following information and is it correct and up-to-date?

			Comments
Sample description	YES	NO	
Sample identification number	YES	NO	
Date, time, and location of sample collection	YES	NO	
Number of samples collected and transported	YES	NO	
Number of containers collected for each sample	YES	NO	
Identification of sample collector	YES	NO	
Contact information for principal investigator, project manager, or project coordinator	YES	NO	
Names of any person(s) handling the sample	YES	NO	
Time and location of any transfer of sample possession	YES	NO	

4. Review and Evaluate the Field Report or Emergency Sample Form

Does the field report or emergency sample form contain the following information?

			Comments
Date, time, and location of sample collection	YES	NO	
Sample identification number	YES	NO	
Environmental and/or human health impacts	YES	NO	
Name(s) of field personnel collecting the sample	YES	NO	
Were field tests performed?	YES	NO	
If yes, does the form indicate:			
Types of tests performed	YES	NO	
Equipment used	YES	NO	
Date and time of testing	YES	NO	
Results of Tests	YES	NO	
Person(s) performing tests	YES	NO	

5. Visual Inspection of Sample Transport Container

NOTE: Sample transport containers must not be opened during any sample receipt activities, including during visual inspection of container.

a) Examine the sample transport container and the field report form for suspicious indicators.

			Comments
Protruding wires	YES	NO	
Strange odors (Odor should be evident. DO NOT sniff the sample container!)	YES	NO	
Oily stains, discoloration, or crystallization	YES	NO	
Excessive tape or string	YES	NO	
Damaged, bulging, or discolored container	YES	NO	
Unusual or unexpected field contamination on the container (e.g., bright colored substances, crystalline deposits, liquids)	YES	NO	

b) Visually inspect the sample transport container and perform the following tasks and note observations.

Description of the sample as determined by inspection _____

Color _____

Approximate volume or size/weight _____

Photograph sample transport container (number taken)	#		
Is the transport container properly sealed?	YES	NO	

6**. Inspect Sample Container Label**

			Comments
a) If the transport container has a label or custody seal, does the date, time, and location of sample collection match the information on the COC form?	YES	NO	
b) If the transport container has a label or custody seal, does the date, time, and location of sample collection match the information on the field report or emergency sample form?	YES	NO	
c) Does each sample transport container label contain the following information?			
Sample description (location and type)	YES	NO	
Time/date taken or found	YES	NO	
Field technician initials	YES	NO	
Sample identification code or number	YES	NO	
d) Examine the transport container for additional placards, labels, or marks indicating that the contents are hazardous.			
Any reported associated risks?	YES	NO	

NOTE: Unlabeled sample transport containers should be assumed hazardous until the contents are further screened or evaluated.

Notes/Comments:

_____

_____

_____ _____ _____ A.M. / P.M.
Signature of Sample Receipt Personnel Date (mm/dd/yyyy) Time

_____ _____ _____ A.M. / P.M.
Signature of Approving Official Date (mm/dd/yyyy) Time

9.3 Attachment 3: Example Chain of Custody Form (COC)

A Chain of Custody (COC) form creates an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis. Chain of Custody is used and required, without exception, for the tracking and recording of on-site or off-site sample collection, transport, and analysis. A COC form creates an accurate documented record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis. An example COC form is provided in this attachment.

A COC form accompanies each sample or group of samples as custody of the sample(s) is transferred from one custodian to another. One copy of the form is retained by the original sample collector. Another is obtained by each receiving laboratory. Each laboratory or AHRF representative who accepts an incoming sample shipment signs and dates the COC record. It is the laboratory or AHRF's responsibility to maintain internal logbooks and custody records throughout sample preparation and analysis. Sample custodians are responsible for initiating, maintaining, or completing COC tracking. A sample custodian is the person responsible for the custody of a sample or samples at a particular time, until custody is transferred to another person (and so documented), who then becomes the new custodian. A sample is under a person's custody if:

- it is in that person's possession
- it is in that person's view, after being in that person's physical possession
- it was in that person's physical possession and then he/she locked it up to prevent tampering
- that person placed it in a designated and identified secure area

NOTE: Common carriers usually will not accept responsibility for handling Chain of Custody forms. This often necessitates packing the COC record in the shipping container (enclosed with other documentation in a re-sealable plastic bag). As long as custody forms are sealed inside the shipping container and the custody seals are intact, commercial carriers are not required to sign the custody form.

Example Chain of Custody Form

Sample Owner and Contact Info:		**Primary Sample Collector (Print)**	**Primary Sample Collector (Signature)**
Sample Type	**Sample Collector(s) Affiliation (If different from Sample Owner)**	**Sample Collector(s) Print**	**Sample Collector(s) Signature**
1.Surface Water 7.Sludge			
2.Ground Water 8.Waste		**Sample Collector(s) Print**	**Sample Collector(s) Signature**
3.Potable Water 9.Air			
4.Wastewater 10.Powder	**Comments:**		
5.Leachate 11.Petroleum			
6.Soil/Sediment 12. Other:			

Sample ID Number	**Sample Type**	**Date 20__**	**Time**	**Composite**	**Grab**	**Site Location/Description**	**Original Quantity**	**Field Chemical Screen**	**Field Explosive Screen**	**Field Radiation Screen**	**Field Biological Screen**	**Description of Packaging Container(s) and Preservation (if added)**

Relinquished By: (Print Name and Affiliation)	Date/Time	Received by: (Print Name and Affiliation)	Relinquished By: (Print Name and Affiliation)	Date/Time	Received By: (Print Name and Affiliation)
Sign:		Sign:	Sign:		Sign:
Relinquished By: (Print Name and Affiliation)	Date/Time	Received by: (Print Name and Affiliation)	Relinquished By: (Print Name and Affiliation)	Date/Time	Received By: (Print Name and Affiliation)
Sign:		Sign:	Sign:		Sign:

9.4 Attachment 4: Example AHRF Screening Results Forms

These forms are supplied as examples only. Each AHRF may opt to create their own Screening Results Forms based on their specific operating procedures and concerns.

9.4.1 Example AHRF Transport Container Screening Results Form

Example AHRF Transport Container Screening Results Form

Date _____ (mm/dd/yyyy)

Customer Sample Identification Number _____ **AHRF Sample Identification Number_____**

Screening Personnel #1_____ **#2_____** **#3_____** **#4_____**

Explosives Device Screen

Are suspicious indicators present?

Protruding wires	YES	NO
Rigidness or bulkiness	YES	NO
Excessive tape or string	YES	NO
Other:		

If yes, immediately isolate sample and contact the bomb squad.

X-Ray Screen Performed? Instrument Model: S/N:	YES	NO	**Results:**
Deemed Inert by Certified Bomb Technician?	YES	NO	**Comments:**

Radiological Survey

Direct Alpha, Beta and Gamma Survey Performed? Instrument Model: S/N:	YES	NO	**Results:**	Above Thresholds	Below Thresholds
Wipe Alpha and Beta Survey Performed? Instrument Model: S/N:	YES	NO	**Results:**	Above Threshold	Below Threshold

Hint: Each Facility may chose to enter their specific threshold levels on the form for ease of use in determining if levels detected are low enough for sample screening to continue.

Chemical Screen			
Unknown substance on container?	YES	NO	**Comments:**
Oily stains	YES	NO	**Comments:**
Discoloration	YES	NO	**Comments:**
Crystallization	YES	NO	**Comments:**
Powders	YES	NO	**Comments:**
Liquids	YES	NO	**Comments:**
M8 Paper Test Performed	YES	NO	**Results:**
Colorimetric Test for Explosives Performed	YES	NO	**Results:**

9.4.2 Example AHRF Primary Sample Container Screening Results Form

Example AHRF Primary/Secondary Container Screening Results Form

AHRF Sample Identification Number_____

NOTE: Each layer of secondary containment must be screened with the IMS and FSP before continuing to the primary sample container. At any point, if the IMS or FSP screen is positive, the layer being screened and any interior layers must be immediately moved to the glove box.

IMS and FSP Screen

IMS Screen Performed? Instrument Model: S/N:	YES	NO	**Results:**
FSP Screen Performed? Instrument Model: S/N:	YES	NO	**Results:**

Visual Inspection

Sample integrity	Good	Poor		**Container type**			
Description				**Unusual or unexpected contamination on container**	YES	NO	
Color				**Suspicious indicators**	YES	NO	
Volume or size/weight				**Presence of foreign material or objects**	YES	NO	
Temperature				**Unusual powder**	YES	NO	
Photograph	YES	NO		**Damage, bulging, discoloration or leakage**	YES	NO	

Radiological Survey

Direct Alpha, Beta, and Gamma Survey Performed? Instrument Model: S/N:	YES	NO	**Results:**	Above Thresholds	Below Thresholds
Wipe Alpha and Beta Survey Performed? Instrument Model: S/N:	YES	NO	**Results:**	Above Threshold	Below Threshold

Chemical Screen			
Are there any visual signs of Leakage?	YES	NO	**Comments:**
M8 Paper Test	POS	NEG	**Comments:**

Explosives Screen			
Colorimetric wipe test performed? **Start Time: Stop Time:**	YES	NO	**Comments:**
Crystallization present?	YES	NO	**Comments:**

Continuation of Screening Procedures Assessment			
Is it suitable to transfer entire primary sample container to the glove box?	YES	NO	**Comments:**
Is there greater than 2 grams/milliliters of sample present?	YES	NO	**Comments:**
Is there enough information to transfer the sample to a fixed site laboratory?	YES	NO	**Comments:**

9.4.3 Example AHRF Sample Screening Results Forms

Example AHRF Sample Screening Results Form

Date _____ (mm/dd/yyyy)

Customer Sample Identification Number _____ **AHRF Sample Identification Number**_____

Screening Personnel #1_____ **#2**_____ **#3**_____ **#4**_____

Combustible Gases and VOCs Screen

CGI Screen Performed? Instrument Model: S/N:	YES	NO	**Results** POS NEG	**Comments**
PID Screen Performed? Instrument Model: S/N:	YES	NO	**Results** POS NEG	**Comments**

Radiation Survey

Direct Alpha and Beta Survey Performed? Instrument Model: S/N:	YES	NO	**Results** Above Threshold Below Threshold	**Comments**
Wipe Alpha and Beta Survey Performed? Instrument Model: S/N:	YES	NO	**Results** Above Threshold Below Threshold	**Comments**

IMS and FSP Screen

IMS Screen Performed? Instrument Model: S/N:	YES	NO	**Results:**
FSP Screen Performed? Instrument Model: S/N:	YES	NO	**Results:**

Explosives Screen

Colorimetric Test Performed? **Start Time: Stop Time:**	YES	NO	**Results** POS NEG	**Comments**
Thermal Susceptibility Test Performed? **(solids only)**	YES	NO	POS NEG	

Visual Inspection

Physical Description			
Color			
Composition			
Texture			
Photograph Taken	YES	NO	
Other			

Water Solubility, Miscibility, and Reactivity Sample Test

Water Solubility, Miscibility, and Reactivity Test Performed?	YES	NO	Results **Miscible or Soluble** **Immiscible** **Insoluble**	Comments
Did Sample React with the Water?	YES	NO	**Increased water temperature** **Fuming** **Bubbling** **Other**	
Did precipitate form during solubility test?	YES	NO		**Description:**
Did sample float on water?	YES	NO		

Additional Tests

M8 Paper Test Performed?	YES	NO	Results **POS** **NEG**	Comments
pH Paper Test Performed?	YES	NO	**POS** NEG	
Starch Iodide Paper Test Performed?	YES	NO	POS 4 > pH >8 NEG 4 < pH < 8	
Nerve Agent Enzyme Ticket Test Performed?	YES	NO	POS NEG	
Colorimetric Test for Arsenic Performed?	YES	NO	POS NEG	
Alkylating Agents Paper Test Performed?	YES	NO	POS NEG	
Record physical properties				

Initial Screening and Shipment Assessment

Is there sufficient information to provide an assessment of risk to the receiving laboratory?	YES	NO	**Comments:**
Is there an appropriate laboratory to transfer the sample to?	YES	NO	**Comments:**
Packaged and decontaminated the exterior of all transport containers	YES	NO	**Comments:**
Chain of Custody prepared and signed	YES	NO	**Comments:**

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