

Standard Operating Procedure # 18

Decontamination Procedures for Aquatic Resource Sampling

Revision History Log:

Previous Version No.	Revision Date	Revised By	Changes Made	Reason for Change	Revised Version No.

18.1: Scope

Staff and cooperating researchers of the Appalachian Highlands Inventory and Monitoring Network (APHN) routinely conduct field activities that include sampling of water and associated aquatic and riparian resources within and adjacent to APHN park units. These resources include a variety of sensitive aquatic ecosystems that are dispersed across a broad geographic area. Consequently, APHN must guard against the transport of non-native species and biological contaminants on field equipment, vehicles, and boats. To meet those obligations APHN will implement decontamination procedures to minimize the risk of spreading nuisance species and other contaminants. APHN will implement a risk-based range of decontamination and disinfection practices and will pay special attention to specific elements of field activities to combat the spread of invasive species.

This SOP is intended to provide standardized methods for cleaning, disinfecting, and decontaminating all equipment used to collect samples from APHN waters in a manner that will prevent the spread and/or introduction of disease pathogens and invasive algae, plant, and animal species. This SOP is designed to be consistent with the decontamination procedures of other entities conducting water resource sampling activities in the states of Virginia, North Carolina, Tennessee, and Kentucky. Examples of confirmed and potential disease pathogens of concern in APHN waters include, but are not limited to: chytrid fungus (*Batrachochytrium dendrobatidis*), ranavirus (*Ranavirus spp.*), *Ribeiroia saprolegnia*, *Proteocephalus ambloplitis* and other fish pathogens. Examples of invasive aquatic plant and alga species of concern include, but are not limited to variable water milfoil (*Myriophyllum heterophyllum*), Eurasian water milfoil (*Myriophyllum spicatum*), hydrilla (*Hydrilla verticillata*), curly-leaved Pondweed (*Potamogeton crispus*), and didymo (*Didymosphenia geminata*).

Applicability: This SOP applies to all aquatic and riparian monitoring activities conducted by APHN, and the methods described herein will be utilized unless more stringent program or project decontamination protocols are mandated by other state, federal, or local entities. This SOP applies to all sampling equipment (waders, wetsuits, nets, seines, sondes, handheld meters, handheld or reel mounted water samplers, boats and trailers, etc.) that directly contacts a water body during collection of water quality or biological samples from APHN park waters. This SOP also applies to state, federal, and academic partners that conduct water resource investigations

supported or coordinated by the APHN. Activities to be conducted under APHN disinfection guidelines include but are not limited to:

- Continuous Water Quality Monitoring Protocol
- Discrete Water Quality Monitoring Protocol
- Freshwater Mussel Monitoring Protocol
- Rare Fish Monitoring Protocol
- Long Term Monitoring Protocol for Cobblebar Communities
- Benthic Macroinvertebrate Monitoring Protocol
- All water resource inventory and monitoring activities conducted by APHN collaborators

18.2: Description of Disinfection Measures

Required decontamination equipment and chemicals will be housed in NPS laboratories and offices and will also be available in field vehicles. These procedures will be followed when field activities necessitate the movement of personnel and equipment between waterways and watershed basins. All susceptible equipment moved between watersheds should be properly cleaned and disinfected. Particular attention should be given to situations where aquatic invasive species (AIS) are known or suspected to occur.

Field staff should be aware of infestations in their management areas and assess whether direct contact with the water body is necessary. If in-water work cannot be avoided, identify ways to minimize contact with water, plants, or sediments, and follow the *Dedicate*, *Clean*, and *Decontaminate* procedures described below. Information on distribution of some AIS can be found at: <http://nas.er.usgs.gov/>. Contact your local or agency AIS specialist for additional information. If an infestation of a water body is questionable, treat as if it is infested.

Dedicate

When working in infested water bodies, field staff should ideally maintain unique sets of equipment and clothing dedicated to those waters in a manner that will prevent the transfer of AIS to uncontaminated areas. Dedicated equipment does not need to be cleaned or decontaminated after each use, but must be labeled and kept isolated to avoid cross-contamination with other equipment. Dedicated equipment should never be used in another water body. If dedicated equipment is impractical or cost prohibitive, field staff must follow the *clean* and *decontaminate* practices described below.

Clean

Before leaving a water resource sampling location, field staff should visually inspect all clothing and equipment for any foreign material, including plant fragments, animals, or sediment. All material should be removed at the site and properly disposed of in an upland area. All equipment should then be decontaminated before leaving the site to sample another water body. Always re-inspect clothing and gear before entering another water body to assure that it was properly cleaned after last use.

Decontaminate

Field clothing, equipment, and vehicles that have been used in a water body should be cleaned as above and then should be decontaminated using a temperature or chemical treatment prior to use elsewhere. There are a number of acceptable disinfecting agents, but the preferred treatment in

APHN waters is the use of a 1% solution of Virkon Aquatic®, a disinfectant/virucide containing potassium peroxymonosulfate and sodium chloride as the active ingredients. Virkon Aquatic has been clinically demonstrated to be effective against viruses, fungi, and bacteria. Virkon is non-toxic when used as recommended and degrades quickly in the environment. It is the principal disinfectant used by Great Smoky Mountains National Park and Conservation Fisheries, Inc. (Knoxville, Tennessee), both organizations with long experience in the aquatic resource conservation field.

Virkon® Aquatic - Directions for General Use

A 1% Virkon Aquatic solution is recommended for cleaning and disinfection of all equipment that comes in contact with aquatic resources in Network parks, including: meters, nets, boots, waders, dive suits, boats, vehicles & other equipment. A container of Virkon solution, mixed at the recommended dilution, will accompany field crews involved in activities requiring contact with aquatic resources.

Dilution Instructions

Virkon Aquatic is available in individual 1.3 ounce packets or in bulk tubs that include a 1.3 ounce measuring scoop. A 1% solution is obtained by mixing 1.3 ounces of Virkon powder with 1 gallon of water. Practice the following procedures when utilizing Virkon Aquatic.

- For heavily soiled surfaces, it is recommended that surfaces be cleaned with an appropriate detergent prior to disinfection. A scrub brush may be useful to facilitate cleaning.
- Do not apply Virkon® Aquatic powder directly on surfaces you are trying to disinfect. Always mix with water first to obtain the desired strength.
- Always prepare the Virkon® Aquatic solution in a clean container of known volume.
- If utilizing bulk product, measure the correct amount of Virkon® Aquatic powder using the measuring scoop provided. The scoop holds approximately 1.3 ounces of Virkon® Aquatic powder, which when added to gallon of water will make a 1.0% disinfectant solution.
- Stir or agitate the mixture to dissolve the Virkon® Aquatic powder.
- After application of the solution to the surface(s) to be disinfected, allow a minimum of two minutes contact time and follow up with a clean water rinse. One gallon of solution is sufficient to disinfect approximately 135 square feet of surface area.
- Virkon® Aquatic solutions are stable for up to 7 days. Test strips are available to determine the mixed solution's strength.

Safety Precautions for Virkon Aquatic

Virkon Aquatic is a disinfectant in the peroxygen (hydrogen peroxide) family. It is 99.9% biodegradable and breaks down to water and oxygen and is not corrosive at the working dilution (1% solution). Virkon Aquatic is available from Western Chemical (contact number 1-800-283-5292).

Skin contact: Virkon Aquatic diluted in water according to package directions (1% solution) is not a skin irritant. Skin contact with dry powder may cause skin burns or ulceration. In rare cases, skin contact with dry powder may cause an allergic skin reaction in sensitive individuals. Utilize rubber gloves when mixing dry powder with water. If skin irritation occurs after accidental contact with dry powder, take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a Poison Control Center or doctor for further treatment advice.

Eye contact: Virkon Aquatic diluted in accordance with package directions (1% solution) is not an eye irritant. Eye contact with dry powder may cause eye corrosion or ulceration. Severe eye damage may result if not immediately treated. Always utilize safety goggles when mixing dry Virkon Aquatic with water. If accidental contact of dry powder with eyes occurs, hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after 5 minutes, then continue rinsing eye. Call a Poison Control Center or doctor for further treatment advice.

Inhalation of this product may cause nose bleed or irritation of the upper respiratory passages, with coughing, sneezing, runny nose and sore throat. Gross overexposure may cause ulceration of mucous membranes. Utilize a dust mask when mixing dry powder with water. If accidental inhalation occurs, move the victim to fresh air. If person is not breathing call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a Poison Control Center or doctor for further treatment advice.

Ingestion of this product may cause gastritis, with stomach pain, nausea, vomiting, diarrhea, headache or weakness; possibly progressing to necrosis or hemorrhage with gross overexposure. If accidental ingestion occurs, call Poison Control Center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

Summarized, wear a dust mask and eye protection when mixing powder. Wear rain gear and gloves if spraying and position personnel upwind from the spray. When handling or spraying 1% Virkon Aquatic disinfectant, wear protective equipment (mask, gloves, goggles, rain gear, etc.) and use in a well-ventilated area. Follow precautions on the Material Safety Data Sheet (available at <http://www.pharmacal.com/MSDS/US/MSDSVirkonS.pdf>).

18.3: General Guidance for Control of Aquatic Invasive Species

- At the beginning of a sampling effort, all stream, river, and lentic surveys should be conducted with thoroughly dry or disinfected equipment.
- Staff should never become complacent and assume that aquatic invasive species (AIS) are absent from, or that AIS will eventually affect all waterways or all locations within a given watershed. Towards that end, only properly treated gear should be used during each survey when a risk of transporting AIS to a new location is present.
- If possible, staff should purchase extra boots, nets, and other gear to ensure that disinfected or dry equipment is available during the height of the field season. If duplicate gear is not practical or is cost prohibitive, then all sampling gear should be

properly treated prior to use, especially when both infected and non-infected waterways are scheduled for sampling.

- Staff should identify waters in their respective regions or areas of responsibility where AIS or other potentially harmful organisms occur so that precautionary measures can be taken to prevent translocations of AIS into non-infected waters. If a high percentage of field efforts are to be conducted in waters with AIS or other potentially harmful organisms, staff should consider dedicating certain gear for use only in those waters. In situations when both infected and non-infected waters are to be sampled, non-infected waters should be worked prior to working infected waters. **Do not work infected water first!**
- For water resource investigations in waters where the status of potentially harmful organisms is unknown, sampling should start at the uppermost reach and then proceed in a downstream or down lake direction. This will ensure that non-motile organisms are not transported on boots or other gear to uninfected upstream or remote lake locations.

18.4: Gear-Specific Disinfection Guidance

- Personal protective gear: Personal protective gear includes equipment such as rain gear, gloves, boots, waders, wetsuits, and snorkeling gear. Remove all organic material from gear after exiting a water body. Spray personal protective gear with a 1% solution of Virkon Aquatic disinfectant and allow a minimum of 2 minutes contact time. The spray method is particularly useful when sampling multiple locations during the course of a day (e.g., discrete water quality sampling). Alternately, gear can be immersed for a minimum of 2 minutes in a tub of 1% Virkon Aquatic. Rinse with clean water or water from the next water body. Personal gear may be steam cleaned or dried thoroughly for five days after cleaning with soap and water if visiting only one site as part of an isolated single day field effort.
- Water quality data sondes and water quality sensors: After a sonde is removed from deployment, it should be returned to a laboratory environment for servicing in accordance with APHN *Water Quality Monitoring Protocol for Continuous Sampling, SOP#7: Continuous Monitor Operation and Maintenance Site Visit*. Sensors should be removed from the datasonde as part of that maintenance and sensors ports should be sealed with port specific plugs. At that time, the sonde body can be cleaned and then sprayed with a 1% Virkon Aquatic solution for a minimum 2 minutes contact time, then rinsed with distilled or tap water and allowed to dry. If a field meter or sonde is utilized at multiple locations during the course of a field day, the sensor guard can be filled with chlorinated tap water between sites and the sonde body can be disinfected with Virkon as described above. Note that water quality sensors, probes and sensitive electronic equipment can be damaged by disinfectants and should only be rinsed with tap water, then stored in appropriate sensor storage solutions.
- Dip nets, measuring boards, and other sampling gear: To disinfect small nets and other sampling gear, immerse in 1% solution of Virkon Aquatic disinfectant for a minimum of two minutes contact period. Rinse, hang to dry, or use immediately. Alternately provide a soaking spray of Virkon and allow 2 minutes contact time.

- Large Sampling Nets – Organic debris should be removed prior to disinfection. Power washing is effective but not required to remove debris, but nets may be sprayed with a garden hose if available to assist with debris removal. Nets may then be steam cleaned, washed, and dried thoroughly for five days or treated with a 1% solution of Virkon Aquatic for a minimum of two minutes contact time in the following manner. **Option One:** The gear can be sprayed with Virkon disinfectant and a wet surface maintained for the appropriate contact time. The gear should be rinsed with clean water or water from the next water body before it is used again. **Option Two:** Fill a tub with disinfectant and place all equipment in the tub for the appropriate contact time. The gear should be rinsed with clean water or water from the next water body before it is used again. **Option Three:** Use a completely new set of gear for each water body sampled throughout the work day or work week. Disinfect all gear at the end of the survey day or week using option one or two.
- For other gear used in water, choose one of the following options: **Option One:** The gear can be sprayed with the Virkon disinfectant and a wet surface maintained for the appropriate contact time. The gear should be rinsed with clean water or water from the next water body before it is used again. **Option Two:** Fill a tub with Virkon disinfectant and place all equipment in the tub for the appropriate contact time. The gear should be rinsed with clean water or water from the next water body before it is used again. **Option Three:** Use a completely new set of gear for each water body sampled throughout the work day or work week. Disinfect all gear at the end of the survey day or week using option one or two.

Boats, trailers, and other gear:

- Arrival and departure from boat launch sites: Upon arrival and departure from a water body, the following procedures shall be followed for boats, trailers, and all other gear that comes in contact with the water. Inspect and remove all visible aquatic plants, animals, mud, and other organic material from your boat, trailer, equipment, and gear at the sampling location. If you suspect a new occurrence of an invasive plant or animal, save a specimen for identification and report the sighting (Specimen collection kits should be available on all surveys).
- When departing from a boat launch, drain all water from your boat, motor, live well, bilge, transom well, and all equipment and gear that came in contact with or stored ambient water. This should include trailers, tubs, buckets, electrofishing droppers and cross supports, boots, hoses, pumps, and all other items that could serve as potential water holdings for aquatic species.
- Do not knowingly transfer any aquatic animals, plants or water from one water body to another.
- Dispose of unwanted aquatic plants and animals an appropriate distance away from any water body.
- Do not store dissolved oxygen probes or other water chemistry gear in lake water, use chlorinated tap water to rinse probes and empty all containers and samplers used during chemical or vertical profile assessments.

- Boat trailers should be disinfected after the boat is launched in waters where AIS are known to exist. A garden sprayer with a 1% solution of Virkon Aquatic should be kept in the vehicle so the driver can treat the trailer bunks after the boat is deployed.