

**Containment and Decontamination Procedures
for Bureau of Land Management Administered Lands to
Minimize the Spread of White-Nose Syndrome
in Caves and Abandoned Mines
August 5, 2010**

Since the first observation in New York State in early 2006, White-nose Syndrome (WNS) in bats has been documented across the eastern United States (U.S.) and Canada, and most recently in Missouri and Oklahoma. The *Geomyces destructans* fungus is considered to be the primary causal agent of the mass mortality of these bats. Mortality rates at affected sites are high, typically 80 to 100 percent.

In addition to the presence of the fungus, fat reserves of bats afflicted with WNS are prematurely depleted by mid-winter, as opposed to persisting until spring. This depletion of fat reserves results in starvation, and typically subsequent death. Although bat-to-bat transmission has been the focus of transmission studies and has been found to be a significant vector for the spread of WNS, long distance jumps of WNS from New England to West Virginia could have been a result of human transmission between sites. Recent unpublished studies have shown persistence of *G. destructans* spores on field equipment exposed to contaminated caves. Other research has shown that spores may become adhered to cave clothing, boots, gear, etc., indicating that *G. destructans* could be transported between sites. In light of this information, it is imperative that individuals who must enter caves or abandoned mines follow the containment and decontamination procedures described in Sections 3 and 5 to prevent further spread of WNS.

Note: The recommended decontamination products listed in Section 5 have been found to be effective at killing the fungus in a laboratory setting; However, research is still needed to test the effectiveness of these products in the field. We are aware that implementing these procedures requires a significant change to the historical ways surveys or other visitations have been conducted underground. However, it is our responsibility to use reasonable procedures in accordance with agency resources and other priorities to avoid being vectors of WNS.

SECTION 1: Characteristic Signs of WNS

During summer months, bats are normally active near dusk and dawn. During the winter months, bats may be active during the day when temperatures are warm and tolerable. Different bat species naturally go into varying degrees of torpor during hibernation, and if the environmental conditions are right they can arouse and exit hibernacula. Bats **may** be considered WNS-affected when:

- They are observed flying on the landscape during very cold temperatures.
- They are observed clinging to surfaces outdoors in winter.
- A white fungus is visible on their bodies, particularly on the nose and forearms.
- They have a dehydrated appearance.
- They are alive, but found on the ground and appear unresponsive.
- Numerous bats have been found sick or dead at a location where a large population exists.

You should not handle bats unless specifically authorized to do so. If you should observe live or dead bats that are exhibiting characteristic signs of WNS, report this immediately to the appropriate BLM office, state wildlife agency, or U.S. Fish and Wildlife Service Ecological Services Field Office (<http://www.fws.gov/offices>).

For WNS, bat and cave research decontamination procedures, refer to protocols given by the FWS at: [USFWS White-Nose Syndrome Decontamination Protocols for Researchers](#).

SECTION 2: General Guidelines to Prevent the Spread of WNS

- Avoid entry into all caves and abandoned mines, and observe closures and advisories.
- **Never use gear that was used in a WNS-affected state outside of that state.**
- **Decontaminate used gear** immediately, store gear away, and thoroughly wash and decontaminate any surfaces with which these items may have come into contact (e.g., car trunk, duffle bag, etc.).

SECTION 3: Containment and Decontamination Procedures

3.1 Caves:

The term “cave” as defined in the Federal Cave Resources Protection Act includes all features whether they are known to be used by bats or not. A cave is defined under the Federal Cave Resource Protection Act as “any naturally occurring void, cavity, recess, or system interconnected passages beneath the surface of the earth or within a cliff or ledge that is large enough for a person to enter, whether the entrance is excavated or naturally formed”.

Cave Entry:

- If possible, avoid cave entry.
- All clothing, footwear, safety and work equipment, and other required implements should not be used in multiple entries on the same day unless the cleaning and decontamination procedures can be performed between each entry. In situations where caves are known to be interconnected and have multiple entrances, decontamination is not required between entry at the various entrances, within the same day.
- Keep the number of items intended to be brought into a cave to a minimum.
- Prepare for cave exit by placing a plastic container near the entrance of the cave. The plastic container should contain necessary equipment for on-site decontamination. On-site decontamination equipment includes such items as plastic bags, small broom, extra clothing, footwear, and equipment.
- In some situations where caves are concentrated in a small area, states may identify logical decontamination areas that allow decontamination between cave clusters that are likely to be used by the same group of bats.
- Enter each cave with clean clothing, footwear, and equipment.
- Tyvek® or other disposable outerwear, rubber boot covers, and latex rubber gloves be used for each site entry in lieu of decontamination procedures for clothing. Upon exit, place items in sealable containers, to be appropriately decontaminated or disposed of off-site.
- Companion animals should be kept out of caves.

Cave Exit:

- At or near the exit of the cave, brush dirt and mud from all clothing, equipment, ropes, and any other items carried into the cave. Brushing dirt and mud off of clothing is especially important as organic material (i.e., clay soils) can prevent the chemical products from penetrating equipment, clothing, and boots, etc.
- Exposed portions of the skin (e.g., face, neck, hands, arms) should be wiped down with disinfectant wipes. Place used wipes in a sealable plastic bag.

- Place all contaminated equipment and clothing which are to be decontaminated off-site in a sealable plastic bag and/or plastic container.
- Change into clean clothing and footwear. Place contaminated clothing and footwear into a sealable plastic bag and/or container. A clean change of clothing is required after a cave visit.
- Do not enter vehicles with contaminated clothing or equipment.
- Showering or bathing is required after cave visits, including when conducting multiple-day excursions to multiple sites.

3.2 Show Caves:

Work with contractors, special use permittees, concessionaires, and resource professionals to develop a site specific decontamination process for all individuals entering show caves. Some suggested actions, restrictions, or activities are:

- Educate visitors about the WNS situation. Examples of WNS educational efforts in place are available at the National Park Service's Mammoth Cave website (<http://www.nps.gov/macawhitenose.htm>).
- Close the cave to public entry during hibernation season (roughly from October 1 – May 1).
- Restrict human entry from portions of caves used by bats any time of year.
- Control visitor traffic to well-defined, physically contained pathways.
- Do not allow visitors to enter the cave with footwear, clothing, and other accoutrements that have been worn or carried into another cave or underground resource, or allow the visitor to sanitize their items prior to entry.
- Provide disposable rubber booties, overshoes, and/or Tyvek suits for visitors.
- Provide a supervised decontamination station for visitors to utilize.

3.3 Decontamination of Clothing and Equipment:

All clothing and gear used for underground site entry must be clean or be decontaminated prior to entry.

3.3.1 Submersible Gear (i.e., clothing and equipment that can be submerged without damage):

General guidance:

- Check the manufacturer's information on all of your clothing, equipment, and other items requiring decontamination to ensure that these items can withstand the application of the recommended decontamination products.
- If the effects of the decontamination procedures and products to your clothing, equipment, and other items are unknown, it is advised that these items be used only where decontamination procedures are not in effect or dedicate these items to one cave, or do not use them at all.
- In lieu of chemical treatment, the contaminated items can be boiled in water for at least 15 minutes.
- Decontamination products are listed in Section 5.

Clothing and equipment suitable for immersion:

- Wash all clothing and all suitable equipment in a washing machine or by hand at any water temperature using conventional detergents. Rinse items thoroughly and then soak items for a minimum of 10 minutes in one of the recommended decontamination products. After soaking, rinse item again and hang to dry.
- Laboratory testing has found Woolite® fabric detergent to be the most effective surfactant for this procedure.

Footwear:

- Rubber caving boots (Wellington-type) are recommended for cave entry.
- Boots need to be completely scrubbed free of all visible soil and organic material and rinsed at the cave entrance.
- Rubber and leather boots, including soles and leather uppers, can then be decontaminated with an appropriate decontamination product for a minimum of 10 minutes, rinsed, and air dried.

Ropes, Webbing, and Harnesses:

- To date, only *Sterling rope and webbing* have been shown not to be damaged by this decontamination procedure: Wash rope/webbing in a front loading washing machine on the gentle cycle using Woolite Extra Delicates detergent. After the cycle is complete, immerse the rope/webbing in a 1:128 dilution of Lysol® IC Quaternary Disinfectant Cleaner for 15 minutes. Rinse rope/webbing at least two times in clean water and allow to air dry.
- If you are using other brands of rope and webbing not mentioned above, these products have yet to be tested for integrity after decontamination. In cases where safety following decontamination has not yet been evaluated, then ropes and webbing should be dedicated to one cave or not used at all to prevent the spread of WNS.

3.3.2 Non-submersible Gear: (i.e., equipment that will be damaged by submersion):

General guidance:

- Check the manufacturer's information on all of your clothing, equipment, and other items requiring decontamination to ensure that these items can withstand the application of the recommended decontamination products.
- If the effects of the decontamination procedures and products to your clothing, equipment, and other items are unknown, it is advised that these items be used only where decontamination procedures are not in effect or dedicate these items to one cave, or do not use them at all.
- In lieu of chemical treatment, the contaminated items can be boiled in water for at least 15 minutes.
- Recommended decontamination products are listed in Section 5.

Cameras and Electronic Equipment:

- Cameras and other similar equipment that must be carried into a cave may be placed in plastic casing (i.e., underwater camera housing) or wrapped in plastic wrap where only the lens is left unwrapped to allow for proper camera function. Lysol disinfecting wipes can be used to decontaminate the plastic casing or plastic wrap.
- If no protective cover is used, electronic equipment can be decontaminated using the Lysol disinfecting wipes. Refer to the equipment manufacturer's instructions before applying any of the decontamination products.

Vehicles:

- Always remove and contain clothing and gear away from your vehicle in sealed plastic bags and storage containers with lids and wipe them with wipes prior to placing them in your vehicle.
- Properly dispose of, or decontaminate, bags and storage containers used to hold contaminated clothing and gear using the decontamination products listed in Section 5.

SECTION 4: Special Guidance for Abandoned Mines

Only those individuals who are sanctioned to conduct activities in abandoned mines may enter. Sanctioned activities authorized by the 1872 Mining Law and the BLM's regulations at 43 CFR Subpart 3809 and other BLM-authorized activities such as bat surveys and studies.

An abandoned mine is defined as a hardrock mine on or affecting public lands administered by the BLM, at which exploration, development, mining, reclamation, maintenance, inspection of facilities and equipment, and other operations ceased as of January 1, 1981 (the effective date of the BLM's Surface Management regulations codified at 43 CFR Subpart 3809), with no evidence demonstrating that the miner intends to resume mining. Abandoned mines generally include a range of mining impacts, or features that may pose a threat to water quality, public safety, and/or the environment. Adits, shafts, and tunnels are abandoned mine features.

In situations where surveys are being conducted for abandoned mine feature closures for human safety, or multiple sites are being visited in a single day, we recommend the following:

- Avoid entry if possible.
- Limit entry to that necessary to safely perform required work. For construction this is typically less than 50 feet inside the adit or shaft.
- Follow the decontamination and containment procedures outlined below between sites if feasible. If not, at a minimum follow the containment procedures and identify opportunities for decontamination at the smallest possible geographic unit to minimize risk of contamination between locations, as appropriate. These geographic units will not exceed hydrologic unit code level 5 boundaries (HUC).
- Decontamination must occur no less frequently than at the end of each day.
- Air monitors are required safety equipment for underground abandoned mine entry. Consult with the manufacturer of your air monitor prior to applying any decontaminant chemicals, to ensure that the sensors and electronic components are not compromised in any way. Follow the manufacturer's recommended procedures.

SECTION 5: Recommended Decontamination Products

The following chemical products were tested in a laboratory setting and were found to be particularly effective against killing the more resistant, spore-form of *Geomyces destructans*, as well as the hyphae:

- Lysol IC Quaternary Disinfectant Cleaner (with a minimum of 0.3% quaternary ammonium compound) or chemical equivalent—this is a concentrate which requires a 1:128 dilution (1 part concentrate to 128 parts water or 1 ounce of concentrate per gallon of water).
- Lysol All-purpose Professional Cleaner, or chemical equivalent.
- Formula 409[®] Antibacterial All-Purpose Cleaner (with a minimum of 0.3% quaternary ammonium compound), or chemical equivalent.
- A 10% solution of household bleach—this must be made by measuring 1 part bleach to 9 parts water (an estimate of 1:9 is insufficient).
- Lysol Disinfecting Wipes, or chemical equivalent.
- Boiling water.

Detergents and quaternary ammonium compounds (e.g., Lysol IC Quaternary Disinfectant Cleaner) should not be mixed with bleach as this will inactivate the bleach, and in some cases produce a toxic chlorine gas.

Quaternary ammonium products such as 409 and Lysol cleaner must be properly disposed of in accordance with instructions contained in the Material Safety Data Sheet for those products.

If using bleach solution, do not store dilution for more than 24 hours as the bleach will begin to break down once it is diluted. Store in opaque bottles as bleach also breaks down when exposed to sunlight.

Product guidelines should be consulted for compatibility before using any decontamination product listed under Section 3 on specific equipment.