NRT Quick Reference Guide: *Smallpox and Mpox (Variola and Monkeypox Viruses)*

QRG PURPOSE: *Given that a Federal OSC/RPM leading an emergency response to an environmental release may not know the specific type of agent during the first 24-48 hours of a response, this document provides information on the general characteristics, effects, safety, and decontamination procedures for initial response to suspected smallpox and mpox viral agent incidents. This QRG does not address protective methods for a public health response, or public health or healthcare workers.*

1. Agent Characteristics

Agent Classification: Biological; **Type:** Virus; Family: *Poxviridae*, Genus: *Orthopoxvirus*; linear dsDNA genome and lipid-enveloped

Description: Strains of *Variola* virus (VARV) group into two distinct clades associated with clear phenotypic differences. (*Variola major* and *Variola minor*) that cause the highly contagious disease termed smallpox. Smallpox caused by *Variola major* produces more severe disease including a disseminated rash and high fever with a high fatality rate range. Smallpox caused by *Variola minor* is a less severe disease with a lower fatality rate range. See the HEALTH EFFECTS section for more information on lethality, infective dose, and incubation period. Smallpox is solely contagious in humans, not animals. Naturally occurring VARV was eradicated in 1980, and only two labs in the world maintain live VARV isolates.

Monkeypox virus (MPXV) is the causative agent of mpox, which is a zoonotic disease with increasing human cases detected in the last few decades. MPXV has two distinct genetic groups termed Clade I and II, which are endemic to central and west Africa, respectively. Clade IIb MPXV has been associated with the 2022-23 global outbreak that predominately spread through sexual contact. Clade I MPXV has previously been observed as more transmissible and may cause more severe infections than Clade II. Human clinical presentation of MPXV infection is similar to VARV infection, with mpox typically having more mild disease presentation than the most severe types of smallpox; molecular methods (e.g., PCR and sequencing) will be necessary to definitively identify the pathogen involved.

Other naturally occurring *Orthopoxvirus* species with animal reservoirs/intermediate hosts that are reported to infect humans (i.e., zoonotic diseases) include: Akhmeta, borealpox, cowpox, horsepox, and vaccinia viruses. Camelpox virus is also an *Orthopoxvirus* that infects camels; however, there have been no confirmed infections in humans.

The focus of this QRG will be on the smallpox and mpox viral pathogens VARV and MPXV, respectively.

Categorical Definition:

***Variola* Virus**

Risk Group: 4	**Bioterrorism Agent:** Category A (VARV)
HHS/CDC Select Agent: Tier 1 (*Variola major*, *Variola minor*)	**CERCLA/NCP:** Pollutant/Contaminant
USDA Select Agent: No	**Waste/DOT:** Category A

Monkeypox Virus

Risk Group: 3	**Bioterrorism Agent:** No
HHS/CDC Select Agent: Yes (Clade I strains only)	**CERCLA/NCP:** Pollutant/Contaminant
USDA Select Agent: No	**Waste/DOT:** Clade I cultures, Category A; Clade I waste and Clade II, UN3291 Regulated Medical Waste

Characteristics:

Refer to the CDC Yellow Book (2024) for more information on diseases caused by poxviruses. Contact the CDC/HQ-EOC at 770-488-7100 for assistance during a response.

Persistence/ Stability	Infectivity	Lethality	Person-to-Person Transmission	Sources of Exposure
VARV and MPXV show a high resistance to drying and are stabilized when associated with dermal crust, serum, blood, and other bodily excretions. Contaminated dust and textiles can remain infectious for several years. Purified virus particles from culture are not thought to be as persistent as those from infected individuals. Heat and humidity combined make the virus less stable. (Published examples: Wood *et al.*, and Meister *et al.*)	Highly infectious by different exposure routes.	Variola major, high lethality Variola minor, low lethality MPXV: Clade I, low-moderate lethality* Clade II, low-moderate lethality* (see the HEALTH EFFECTS section) *Wide range has been observed depending on population and study.	Yes; MPXV is also zoonotic	Respiratory particles, bodily fluids, dried scabs, used IV needles, contaminated food, water, environments, and fomites

2. Exposure Routes

- **Inhalation:** VARV is highly infectious via inhalation. Infectious respiratory particles, and airborne infectious particles from dried bodily fluids or other materials contaminated with virus, can readily infect mucus membranes of the sinus and oral cavities and the respiratory tract.

- **Dermal:** VARV and MPXV are highly infectious via direct contact of the skin, particularly broken skin (e.g., abrasions, puncture wounds or sharps injuries), with liquid and dried bodily fluids containing infectious virus. Fomite transfer from contaminated objects (e.g., bedding, clothing) is known to occur.
- **Injection:** Contaminated needles, other sharp objects, and animal bites/scratches are potential routes of exposure.
- **Ingestion:** Ingestion of food or water contaminated with infectious virus is likely to cause infection via contact with oral cavity mucus membranes.

3. Health Effects

- **Incubation Period:** Smallpox symptoms occur within 7-17 days after exposure. Mpox symptoms have been reported 3-17 days after exposure.
- **Median Infective Dose:** 10-100 viruses estimated for VARV and ~200 viruses estimated for MPXV via the inhalation route; otherwise, unknown.
- **Lethality:** For VARV *Variola major* infections, fatality levels ranged from 5% - 60% in unvaccinated/untreated populations. For VARV *Variola minor* infections, fatality levels are predicted to be in the 0.2% - 2% range. From the historic literature, clades I and II MPXV fatality levels are estimated at 10.6% and 3.6%, respectively, for cases without medical intervention (Bunge *et al.*). During the clade IIb MPXV global outbreak, fatality levels reported were approximately 0.2%; this estimate includes data from areas with robust healthcare systems. Additionally, fatality levels for clade I MPXV have been reported as low as 1.4% and 1.7% in Democratic Republic of the Congo (DRC) studies where standard medical care was available (Pittman *et al.*; NIH News Release (August 15, 2024): antiviral tecovirimat in DRC).

3.1. Signs/Symptoms

- Classic smallpox symptoms include high fever, malaise, aching pains, headaches, and a rash that develops first in the mouth and throat. The rash then covers the body and produces raised bumps. These bumps eventually become pustules that are raised, round, and firm. The pustules form a crust and then a scab, which fall off leaving scars. Patients are most contagious during the week after appearance of mouth and throat rashes; they are no longer contagious once all scabs have fallen off and a fresh layer of skin has formed. Mpox symptoms can be like those seen for smallpox.
- Hemorrhagic smallpox and similar mpox signs and symptoms will depend on a combination of exposure route, viral dose, and individual health status.
- Smallpox and mpox may directly contribute to a variety of physical disabilities and, in some cases, secondary bacterial infections. Infections of the eye may lead to permanent corneal scarring and blindness. Individuals with underlying conditions that cause immunocompromise (e.g., advanced HIV infection, organ transplant recipient) are at higher risk of severe disease and death. A differential diagnosis will require molecular diagnostic testing (e.g., PCR or sequencing) to determine the causative *Orthopoxvirus* agent.

3.2. Effect Levels

Exposure Guidelines: There are no exposure guidelines for VARV or MPXV. In the absence of guidelines, it is imperative to minimize exposure to as low as reasonably achievable.

3.3. Other Disease Characteristics, and Treatment Options

Treatments: Optimization of immune function is critical (e.g., via starting antiretroviral treatment for HIV or withholding immunocompromising therapeutics, if possible). Supportive care (e.g., through over the counter analgesics) should be provided.

Under the PERSONNEL SAFETY section, see the Medical Requirements subsection (5.1) for information regarding treatment and vaccination options.

4. Release Scenarios

CAUTION: REAEROSOLIZATION IS A CONCERN FOR ALL RELEASE SCENARIOS.

- **Air/Aerosolization and Transmission:** An intentional dissemination of VARV or MPXV could occur: 1) by person-to-person transmission from purposeful insertion of an infected individual into a community or 2) through intentionally produced aerosols or fomites*.
- **Surfaces:** Surfaces or other objects (i.e., fomites*) may become contaminated following an intentional release, or from contagious individuals. Stability of VARV and MPXV is diminished with combined heating/humidity. Indoors, either virus type can persist for long periods on clothing and certain surfaces (e.g., Morgan *et al.*), though persistence may vary depending on conditions not yet assessed. In an outdoor release, VARV and MPXV are less likely to remain infectious over time depending on direct sunlight exposure, temperature, and humidity (e.g., Rao).
- **Food:** Adulteration of food is a potential release scenario. When stored at 4ºC, infectious vaccinia virus has been isolated from contaminated food for at least 14 days (e.g., Essbauer *et al.*).
- **Water/wastewater:** There is some evidence for dissemination of VARV and MPXV via water/wastewater (e.g., laundry water and eye splashes; Yinda *et al.*). VARV and MPXV could potentially survive for long periods of time in water/wastewater contaminated with body fluids and excreta, so secondary spread of VARV and MPXV may occur. Water-based activities that generate airborne particles, such as firefighting and splashing, may also result in secondary spread; however, aerosolization of viruses has been studied primarily for wastewater scenarios.

***Fomites:** Fomites are objects or surfaces capable of transmitting infectious organisms (e.g., viruses). Improperly handled and/or contained contaminated medical instruments and waste (e.g., patient excreta, sharps, bedding, PPE) could initiate or amplify existing VARV or MPXV outbreaks.

5. Personnel Safety

NOTE: Check with the site Health and Safety Officer regarding personal protective equipment (PPE) selection, medical surveillance requirements, and other safety measures included in the site-specific Health and Safety Plan (HASP). PPE selection (Levels A–D), first aid procedures, and personnel decontamination may vary depending on potential exposure route, site conditions, specific job tasks, and release scenario. Responders should always check their own internal procedures (i.e., Standard Operating Procedures [SOPs]), if applicable.
The PPE Levels listed below are general suggestions only. The final determination will be made by the Health and Safety Officer on site. For decontamination of workers, see the PERSONNEL DECONTAMINATION section. The PERSONNEL SAFETY section includes medical requirements, first aid procedures, and PPE selection for all hazards that may be present during a VARV and MPXV response (e.g., viral exposure, chemical decontaminants, heat stress).

CAUTION: RESPONDERS SHOULD DISCUSS THE ISSUE OF SMALLPOX VACCINATION OPTIONS WITH THEIR HEALTH AND SAFETY OFFICER PRIOR TO COMMENCING WORK BECAUSE PPE, CLEANUP, AND DECONTAMINATION ACTIVITIES MAY POSE INFECTION POTENTIAL.
Note: Vaccination does NOT ensure immunity. For example, the JYNNEOS vaccine is effective against mpox in 75% of cases after one dose and 86% after two doses (CDC Vaccine Considerations).

5.1. Medical Requirements

- **Pre-deployment:** Must have current medical and respiratory clearances as part of an Occupational Medical Surveillance Program according to OSHA HAZWOPER and Respiratory Protection Program, per 29 CFR 1910. **Seek prophylaxis provided per specific agency policy**.
- **During Incident:** Conduct periodic on-site medical monitoring as necessary per site-specific HASP. Report all signs and symptoms of smallpox or mpox (see the HEALTH EFFECTS section), side effects from medical countermeasures, or other general adverse health effects such as fatigue, heat stress, and behavioral health, and treat according to the First Aid section. Monitoring of exposed workers may be required by the site Health and Safety Officer or public health officials.
- **Treatments and Vaccines Available:** Seek medical attention per specific agency policy.
  - Tecovirimat is FDA-approved for the treatment of smallpox based on animal efficacy data and has been provided as first line therapy to certain patients with mpox. Combination therapy with tecovirimat, brincidofovir/cidofovir, and/or vaccinia immunoglobulin may be considered for some patients with severe manifestations of smallpox or mpox (or at risk for severe manifestations). Tecovirimat and brincidofovir are available through the Strategic National Stockpile for VARV infections and for certain patients with mpox in addition to supportive care. In the event that antiviral resistance occurs during treatment, this should be reported to public health authorities.
  - While not a treatment, vaccination is believed to prevent or lessen the severity of disease if given within four days of the initial exposure and before symptoms begin. ACAM2000 and JYNNEOS vaccines are available for post-exposure utilization against both VARV and MPXV.
  - Medical care may be accompanied with possible quarantine or isolation at home or other location. Isolation procedures for infected individuals should be strictly followed.
  - Access to available medical countermeasures (MCMs) may be through clinical studies (e.g., randomized control trials, open-label observational study) and/or appropriate regulatory routes at the time of VARV or non-variola virus outbreak, depending on the adequacy of available data to inform effective use of MCMs while balancing the need for evaluating the efficacy and safety of the MCMs in infected populations. As an example during the 2022 multinational mpox outbreak, the domestic access to JYNNEOS vaccine was via the FDA-issued Emergency Use Authorization (EUA) that allowed for a dose-sparing regimen in adults and use in children; oral tecovirimat via the NIH-sponsored STOMP trial; oral and IV oral tecovirimat, brincidofovir, and vaccinia immunoglobulin for certain patients under the CDC-held expanded access Investigational New Drug (IND) program; and off-label use of commercially-available cidofovir and trifluridine ophthalmic solution under practice of medicine. Treatment may require pain management regimens and monitoring for eye complications due to associated risk of developing blindness.
- **Post Incident:** Off-site monitoring may be required by site Health and Safety Officers or public health officials for a period following last exposure.

5.2. First Aid

CAUTION: Workers rendering first aid must be properly trained and use appropriate PPE as indicated by the site Health and Safety Officer and the site-specific HASP to avoid potential exposure.

- **During Incident:** Conduct medical monitoring, use PPE as designated by the HASP, record the PPE levels used, monitor for fever and other signs/symptoms as listed under the HEALTH EFFECTS section, and, if necessary, ensure medical attention is provided as soon as possible for injuries/illnesses.
- **Post Incident:** Continue to monitor for signs/symptoms and, if necessary, ensure medical attention is provided as soon as possible for injuries/illnesses.

5.3. Personal Protective Equipment (PPE)

NOTE: PPE recommendations below are for Federal OSC/RPMs and emergency response teams conducting environmental response activities (e.g., sampling, environmental cleanup, decontamination, waste management) during and following an environmental release of VARV or MPXV. This is not intended for public health or healthcare workers involved in a suspected or confirmed VARV or MPXV incident.

EPA's CBRN Consequence Management Advisory Team (CMAT) provides PPE guidance for Federal OSC/RPMs for emergency response to a biological agent. For additional details, reference the most recent version of EPA's CMAT Biological Response Personnel Decontamination Line SOP, which can be found at: response.epa.gov/BioResponse_Decontamination_Line_SOP (website registration is required).

General Information: Responders should use NIOSH Approved® chemical, biological, radiological, and nuclear (CBRN) respirators [self-contained breathing apparatus (SCBA), full-facepiece powered air purifying respirator (PAPR), or full-facepiece air purifying respirator (APR)] and protective clothing that provides protection for an ongoing or uncontrolled environmental release of aerosolized VARV or MPXV. Pre-incident training and exercises on the proper use of PPE are recommended. When selecting appropriate levels of PPE, information regarding potential of exposures to non-biological hazards (e.g., decontaminants) should be factored into any selection decisions.

For use of APRs or PAPRs, only those incorporating canister(s)/cartridge(s) labeled CBRN are appropriate for use in suspected or known CBRN environments. Canisters/cartridge(s) for APRs/PAPRs may be adversely affected by an increase in moisture and spray from certain work tasks, including during environmental cleanup and decontamination. Canisters and cartridges should be stored as specified by their manufacturer and remain sealed until fitted to the respirator just prior to use. Canisters and cartridges that have had the vacuum seal broken or are otherwise damaged should be removed from possible service.

NOTE: Since VARV and MPXV pose no permeability potential, when no other hazards are present, full-facepiece APR or any tight-fitting, full-facepiece PAPR incorporating at a minimum, high-efficiency (HE®), PAPR100-P®, or PAPR100-N® particulate protection (as determined by the site Health and Safety Officer) may be appropriate.

CAUTION: Acute Exposure Guideline Levels (AEGL) values are not available for VARV and MPXV and no occupational permissible or recommended exposure limits (PEL or REL) exist for VARV and MPXV. AEGL values or appropriate occupational exposure limits may exist for selected decontaminants or fumigants; see the site-specific HASP for more details.

PPE Levels for emergency response to a suspected biological agent incident are based on scenario risks from highest to lowest level of protection:

- **LEVEL A:** NIOSH Approved CBRN full-facepiece SCBA operated in pressure demand mode, a totally-encapsulating chemical protective (TECP) suit that provides protection against CBRN agents, chemical-resistant gloves (inner and outer), and chemical-resistant boots. This level is appropriate when **any** of the following are met: a) the incident is uncharacterized and/or uncontrolled, b) the type(s) of agent is unknown, c) the dissemination method is unknown, d) dissemination via an aerosol-generating device is still occurring, e) other conditions may present a vapor or splash hazard, or f) when decontaminating workers in TECP suits (because of potential for reaerosolization). Level A provides the highest available level of respiratory, skin, and eye protection. Fully-encapsulating suit material must be compatible with the substances involved.
- **LEVEL B:** NIOSH-approved CBRN or non-CBRN full-facepiece SCBA operated in pressure demand mode, a hooded chemical-resistant suit that provides protection against CBRN agents, chemical-resistant gloves (inner and outer), and chemical-resistant boots. This level is appropriate when **both**: a) aerosol is no longer being generated and b) other conditions may present additional hazards, such as a splash hazard. Level B provides the same level of respiratory protection (SCBA) but less skin protection than Level A. Level B differs from Level A in that it typically incorporates a non-encapsulating, splash-protective, chemical-resistant outer suit that provides protection against most liquids but is not vapor tight.
- **LEVEL C:** NIOSH-approved CBRN or non-CBRN APR or tight-fitting PAPR, a hooded chemical-resistant suit that provides protection against CBRN agents, chemical-resistant gloves (inner and outer), and chemical-resistant boots. This level is appropriate when the aerosol is no longer being generated and either: a) the agent and hazard level has been defined **or** b) a small item on site can be easily bagged. Level C provides the same level of skin protection as Level B, but a lower level of respiratory protection. All criteria for the use of APRs must be met, atmospheric concentrations of chemicals must not exceed Immediately Dangerous to Life or Health (IDLH) values, and the atmosphere must contain at least 19.5% oxygen.
- **LEVEL D:** Disposable hooded coveralls, gloves, and foot coverings can be worn when a risk assessment has determined there is no further risk of exposure to VARV or MPXV or other hazards that would necessitate the use of respiratory protection, during post-incident operations. Level D provides no respiratory protection and minimal skin protection. This level should not be worn in the exclusion zone and the atmosphere must contain at least 19.5% oxygen.

Other Workers: PPE recommendations for non-emergency response workers must be developed in the HASP for the site-specific scenario. PPE recommendations will vary by job type (e.g., cleanup, decontamination), type of exposure

(ingestion, dermal, inhalation—see the EXPOSURE ROUTES section), and additional site hazards (e.g., chemical, physical).

NOTE: Downgrading PPE levels may be considered only when the identity and concentration of the agent is known and the risks of reaerosolization or dermal exposure are known to be extremely low. Decisions regarding downgrading of PPE levels are only made at the discretion of the site Health and Safety Officer after conducting a risk assessment including the results of on-site sampling.

The selection of PPE must address all site hazards. Also refer to NIOSH "Recommendations for the Selection and Use of Respirators and Protective Clothing for Protection Against Biological Agents" (https://www.cdc.gov/niosh/docs/2009-132/default.html), NIOSH "Chemical, Biological, Radiological, and Nuclear (CBRN) Respiratory Protection Handbook" (https://www.cdc.gov/niosh/docs/2018-166/default.html), NIOSH "Guidance on Emergency Responder Personal Protective Equipment (PPE) for Response to CBRN Terrorism Incidents" (https://www.cdc.gov/niosh/docs/2008-132/default.html), and NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" (https://www.cdc.gov/niosh/docs/85-115/default.html).

When selecting protective clothing, responders should consider biological and chemical exposure hazards from decontaminants, and data on fabric performance (i.e., material thickness, fluid resistance) and seam construction. Suits and gloves should be selected that pass ASTM F1671 (https://www.astm.org/f1671_f1671m-22.html) and ASTM F739 (https://www.astm.org/f0739-20.html) for the specific chemicals present.

6. Personnel Decontamination

6.1. Personnel Decontamination Procedure

NOTE: Individuals involved in decontamination of personnel must use PPE as indicated in the PERSONNEL SAFETY section to avoid a potential for exposure. Be sure to cover all abraded skin prior to donning PPE and take care to avoid abrasion of the skin during all personnel decontamination operations to minimize potential for cutaneous exposure to VARV or MPXV. Level C PPE with NIOSH-approved CBRN or non-CBRN APR or PAPR is appropriate when decontaminating personnel potentially contaminated with VARV or MPXV. If a higher level of PPE (A or B) is used, the steps below may need to be modified per the HASP.

WARNING: DO NOT BEGIN ANY WORK UNTIL A COMPREHENSIVE WASTE MANAGEMENT PLAN HAS BEEN DEVELOPED AND APPROVED (see the WASTE MANAGEMENT section). All waste/trash generated from personnel decontamination procedures must be disposed of as outlined in the site-specific Waste Management Plan.

6.2. Personnel Decontamination Procedures by Zone/Step

Prior to entering the exclusion zone, all personnel are required to familiarize themselves with the site-specific personnel decontamination procedures. Negative air machine(s) should be incorporated into the personnel decontamination line, pulling HEPA-filtered air from the cleanest areas to areas with contamination (support zone to exclusion zone). Tents, berms, and collection vessels should be able to maintain copious amounts of wastewater in a contained and safe manner. Procedures should be in place to treat, replace, and dispose of contaminated materials used during the decontamination process in case the setup itself cannot be properly decontaminated/disinfected. See the ENVIRONMENTAL DECONTAMINATION/CLEANUP section for specific decontaminants to use. In addition, procedures should be implemented to replace necessary spent chemicals and decontamination solutions and containerize for disposal if necessary.

- For additional details on personnel decontamination procedures, reference the most recent version of EPA's CBRN CMAT Biological Response Personnel Decontamination Line SOP, which can be found at: response.epa.gov/BioResponse_Decontamination_Line_SOP.
- All waste/trash (e.g., wipes, towels, booties, gloves, inner suits, cartridge filters) generated from personnel decontamination procedures must be disposed of as outlined in the site-specific Waste Management Plan.
- The Decon Line Attendant (DLA) will verbally direct personnel through each step.

Conducted in Exclusion Zone (Hot Zone)

1	Tool and Instrument Drops	Place equipment taken into the Hot Zone on a plastic covered table or container provided prior to entering the contamination reduction corridor. Equipment will either be reused if more than one entry is planned or will be decontaminated later.

Conducted in Contamination Reduction Zone (Warm Zone)

2	Sample Drop	Place samples in a container provided for sample decontamination. Care needs to be taken to ensure that workers maintain chain-of-custody of samples. It is recommended that samples are decontaminated in a separate decontamination line.
3	Doff Booties and Work or Task PPE	Any work or task-specific PPE is to be disposed of in designated container or can be placed into a designated bin to be cleaned for reuse. Check for breaches in PPE and identify any gross contamination. Remove any gross contamination with wipes and place into designated container. Sit on bench and remove booties and place in designated container.
4	Wet Operations – Outer Boot and Glove Wash (1st and 2nd	The purpose of this step is to remove gross contamination, such as dirt or grime from boots and gloves. If gross contamination is not visible, this step may be skipped. Wash outer boots by stepping in decon basins with designated decontamination solutions and then outer gloves using designated decontamination solutions in glove wash basin as specified in HASP (1:10 diluted bleach).

	Gross Decon Wash)	
5	Wet Operations – Full Decon of Gloves, Boots, PAPR, and Outer Suit	Step from the first and second Gross Decontamination Wash into a contained area (large tub or basin) at this station in the decon line to wash boots and gloves. Keep PAPR and facepiece on face and body. Turn off PAPR and cover the outside of the cartridge loosely to avoid saturation with water. Wash all outer surfaces in a contained area (e.g., kiddie pool) using a pressurized spray with designated decontamination solution. Use fine mist tip on sprayer to prevent cross contamination. Start with decontaminating boots and gloves, then work on suit from the top down, including PAPR. Decontamination personnel should conduct this step. Care should be taken to ensure all areas are wetted, including around zipper, arms, front torso, and any other area that could have been contaminated. Used decontamination solution and aqueous waste should be contained, collected, and disposed of properly.
6	Wet Operations – Doff Outer Boots, Gloves, and Outer Suit	While sitting on a stool, remove outer boots and outer gloves. Undo the PAPR belt and hold in hand. While touching only the inside of suit, remove outer suit by carefully rolling suit in an outward motion from shoulders down to feet. Dispose of boots, gloves, and suit in a designated container. This step may require decontamination personnel to assist either by holding PAPR unit or assisting in suit removal.
7	Dry Operations – Inner Suit Wipe and Removal	Conducted by DLA – While touching only the inside of the suit, remove the worker's inner suit by carefully rolling it inside out while progressing slowly, using a downward motion, from the hood head/shoulders area, to the hands and sleeves, all the way down to the feet. Wipe down the zipper, hood near the facepiece, and cuffs (area within 6 inches above the wrist) of the worker's inner suit with a paper towel wetted with new decontamination solution. Step out of suit while holding PAPR with facepiece on and place inner suit in designated container.
8	PAPR and Facepiece Removal	Put on a new pair of gloves over the inner gloves (provided by DLA). With new gloves on, doff PAPR facepiece and hose by looking downward and pulling the facepiece down from the top of head and away from chin. Remove cartridge filters and place into a designated container. Put facepiece and hose into designated containers for cleaning. Decontamination personnel will clean each facepiece and PAPR assembly prior to return to service.
9	Inner Glove Removal, and Hand and Face Wash	Remove inner gloves by only touching outside of first glove and then only inside of second glove. Place gloves into designated container. Wash hands and then face with soap and warm water after all PPE has been doffed and prior to entering the personal shower.

Conducted in Support Zone (Cold Zone)

10	Personal Shower	Personnel should shower using copious quantities of soap and water for a minimum of 5 minutes and change into clean clothes. If a personal shower is not immediately available, at the minimum, hands and face should be washed thoroughly.
11	Medical Monitoring	Report to the medical monitoring station for post-entry monitoring and if necessary, meet with appropriate personnel for debriefing.

Emergency Egress Corridor: Establish an emergency egress line to use for quickly decontaminating personnel with medical emergencies while in the exclusion zone. Depending on the severity of the injury or illness, personnel may have to be quickly gross or dry deconned only and have PPE and clothing removed. Prior to receiving treatment from emergency medical technicians (EMT) or being transported to a hospital, personnel must be decontaminated to minimize potential exposure to others and comply with all ambulance/EMT requirements.
Note: All work in the exclusion zone must come to a stop until the emergency egress corridor is cleared and reset.

Hand-Wash Station: A hand-wash station with soap and water should be available for personnel to physically remove any residual agent/decontaminant following entry. However, this may not be available initially at the scene or weather conditions may prohibit its use.

7. Environmental Sampling

Note: *Environmental samples refer to samples collected from environmental matrices and do not include forensic or clinical samples collected by other agencies. Environmental sampling for VARV or MPXV, for the purposes of informing decontamination strategy, is unlikely to be recommended as results are expected to have limited utility.*
If there is a need, however, for limited sampling to collect evidence of either a VARV or MPXV release, then EPA should first consult with CDC regarding sample collection and analysis prior to collecting environmental samples.
In addition, in the event of a BioWatch detection for VARV, additional confirmatory sampling may be conducted in consultation with CDC and state or local public health departments to determine viability (infectivity) of the pathogen in CDC's BSL-4 laboratory.

7.1. Before Collecting Samples

- Identify, coordinate with, and initiate information sharing with the law enforcement agency in charge to ensure site access and ensure that sample chain-of-custody is maintained between groups. CDC/HQ-EOC (770-488-7100) can provide guidance on approved sample types for testing at CDC's Laboratory Response Network (LRN), as well as provide critical clinical and public health information during such an emergency. Public health departments and public health laboratories also may be involved. This may include initiating contact with CDC and/or CDC's LRN to analyze the site-specific types of samples. Accordingly, the Environmental Response Laboratory Network (ERLN)

laboratory lead can be contacted (EPA/HQ-EOC 202-564-3850) to provide information on which laboratories to send the samples to and help coordinate. Laboratory capacity for analysis of environmental samples may be limited. Clearly identify and discuss with the laboratory its acceptance criteria since most laboratories cannot analyze all types of media, nor can they dispose of some types of non-analyzed samples.

- If it is determined that environmental sampling efforts are needed, create a site-specific sampling and analysis plan (SAP) that includes the Data Quality Objective (DQO) process as part of a quality assurance project plan to be reviewed and approved by appropriate subject matter experts and/or through Incident Command System (ICS) channels. **Note:** Choice of sampling techniques and detection/analytical equipment will be highly site- and incident-specific and will be affected by the following: type of release; characteristics of the VARV or MPXV preparation; type of contaminated matrix; sampling objectives; sample handing requirements; transportation regulations; analytical laboratory acceptance criteria; and waste disposal facilities sample decontamination requirements.
  - Additional details on the DQO process can be found at: Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4.
  - Refer to ESAM's Sampling and Analysis Plan Resources - Pathogens webpage for guidance on developing pathogens Sampling and Analysis Plan (SAP) Template Tool.
  - Contact the EPA/HQ-EOC at 202-564-3850 or the incident environmental unit leader for information on sample types.
- The sampling plan should include sample handling, packing, and transportation requirements so that VARV and MPXV remain infectious/viable during the handling process but can be safely transported.
- The sampling strategy and design chosen will be based on many factors including but not limited to site characteristics, sampling resources, and laboratory capacity. The following tools can be used to select and develop sampling designs (number, type, and location) that meet the site-specific objectives:
  - Trade-off Tool for Sampling (TOTS): Online tool to estimate and optimize cost, time, and resources for SAPs.
  - Visual Sample Plan (VSP): Statistical software tool for generating probabilistic sampling designs.
  - Guidance for Choosing a Sampling Design for Environmental Data Collection, EPA QA/G-5S.

7.2. Sampling Strategy and Methods

***Note**: Prior to collecting samples, consult with the receiving laboratories to determine accepted sample types for their VARV or MPXV analysis capability. Note: Approved environmental sample types for VARV or MPXV analysis by the LRN laboratories using a multi-agent screen include swabs for clinical samples, liquid samples, and powder, however the LRN may be able to provide a multi-agent screen for limited environmental samples. Environmental sample types that the ERLN is able to accept have not been identified.* The ESAM (https://www.epa.gov/esam/sample-collection-information-documents-scids) provides general information regarding sampling procedures supporting collection of samples to be analyzed for pathogens of interest. While ESAM currently does not specifically cover VARV or MPXV, it could be referred to for general information about the sampling types listed below.

Use validated/verified sampling methods where available. Innovative sampling methods can be considered if they are sufficiently advantageous for achieving objectives(s). Procedures encompass different media, sampling supplies, sample size, container, holding time, preservation, packaging, and shipping. For additional information and for other sample matrices, contact the EPA/HQ-EOC at 202-564-3850.

- **Non-porous Surfaces, Swab Sampling**: Sterile swabs are used to sample 4 in^2 area of non-porous, small, hard-to-reach or irregular shaped surfaces (e.g., keyboards, air register vanes). Consult the analysis laboratory to confirm the appropriate swab type and pre-moistening solution (if applicable) to be used. *Note: If an LRN laboratory is to be utilized, the LRN accepts dry swabs while other labs may accept swabs in pre-moistening solution*.
- **Water:** Water is not currently an approved environmental sample type for LRN analysis. However, if this is the main environmental matrix of concern, reach out to CDC/LRN to determine testing capability. Potable water that is chlorinated or contains an oxidant (whether applied as a disinfectant in a water system or introduced during decontamination activities) needs to be neutralized immediately upon collection with sodium thiosulfate or other neutralizer at the concentration specified by the analytical laboratory. See the Protocol for Collection of Water Samples for Detection of Pathogens or Biothreat Agents, EPA/600/R-21/280.
- Where applicable, EPA should consult with CDC and the receiving laboratory for sampling specifics. Innovative sampling methods or sampling types in which there is not an approved LRN, ERLN, or Civil Support Team (CST) analysis method available may be used if they are sufficiently advantageous for achieving objectives and a laboratory can be identified that can accept the samples. These methods might include but are not limited to: non-porous surface sampling using sterile gauze wipes or cellulose sponge-sticks; sampling for porous and/or irregular shaped surfaces using 37-mm filter cassettes/microvacuum techniques; and air sampling portable sampling units (fixed aerosol monitoring systems used in the BioWatch program and/or using low-volume air filtration sampling, filter cassettes, or liquid impinger methods).

7.3. Packaging and Shipping Requirements

- EPA must first consult with CDC regarding sample collection, packaging, and shipping.

- Packaging and shipping of samples are subject to strict regulations established by DOT, CDC, USPS, OSHA, IATA, WHO, and the Federal Select Agent Program. Only trained and certified shippers may package and ship hazardous materials. Also refer to the latest guidance from DOT: Transporting Infectious Substances Safely. Contact the sample-receiving laboratory to determine if they have additional packaging, shipping, or labeling requirements.

8. Environmental Sample Analysis

As stated in the ENVIRONMENTAL SAMPLING section, environmental sampling for VARV or MPXV is unlikely to be recommended. However, if there is a need for limited environmental sampling, EPA should first consult with CDC regarding availability of appropriately equipped and approved laboratories for such sample analysis prior to collecting environmental samples.

8.1. Field Sample Analysis

Note: PCR-based field detection platforms that may be used for rapid analysis of environmental samples cannot distinguish between infectious/viable or non-infectious/non-viable virus if present in the sample. Cell-culture-based methods performed within an approved fixed laboratory may be necessary to adequately assess risk, but it could take several days for results.

Available technologies: Depending upon the assay availability, the VARV PCR-based technology platform (see table below) may be able to provide results for environmental samples in a short time frame. The DoD's CST mobile laboratory (Analytical Laboratory System [ALS]) and/or local public health laboratories that may be part of CDC's LRN are usually equipped with such technology platforms. Contact the EPA/HQ-EOC (202-564-3850) for available resources for rapid sample analysis.

Platform	Availability	Where used	Potential purposes
VARV PCR	CST	Mobile Lab (ALS)	Detection of VARV specific genes (DNA sequences).

8.2. Laboratory Sample Analysis

Note: *EPA should first consult with CDC regarding the availability of appropriately equipped and approved laboratories for environmental sample analysis.*

Laboratory availability: Contact the EPA/HQ-EOC (202-564-3850) for availability of appropriately equipped and approved laboratories for analysis of VARV or MPXV in environmental samples.

Analytical goals: Analytical goals may change as the incident response progresses, and laboratory sample analysis can follow a tiered approach when implementing different analytical methods. For example, PCR-based methods capable of detecting just the DNA/RNA of VARV or MPXV are generally more rapid and might be used during the initial stages of response to determine the extent of contamination. Such rapid methods also might be used to identify samples that should be analyzed using more extensive, cell-culture-based methods that can confirm the presence/absence of infectious/viable virus in the samples. These more extensive analytical methods should be considered for use when: 1) earlier rapid analysis indicates the presence of VARV or MPXV, 2) a smaller subset of samples requires such analysis, or 3) as required for a tiered approach to environmental decontamination/cleanup and sample analysis.

Analytical methods: Specific analytical approaches for VARV and MPXV may be determined after consultation with CDC and/or state public health agencies.

9. Environmental Decontamination/Cleanup

WARNING: DO NOT BEGIN DECONTAMINATION WORK UNTIL A WASTE MANAGEMENT PLAN HAS BEEN DEVELOPED (see the WASTE MANAGEMENT section).
CAUTION: Spraying decontamination solutions may reaerosolize contamination. For more detailed decontamination information, contact EPA/HQ-EOC at 202-564-3850.

CAUTION: Decontaminant solutions or fumigants have unique safety/PPE requirements due to their own toxicity or that of breakdown products during use (e.g., use of bleach results in chlorine vapors, while fumigants may be used at concentrations above their IDLH levels). The preparation and physical forms of VARV- or MPXV-contaminated material (e.g., porous surfaces contaminated with bodily fluids) lead to additional challenges for decontamination.

9.1. Decontamination/Cleanup Planning

A site-specific decontamination/cleanup plan should be developed and approved by all necessary organizations/SMEs via ICS channels. Responders should develop a plan that considers: 1) nature of contamination including physical properties and how it entered the facility; 2) extent of contamination (area and concentration) and possible pathways that have or could have spread the contamination; and 3) decontamination of items for re-use and/or disposal.
General Considerations: An evaluation should be undertaken that considers public safety, total cost, impact on the facility, wastes generated, as well as the time the facility or item will be out of service and any socio-economic, psychological, and/or security impacts that may result. It is advisable to isolate the contaminated area. Large volumes of decontamination wastes may be generated that will need to be collected, treated, and properly disposed of; care should be taken to minimize waste generation.

Disposal Option: Certain materials may be resistant to decontamination techniques, or it may be more cost effective to dispose of the items and replace than to decontaminate and restore. In general, for porous materials that are non-essential (e.g., carpet, upholstered furniture), consideration should be given to removing and managing these items as contaminated waste.
Environmental Persistence: See the AGENT CHARACTERISTICS section for information on persistence/stability. It is not advisable to rely on natural degradation of infectivity as a decontamination option.
Temporary Barrier Option: If the contaminated area cannot be immediately remediated, a temporary barrier option may be desirable in which physical barriers (e.g., plastic sheeting) are used to immobilize and prevent the agent contamination from spreading. Such options can also be a temporary solution until a final decontamination and disposal strategy can be implemented.

9.2. Decontamination Strategy

Dealing with gross decontamination or source of contamination has been the first step in many historical biological agent responses. A site-specific decontamination strategy can be developed by designating contaminated areas into several broad categories: 1) contaminated materials, 2) surfaces requiring remediation, 3) large volumetric spaces, and 4) sensitive and irreplaceable items. For aqueous waste, see the AQUEOUS WASTE STERILIZATION AND DISPOSAL section.
CAUTION: Agent preparation, surface characteristics, and other factors may impact associated decontamination strategies and should be considered to pose a health hazard until proven otherwise. The decontamination strategies presented below for each of the four broad categories may need to be adjusted to ensure decontamination under site-specific conditions.

9.2.1. Contaminated Materials: For removal of scabs, fomites contaminated with bodily fluids, lesion material, and waste materials, or other contaminated objects or materials, such material may be transferred carefully into containers, with care being taken to minimize reaerosolization. Large items such as mattresses may need special handling to minimize cross contamination. This strategy is for contaminated materials that will be disposed of following decontaminant application.

9.2.2. Surfaces Requiring Remediation: Dirt, grime, and the presence of organic material can reduce the effectiveness of decontamination; pre-cleaning surfaces with soap and water may be needed before the application of disinfection solutions but the resulting pre-cleaning rinsates may contain and spread contaminants. Disinfection solutions should be deployed as a low-pressure spray (<30 psi) whenever possible to avoid potential reaerosolization of agent. Prior to use, product-specific safety requirements should be incorporated into the site-specific HASP. Unsealed concrete and wood floors should be considered porous surfaces.

A strategy for visible material contamination is to gently cover any contaminated areas with towel(s), sorbents, or wipes (wet or dry) (overlapping each other if necessary) and applying disinfection solution (see the Disinfectants listed below) starting at the perimeter and wetting towards the center of the contaminated area. Ensure label contact time (e.g., at least 15 (wetted) minutes, dependent on label registration) is provided and ensure each towel is kept "sopping" wet during this time. Remove the towel(s) then wipe up the residual dampness/drops of disinfection solution until the surface is dry. Reapply disinfection solution to the bare surface and allow registered contact time according to product label to elapse and wipe up again with more towel(s) then let surface air dry. All contaminated decontamination materials (e.g., fabric towels, wipes) used in the disinfection process should be collected, labeled, and properly disposed of as designated by the waste management specialist. Paper towels should be avoided, unless this is the only option, because they can break into smaller pieces making the removal more difficult.

Disinfectants:

- For a list of EPA-registered disinfectants that can be used against VARV and MPXV on hard, non-porous surfaces, refer to List Q generated in response to Disinfectants for Emerging Viral Pathogens (EVP) as a resource for specific products registered against vaccinia virus (WR strain consistent with ATCC VR-119) and/or products registered for more resistant viruses (i.e., non-enveloped viruses). This should be included as one of the initial options for hard, non-porous surfaces with limited products for porous surfaces.
- In addition to the List Q disinfectants, VARV and MPXV are expected to be inactivated by products and/or chemistries that have been shown to be effective against harder to inactivate bacterial endospores (List A), including spores of *Bacillus anthracis* or *Clostridioides difficile* (List K).
- Products should be used as specified on the product label or according to manufacturer's instructions as appropriate. Steam disinfection for virus inactivation has long-standing historical precedent, although requirements for equipment and procedures will be specific to the surface or object being disinfected, along with overall objectives.

Disinfection may not be possible for some soft, porous surfaces, such as upholstered furniture, carpets, rugs, or mattresses, if the item has been heavily contaminated, for example, by excessive drainage of body fluids from rashes. These items should be discarded following guidance in the WASTE MANAGEMENT section. Disassembly to reduce size should be carefully considered as aerosolization is a potential hazard. Use the recommended EPA Lists for porous surfaces that can be disinfected.

Before disinfecting any surface, a pre-cleaning step should be performed. Use cleaning and disinfection products according to label instructions. Use disposable cleaning cloths, mop cloths, and wipes, and dispose of these in leakproof bags.

9.2.3. Altered Environmental Conditions: Altered environmental conditions such as increasing temperature and relative humidity to certain levels has been demonstrated to be a decontamination option (EPA 600/R-09/139; Richter *et al.*). Exact treatment conditions will be site- and surface-specific.

9.2.4. Sensitive and Irreplaceable Items: Certain items, usually those which are sensitive or valued for a variety of reasons (e.g., mission criticality, personal or societal significance, rarity, and cost) may need to be decontaminated rather than managed as waste. Some of these items, however, will be devalued or rendered unusable if they are chemically or physically incompatible with the decontaminants. Irradiation and chemical sterilization may be useful in decontaminating items that are to be returned to owners. These items will need to be bagged and tagged prior to removal from the contaminated area to be treated ex-situ. Such options may include:

1) Ethylene oxide sterilization can be used to decontaminate items in an off-site sterilization chamber.
2) Gamma irradiation and electron beam technologies can be used to inactivate biological agents at off-site locations, provided the dose meets sterilization requirements.
3) Ultraviolet-C (UVC) light can be effective for hard non-porous surfaces for inactivating biological agents under optimal conditions. Care should be taken to ensure sufficient UVC dose is applied.

Appropriate SMEs should be consulted for application of these methods. Direct experimental data for VARV and MPXV are minimal for these treatment technologies.
Large sensitive items may require additional protection from the decontaminant being used for treatment of the contaminated item and may be treated with an optional method that is compatible with the item.

Verification of Decontamination: Site- and situation-specific. The local public health department may have jurisdiction over verification. Consult EPA/HQ-EOC at 202-564-3850 for more information.

10. Aqueous Waste Sterilization and Disposal (including PPE wash water and decontamination wastewater)

CAUTION: This section provides information on sterilizing and disposing of PPE wash water and residual decontamination wastewater potentially containing infectious/viable biological agents from decontamination of PPE and decontamination operations. This water should be sterilized prior to disposal. Disinfectant concentration, exposure time, pH, and temperature are important parameters in the sterilization process. Aqueous waste should be collected in DOT-approved containers as described in the WASTE MANAGEMENT section.

Appropriately implemented water/wastewater treatment protocols, like chlorination, will likely inactivate some (and therefore perhaps all) VARV or MPXV in the water/wastewater in a matter of minutes, although without appropriate treatment, MPXV can maintain activity for lengthy periods, with one report suggesting no less than 5 months (https://wwwnc.cdc.gov/eid/article/29/10/23-0824_article). Deactivation by chlorine can occur but is dependent on chlorine dose, contact time, temperature, pH, and virus concentration, so deactivation must not be assumed.

If there is a need to dispose of the aqueous waste at a wastewater utility, responders need to work with wastewater utilities to ensure that the utility will accept the aqueous waste. Wastewater utilities will identify requirements that will need to be met for acceptance. For instance, once sterilization is complete, the wash water may require additional treatment for removing residual oxidant (e.g., chlorine) prior to being accepted by a wastewater treatment facility. Removal of residual oxidant can be verified through readily available field kits, including test strips, perhaps specified by the wastewater utility since they may use these in their routine operations. Verification of sterilization may be required before disposal, and utilities may be less familiar with verification procedures for sterilization.

To support such verification, EPA developed a streamlined bench-scale procedure for testing the efficacy of chlorine bleach for the inactivation of *B. anthracis* spores in aqueous waste originating from cleanup of a contaminated site. This procedure may be considered for treatment of VARV- or MPXV-contaminated aqueous waste. Full-scale procedures exist for the treatment of such aqueous waste with chlorine bleach, and these procedures have been tested and the results published. However, aqueous waste generated at a specific cleanup site is unique, potentially different from the aqueous waste tested in the published research. The streamlined bench-scale procedure helps emergency management personnel test the efficacy of chlorine bleach for the inactivation of a biological agent in aqueous waste from the site cleanup. The streamlined bench scale procedure is not official EPA guidance on what must be done but is meant to be a practical resource for responders to use in combination with other resources when faced with the challenge of dealing with aqueous waste from this type of cleanup that could contain VARV or MPXV. The procedure can be found at the following link (https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NHSRC&dirEntryId=344944).

11. Waste Management for Environmental Contamination from Biological Incident

11.1. Transportation

Federal requirements for the commercial transport of hazardous materials, including Division 6.2 Infectious Substances, and procedures for exemptions are specified in How to Comply with Federal Hazardous Materials Regulations, available

at: https://www.fmcsa.dot.gov/regulations/hazardous-materials/how-comply-federal-hazardous-materials-regulations. Contact the PHMSA Hazardous Materials Information Center at 1-800-467-4922 or infocntr@dot.gov to discuss specific cases.

Additional resources on packaging, labeling, and shipping are available at: https://www.phmsa.dot.gov/standards-rulemaking/hazmat/hazardous-materials-regulations. Detailed state regulations can be found at https://www.envcap.org/.

VARV is classified as a DOT/HMR **Category A infectious substance**, and should be classified as UN2814, Infectious substances, affecting humans. The specific requirements for authorized packaging and materials for transporting a **Category A infectious substance** are listed in 49 CFR §173.196. In addition, each packaging must meet specific test standards in accordance with 49 CFR §178.609.

MPXV is categorized as a DOT/HMR Category B infectious substance (except for Clade I cultures) and can be transported as regulated medical waste (UN3291).

See the guidance in "Managing Solid Waste Contaminated with a Category A Infectious Substance" (April 2024), which can be found at: https://www.phmsa.dot.gov/transporting-infectious-substances/planning-guidance-handling-category-solid-waste. Appendix F-2 contains information on packaging and transport of MPXV-contaminated materials.

On-site treatment (e.g., autoclaving, portable incinerators, chemical disinfection) prior to transport for off-site disposal may ease the requirements for special transportation permits.

11.2. Waste Management

WARNING: DEVELOP A COMPREHENSIVE WASTE MANAGEMENT PLAN PRIOR TO ANY SITE ASSESSMENT OR CLEANUP WORK.

There is no federal regulatory framework that addresses management of waste from biological contamination incidents, therefore, waste management decision-making for biological contamination incidents is done at the state and local level.

Waste generated from site assessment and cleanup activities likely will be staged for later treatment/decontamination prior to being sent off site for disposal. EPA has an online tool (https://github.com/USEPA/Waste_Staging_Tool) to aid in the selection of staging areas for temporary waste storage and on-site treatment activities. Options for treatment/decontamination and disposal of these wastes include, but are not limited to: physical (e.g., incineration, autoclaving) and chemical (e.g., aqueous chemical disinfection, fumigation). If laboratory analysis is needed to evaluate efficacy of treatment, see the ENVIRONMENTAL SAMPLE ANALYSIS section. Verification of waste treatment efficacy may include multiple lines of evidence (e.g., established operating conditions) and/or environmental sampling based on consultation with site-specific responsible officials. Contact the EPA/HQ-EOC at 202-564-3850 for further assistance.

Complex aqueous matrices, such as contaminated wastewater or decontamination effluents, may have significant oxidant demand, requiring additional chemical disinfectant. Porous materials present challenges to waste treatment processes. Waste disposal for agent-contaminated wastewater or decontamination effluents generated from the decontamination activities will be problematic. Disposal of aqueous waste, even if chemically treated, via discharge to sanitary sewer may require consultation with the appropriate authorities.

Landfills willing to take potentially agent-contaminated solid wastes may be limited due to state requirements, even when waste has been treated on site and sampling/analysis suggests that no residual agent remains. Even with permission from state regulators, individual facilities may refuse to accept these materials due to public perception or liability issues. Multiple methods or facilities may need to be used, and size reduction may be required, which presents a potential for aerosolization of contaminants.

Although testing may be desired to satisfy waste acceptance criteria specified by state regulators and/or treatment or disposal facilities, there are very limited options for measuring biological agent levels in common waste matrices. These options typically involve acquiring and/or preparing the samples in such a way as to be among the limited number of sample matrices that available laboratories will accept (i.e., water, sponge sticks, 37mm vacuum filters). Other approaches (e.g., proof of compliance with minimum operating conditions of on-site treatment equipment) could possibly be used to specify waste acceptance criteria. All waste management options along with their applicable waste acceptance criteria should be investigated as early into the response process as possible and included in pre-incident planning documents.

EPA has developed the online All Hazards Waste Management Planning Tool to help communities and facilities develop pre-incident waste management plans. This tool can be found at https://wasteplan.epa.gov. (website registration is required)

EPA has developed I-WASTE, a web-based tool (https://iwaste.epa.gov) that contains links to waste transportation guidance, treatment and disposal facilities, state regulatory offices, packaging guidance, and guidance to minimize the potential for contaminating the treatment or disposal facility.