



DISASTER CLEAN UP AND SANITATION GUIDELINES

PERSONAL & ENVIRONMENTAL HYGIENE

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OVERVIEW: Flood/Water Damage General Guidelines

When an object or a surface has been completely saturated with water or submerged, it can often be reclaimed if it can be cleaned and disinfected.

Objects or surfaces that can be laundered or do not absorb water **can** be cleaned and disinfected if all surfaces can be accessed. For soft surfaces that can't be laundered, remove all contamination (if present) and clean the surface using soap and water or with appropriate cleaners for these surfaces.

Absorbent objects or surfaces that have become saturated with water and cannot be laundered **cannot** be disinfected.

The list below provides some general examples of what can and cannot be cleaned and disinfected. You will find specific information regarding products and procedures within this manual.

CAN be disinfected

Hard Floors	(clean & disinfect)
Plastic surfaces	(clean & disinfect)
Metal Surfaces	(clean & disinfect)
Glass Surfaces	(clean & disinfect)
Fixtures	(clean & disinfect)
Ceramic Surfaces	(clean & disinfect)
Bedding	(launder)
Clothing	(launder)
Removable upholstery	(launder)

CANNOT be disinfected

Carpeting
Mattresses
Saturated sheetrock
Furniture (unless launderable)
Acoustic panels
Insulation
Books and magazines

Natural Disaster Preparation/Clean Up Information:

FEMA:

<http://www.ready.gov/natural-disasters>

Center for Disease Control & Prevention (CDC):

[Floods and Your Safety](#) | [Floods](#) | [CDC](#)

Natural Disasters and Severe Weather

Keep Food and Water Safe After a Disaster or Emergency

Food may not be safe to eat during and after an emergency. Safe water for drinking, cooking, and personal hygiene includes bottled, boiled, or treated water. Your state, local, or tribal health department can make specific recommendations for boiling or treating water in your area.

After Flooding

Food: Throw away food that may have come in contact with flood or storm water, perishable foods, and those with an unusual odor, color, or texture. When in doubt, throw it out.

Water: Do not use water you suspect or have been told is contaminated to wash dishes, brush your teeth, wash and prepare food, wash your hands, make ice, or make baby formula.

Food

Note: Do not use your fireplace for cooking until the chimney has been inspected for cracks and damage. Sparks may escape into your attic through an undetected crack and start a fire.

Identify and throw away food that may not be safe to eat.

- ☐ Throw away food that may have come in contact with flood or storm water.
- ☐ Throw away food that has an unusual odor, color, or texture. When in doubt, throw it out.
- ☐ Throw away perishable foods (including meat, poultry, fish, eggs and leftovers) in your refrigerator when the power has been off for 4 hours or more.
- ☐ Thawed food that contains ice crystals can be refrozen or cooked. Freezers, if left unopened and full, will keep food safe for 48 hours (24 hours if half full).
- ☐ Throw away canned foods that are bulging, opened, or damaged.
- ☐ Food containers with screwcaps, snap-lids, crimped caps (soda pop bottles), twist caps, flip tops, snap-open, and home canned foods should be discarded if they have come into contact with floodwater because they cannot be disinfected.
- ☐ If cans have come in contact with floodwater or storm water, remove the labels, wash the cans, and dip them in a solution of 1 cup (8 oz/250 mL) of bleach in 5 gallons of water. Re-label the cans with a marker. Include the expiration date.

- ❑ Do not use contaminated water to wash dishes, brush your teeth, wash and prepare food, wash your hands, make ice, or make baby formula.

Store food safely

- While the power is out, keep the refrigerator and freezer doors closed as much as possible.

Feeding infants and young children

- Breastfed infants should continue breastfeeding. For formula-fed infants, use ready-to-feed formula if possible. If using ready-to-feed formula is not possible, it is best to use bottled water to prepare powdered or concentrated formula. If bottled water is not available, use boiled water. Use treated water to prepare formula only if you do not have bottled or boiled water.
- If you prepare formula with boiled water, let the formula cool sufficiently before giving it to an infant.
- Clean feeding bottles with bottled, boiled, or treated water before each use.
- Wash your hands before preparing formula and before feeding an infant. You can use alcohol-based hand sanitizer for washing your hands if the water supply is limited

Clean and sanitize food-contact surfaces

Discard wooden cutting boards if they have come into contact with flood waters because they cannot be properly sanitized. Clean and sanitize food-contact surfaces in a four-step process:

1. Wash with soap and warm, clean water
2. Rinse with clean water
3. Sanitize by immersing for 1 minute in a solution of 1 teaspoon of chlorine bleach (5.25%, unscented) per gallon of clean water
4. Allow to air dry.

Related Resources

- USDA Meat and Poultry Hotline: 1-888-PHotline.
- [Keep Your Food Safe During Emergencies: Power Outages, Floods & Fires | Food Safety and Inspection Service \(usda.gov\)](#)
- [Consumer Advice: Disaster Assistance with Food from Foodsafety.gov](#)
- [Food Safety Office, CDC](#)

Water

Safe Drinking Water

After an emergency, especially after flooding, drinking water may not be available or safe to drink for personal use. **Do not use water you suspect or have been told is contaminated to wash dishes, brush your teeth, wash and prepare food, make ice, or make baby formula.**

Note: Caffeinated drinks and alcohol dehydrate the body, which increases the need for drinking water.

Floods and other disasters can damage [drinking water wells](#) and lead to aquifer and well contamination. Flood waters can contaminate well water with livestock waste, human sewage, chemicals, and other contaminants which can lead to illness when used for drinking, bathing, and other hygiene activities.

Before an emergency or a temporary problem with a [community water system](#), a community drinking water treatment facility should have an emergency plan in the event that service is disrupted. Water treatment facilities monitor drinking water to meet federal and state regulations.

Make Water Safe

Water often can be made safe to drink by boiling, adding disinfectants, or filtering.

IMPORTANT: Water contaminated with fuel or toxic chemicals will not be made safe by boiling or disinfection. Use a different source of water if you know or suspect that water might be contaminated with fuel or toxic chemicals.

Boiling

If you don't have safe bottled water, you should **boil water** to make it safe. Boiling is the surest method to make water safer to drink by killing disease-causing organisms, including viruses, bacteria, and parasites.

You can improve the flat taste of boiled water by pouring it from one container to another and then allowing it to stand for a few hours, OR by adding a pinch of salt for each quart or liter of boiled water.

If the water is cloudy:

- Filter it through a clean cloth, paper towel, or coffee filter OR allow it to settle.
- Pour off the clear water.
- Bring the clear water to a rolling boil for one minute (at elevations above 6,500 feet, boil for three minutes).
 - Let the boiled water cool.
 - Store the boiled water in [clean sanitized containers](#) with tight covers.

If the water is clear:

- Bring the clear water to a rolling boil for one minute (three minutes at elevations above 6,500 feet).
- Let the boiled water cool.
- Store the boiled water in clean sanitized containers with tight covers.

Disinfectants

If you don't have clean, safe, bottled water and if boiling is not possible, you can often make water safer to drink by using a disinfectant, such as unscented household chlorine bleach, iodine, or chlorine dioxide tablets. These can kill most harmful organisms, such as viruses and bacteria. However, only chlorine dioxide tablets are effective in controlling more resistant organisms, such as the parasite [Cryptosporidium](#).

To disinfect water:

- [Clean and disinfect water containers properly](#) before each use. Use containers that are approved for water storage. Do not use containers previously used to store chemicals or other hazardous materials.
- Filter water through a clean cloth, paper towel, or coffee filter OR allow it to settle, then draw off the clear water.
- When using household chlorine bleach:
 - Add 6 drops (about 0.5 milliliters) of unscented liquid household chlorine (8.25%) bleach **for each gallon of clear water** (or 2 drops of bleach for each liter or each quart of clear water). Add 12 drops (about 1 milliliter) of bleach **for each gallon of cloudy water** (or 4 drops of bleach for each liter or each quart of cloudy water).
 - Stir the mixture well.
 - Let it stand for at least 30 minutes before using.
 - Store the disinfected water in [clean, disinfected containers](#) with tight covers.
- When using iodine:
 - Follow the manufacturer's instructions.
 - Store the disinfected water in [clean, disinfected containers](#) with tight covers.
- When using chlorine dioxide tablets:
 - Follow the manufacturer's instructions.
 - Store the disinfected water in [clean, disinfected containers](#) with tight covers.

Filters

Many portable water filters can remove disease-causing parasites such as [Cryptosporidium](#) and [Giardia](#) from drinking water. If you are choosing a portable water filter, try to pick one that has a filter pore size small enough to remove both bacteria and parasites. Most portable water filters do not remove viruses.

Filters, continued

Carefully read and follow the manufacturer's instructions for the water filter. After filtering, add a disinfectant such as iodine, chlorine, or chlorine dioxide to the filtered water to kill any viruses and remaining bacteria. For more information about water filters, see the [Choosing Home Water Filters and Other Water Treatment Systems](#) page.

Water Treatment Resources

To learn more about water filters and treatments that can remove microorganisms such as viruses, bacteria, and parasites (such as [Cryptosporidium](#)), see the following resources:

- [Making Water Safe in an Emergency](#)
- [A Guide to Water Filters](#)
- [A Guide to Drinking Water Treatment and Sanitation for Backcountry and Travel Use](#)
- [A Guide to Commercially Bottled Water and Other Beverages](#)

Finding Emergency Water Sources

Alternative sources of clean water can be found inside and outside the home. DO NOT DRINK water that has an unusual odor or color, or that you know or suspect might be contaminated with fuel or toxic chemicals. This water cannot be made safe, so you must use a different source of water. The following are possible sources of water:

Inside the Home

- Water from your home's water heater tank (part of your drinking water system, not your home heating system)
- Melted ice cubes made with water that was not contaminated
- Water from your home's toilet tank (not from the bowl), if it is clear and has not been chemically treated with toilet cleaners such as those that change the color of the water
- Liquid from canned fruit and vegetables
- Water from swimming pools and spas can be used for personal hygiene, cleaning, and related uses, but not for drinking.

Listen to reports from local officials for advice on water precautions in your home.

Outside the Home

- Rainwater
- Streams, rivers, and other moving bodies of water
- Ponds and lakes
- Natural springs

Water from sources outside the home must be treated as described in [Make Water Safe in an Emergency](#).

Unsafe Water Sources

Never use water from the following sources:

- Radiators
- Hot water boilers (part of your home heating system)
- Water beds (fungicides added to the water and/or chemicals in the vinyl may make water unsafe for use)

Related Resources

- [Water-related Emergencies and Outbreaks](#)
- [Drinking Water Wells](#)
- [Personal Hygiene and Handwashing After a Disaster or Emergency](#)
- [Food & Water Safety and Hand Hygiene Resources](#)
- [Cleaning and Sanitizing with Bleach after an Emergency](#)
- [Guidelines for the Management of Acute Diarrhea After a Disaster](#)

For more information, visit emergency.cdc.gov/disasters, or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

Procedures and Guidelines: Carpet

Overview

Carpet that is water- damaged due to events such as flooding, sewage back-ups and potable water leaks must be removed and discarded. If the carpeting is not removed within 24-48 hours of water damage occurring, microbial growth will occur. In those cases, extra precaution must be used during the removal process because microorganisms can be released into the air or water which can lead to human illness.

Carpet that is wet for more than 48 hours must be removed and discarded under controlled conditions. If carpet is wet for less than 48 hours by a relatively clean source of water, it can be salvaged by extracting the excess water, cleaning, deodorizing, and then rinsing and extracting again. Water used for cleaning, rinsing, and deodorizing must be potable quality or cleaning efficacy may be compromised. If potable water is not available, the cleaning water can be treated with chlorine. However, treated water with large chlorine residual must not be used with acidic cleaning products – toxic chlorine vapors will be released.

Procedures for Cleaning of Carpet

Personal Precautions:

If the carpet has developed a strong odor or visible mold growth, microorganisms can be released into the air or water upon removal. Therefore, all people must be removed from the area before removing it. Workers cleaning the area must use appropriate respiratory protection (such as an N95 NIOSH rated particle mask), gloves and coveralls. Personnel hygiene is important as well. Hand soap and hand sanitizers must be used at frequent intervals and especially before eating, drinking, or changing tasks, to remove soils that harbor microorganisms.

Standing water in areas that have been contaminated by surface water will have an increased potential to carry disease causing organisms. Therefore, the same precautions as listed above for wet carpet must be followed in these conditions.

Cleaning Procedures:

Carpet wet for MORE than 48 hours:

As previously mentioned, all carpet wet for more than 48 hours must be removed and discarded under controlled conditions. After removal, the area must be cleaned well with a detergent to remove soil and physical contamination. This must be followed by a freshwater rinse and disinfection (see Flooring section).

Carpet wet LESS than 48 hours:

If the carpet has odor or visible mold growth, it must be removed and discarded as above. If not, it may be salvageable using the following procedure:

1. Extract as much water as possible. Use wet vacuums where accessible.
2. Clean the carpet with one of the following products:

Recommended Product	Use Concentration
Revitalize™ Carpet & Upholstery Extraction Cleaner	1-2 oz/gal
Revitalize™ Perfusion Carpet & Upholstery Cleaner	1-2 oz/gal

3. Deodorize the carpet with **Bio-Enzymatic Odor Eliminator (highest recommended dilution)** and according to label directions for use, using a carpet extractor. Allow the product to dwell on the carpet for several minutes.
4. Rinse and extract the carpet with clean water to remove any chemical residues.

Procedures and Guidelines: Ceilings

Overview

Ceiling tiles that are water damaged due to events such as flooding, sewage back-ups and potable water leaks must be removed and discarded. If not removed within 24 hours of water damage occurring, then microbial growth will occur. In those cases, extra precaution must be used during the removal process because microorganisms may be present and can be released into the air or water which can lead to human illness.

Procedures for Cleaning Ceiling Tiles

Personal Precautions:

If the ceiling tile has developed a strong odor, microorganisms may be present and can be released into the air or water upon removal. Therefore, all people must be removed from the area before tearing tiles down. Workers cleaning the area must use appropriate respiratory protection (such as an N95 NIOSH rated particle mask), gloves and coveralls. Personnel hygiene is important as well. Hand soap and hand sanitizer must be used at frequent intervals, and especially when eating, drinking or changing tasks, to remove soils that harbor microorganisms. Showering after working in the area is also recommended.

Cleaning Procedures:

As previously mentioned, all ceiling tiles must be removed and discarded. The surrounding areas must then be cleaned and decontaminated according to procedures listed in the other sections (walls, flooring, etc.).

Procedures and Guidelines: Electronic Equipment

After a disaster strikes, electrical contractors, administrators, and inspectors face the dual pressures of getting people's lives back to normal as quickly as possible and doing it safely.

- Safety first
- Water damage
- Tornado, wind, and earthquake damage
- Public education
- Policies and procedures
- Communities pulling together

Safety First

Despite the sometimes devastating after-effects of a natural disaster, it is important to remember that flood damaged equipment can be a hazard. Water immersed equipment can be even more hazardous. **NEMA and UL both recommend that all electrical components and equipment below the flood line be replaced, with the possible exception of submersible sump or well pumps, and cables suitable for direct burial or wet locations.**

Water Damage

Electrical equipment may be exposed to water damage through flooding, hurricane, or other disaster. Firefighting can also cause water damage. When submerged, the integrity of electrical insulation can be compromised by moisture, metals can rust, trip units in some molded case circuit breakers can be impaired, and damaged filler material in fuses can degrade their insulation and interruption capabilities. Not only electrical distribution equipment, but motor circuits, power equipment, transformers, wire, cable, flexible cord, ground fault circuit interrupters, surge protectors, lighting fixtures, cable trays, and other electronic devices can all be affected.

Many component parts made of ferrous metals begin to rust or deteriorate, or parts made of aluminum completely disintegrate, and fiber material loses its shape. In addition to its corrosive action, floodwater is contaminated by various substances and will leave a conductive residue on and within electrical materials and equipment. When energized, carbonization and tracking can result, potentially causing a fire.

Flowing floodwater is particularly damaging. It contains combinations of many chemicals and is laden with fine silt that will get into every area of components and equipment. In addition to the corrosive properties of this solution, the silt sediment that accompanies it also may impair the operation of equipment.

NEMA and UL both recommend that all electrical components and equipment below the flood line be replaced, with the possible exception of submersible sump or well pumps, and cables suitable for direct burial or wet locations. In limited situations, some equipment may be reconditioned. It is recommended that qualified personnel check all overhead cable, overhead wiring supports and connections, and conductors and equipment on or in structures with connections to overhead wiring.

Wiring where structural elements are separated from the main structure will be damaged, such as wiring passing through connection points where walls, roofs, ceilings, floors, and foundations meet. Raceways, cables, and conductors that have become separated must be repaired or replaced, and conductor insulation, terminations, and splices thoroughly checked "where there is any evidence that wiring methods have been subjected to tension caused by movement of structural elements."

All work, including repairs, must comply with the most recent edition of the NEC, and except for minor repairs, must be inspected by a state or local electrical inspector.

Excerpts from: **Restoring the Power After a Natural Disaster**

Fall 2003, by Alisa Wolf, www.nfpa.org

UL Can Help Determine Equipment Replacement During Natural Disasters

Q Recently, I came across a Listing Mark on an electrical power cord, which indicated that "only the Listed Power Supply Cord" was covered. We thought that marking requirements no longer applied to power cords. Can you please clarify?

A The product you mentioned was probably an older power supply cord. At one time, UL did permit power supply cords for connection to electrical appliances to bear Listing Marks indicating that such cords were in compliance with UL Standards for Safety. Although the product identifier on the label indicated that the product covered by the Listing Mark applied only to the power supply cord, UL discontinued marking power supply cords because consumers were under the mistaken impression that the Mark applied to the **entire** electrical appliance.

Presently, power supply cords for connection to appliances are required to be bulk packed and only the container is permitted to bear the UL Listing Mark. If an individual power supply cord is provided as a replacement, then the cord will bear the Listing Mark, which must identify the product as a "Replacement Power Supply Cord."

Q Does UL require Listing Marks on fire alarm panels to be readily accessible for viewing without having to dismantle the equipment to locate them?

A Section 49.1.1 of UL 864, the Standard for Safety for Control Units for Fire Signaling Systems, requires control



When approached to investigate flood-damaged electrical equipment to determine if equipment continues to meet safety requirements, UL investigates.

units to be plainly and permanently marked. This marking must be visible after installation and include information such as the manufacturer's name or trademark, model number, electrical rating, type of control unit, reference to the applicable standard, type of signaling service and the correct mounting position.

The UL Listing Mark for a fire alarm panel system must be readily accessible for viewing without having to dismantle the "main unit" or remove any components inside the enclosure. Most often, the UL Listing Mark for the system can be found on the equipment label located on the door of the enclosure. Section 1-5.1.2 of the National Fire Alarm Code (NFPA 72) requires that equipment constructed and installed in accordance with NFPA 72 be listed for the purpose for which it is used.

If you encounter a fire alarm control panel where the label cannot be seen without dismantling the unit, please contact your local UL Regulatory Service Representative and file a Field Report.

Q Is there a UL Standard for Safety for emergency generators?

A UL published the first edition of UL 2200, Standard for Safety for Stationary Engine Generator Assemblies, in September 1998. These requirements cover stationary engine generator assemblies rated 600 volts or less intended for installation and use in ordinary or non-hazardous locations in accordance with the *National Electrical Code (NEC)*; and the following standards: NFPA 37, Installation and Use of Stationary Combustion Engines and Gas Turbines; NFPA 99, Health Care Facilities; and NFPA 110, Emergency and Standby Power Systems.

Listings for stationary engine generator assemblies (FTSR) covered under UL 2200 can be accessed immediately on the UL Online Certifications Directory at www.ul.com. In 2001, information about stationary engine generators will appear in both the UL Building Materials and Electrical Construction Equipment Directories.

Q Recently we experienced flooding in our area due to hurricanes. Can equipment exposed to natural disasters or other catastrophes still be considered Listed and acceptable to jurisdictional authorities?

A Presence of a Listing Mark on a product is a declaration that the product was in compliance with the appropriate safety requirements when it left the factory. When approached to investigate flood-damaged electrical equipment to determine if equipment continues to meet safety requirements, UL investigates equipment on a case-by-case basis. UL takes into account many factors when providing a review to assess whether to replace or refurbish damaged equipment. Such factors include the age of the equipment, the extent of water damage, corrosion and sediment deposits found in the components.

While the ultimate decision to replace or refurbish equipment is left up to the local AHJ or building owner, UL can visit the flood site upon request to determine what can be done to repair, refurbish or replace damaged equipment.

After refurbishment and repairs have been made, the owner or AHJ may ask UL to return to the site to re-evaluate the refurbished equipment. Upon completion, UL issues a letter report covering the evaluation. A copy of the report and test results, where conducted, are provided to the AHJ for use in determining the equipment's suitability for reconnection to the electrical supply.

This special UL meeting for government inspectors provide us an excellent opportunity to ask questions of UL engineers and to clarify UL requirements. The "UL Question Corner" answers questions of general interest that are sent in from authorized governmental inspectors and we believe will have interest for many inspectors.

Please send us questions you may have that are of general interest, and we will have UL engineers answer them in a future issue. If space does not permit answering all questions received, we'll see that you get an answer by letter. Send your questions to:

UL Question Corner - IAEI News
PO Box 630448
Richardson, TX 75083-0448

UL Question Corner - IAEI News
PO Box 630448
Richardson, TX 75083-0448

Evaluating Water-Damaged Electrical Equipment

1. USE OF THIS PUBLICATION

This publication provides information on how to evaluate electrical equipment that has been exposed to water through flooding, firefighting activities, hurricanes, etc. It is designed for use by suppliers, installers, inspectors and users of electrical products.

Electrical equipment exposed to water can be extremely hazardous if reenergized without performing a proper evaluation and taking necessary actions. Reductions in integrity of electrical equipment due to moisture can affect the ability of the equipment to perform its intended function. Damage to electrical equipment can also result from flood waters contaminated with chemicals, sewage, oil, and other debris, which will affect the integrity and performance of the equipment. Ocean water and salt spray can be particularly damaging due to the corrosive and conductive nature of the saltwater residue.

Distributors of electrical equipment should not supply any inventory that has been subjected to water damage. This can lead to damaged equipment still being used and creating a hazard to individuals or property.

2. CONTACT THE MANUFACTURER

Working knowledge of electrical systems and of the equipment in question is required to evaluate damage due to contact with water. The original manufacturer of the equipment should be contacted if any questions arise or specific recommendations are needed. In many cases, replacement will be necessary.

After consultation with the manufacturer, some larger types of electrical equipment may be reconditioned by properly trained personnel. The potential to recondition the equipment may vary with the nature of the electrical function, the degree of flooding, the age of the equipment, and the length of time the equipment was exposed to water.

2. CONTACT THE MANUFACTURER, continued

Attempts to recondition equipment without consulting the manufacturer can result in additional hazards due to the use of improper cleaning agents, which can further damage the equipment (see National Electrical Code Section 110.11 Information Note No. 2) or due to improper reconditioning techniques.

NEMA member companies are committed to safety.

Points of Contact:

Midwest Field Rep	Tim McClintock
	330-749-9782
West Coast Field Rep	Mike Stone
	831-229-0056
Northeast Field Rep	Jack Lyons
	413-296-4399
Southern Field Rep	Bryan P. Holland
	941-613-6802
Point contact for the NEMA Storm Response Team	Megan Hayes
	703-841-3236

[Disaster Recovery \(nema.org\)](#)

[Storm FAQs \(nema.org\)](#)

3. ELECTRICAL EQUIPMENT REPLACEMENT/RECONDITIONING REQUIREMENTS

The table shown below provides the requirements and recommendations associated with various categories of electrical equipment that have been subjected to water damage. Where it is shown that the equipment “may be reconditioned” it is critical that the manufacturer of the equipment be contacted for specific guidance.

Equipment	Replace Equipment	May be Reconditioned (Contact the manufacturer.)	Additional Standards Reference (if available)
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ELECTRICAL DISTRIBUTION EQUIPMENT (refer to 4.1)

Molded case circuit breakers	X		
Low voltage fuses	X		
Switches	X		NEMA KS 3-2010, <i>Guidelines for Inspection and Preventive Maintenance of Switches Used in Commercial and Industrial Applications</i>
Busway (mylar wrapped bars)	X		NEMA BU 1.1-2000, <i>General Instructions for Handling, Installation, Operation, and Maintenance of Busway Rated 600 Volts or Less</i> , para 3.4.4, 9.2.4.2
Busway (powder coated bars)		X	
Panelboards		X	NEMA PB 1.1-2002, <i>General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less</i> , para. 10.3, 10.8.3, 10.8.4
Switchboards		X	NEMA PB 2.1-2002, <i>General Instructions for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less</i> , para. 11.3.1.3, 11.10

MOTOR CONTROL EQUIPMENT (refer to 4.2)

Adjustable speed drives		X	
Components containing semiconductors and transistors	X		
Electronically controlled and solid state contactors and starters	X		
Overload relays	X		
Manual and magnetic controllers		X	
Motor control centers (see 4.2.2)		X	

Equipment	Replace Equipment	May be Reconditioned (Contact the manufacturer.)	Additional Standards Reference (if available)
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POWER EQUIPMENT (refer to 4.3)

Electronic trip units of LV power circuit breakers	X		
High-voltage circuit breakers (AC)		X	
Low voltage power circuit breakers		X	
Protective relays, meters, and current transformers (see section 4.11 for devices that contain electronic components)		X	
Low voltage switchgear		X	
Medium voltage switchgear		X	

TRANSFORMERS (refer to 4.4)

All dry-type transformers regardless of kVA ratings	X		
All dry type control circuit transformers	X		
Liquid-filled transformers	X (Analysis of the insulating medium is required for evaluation of this equipment.)		
Cast-resin transformers	X		

CONDUIT, TUBING, FITTINGS, OUTLET BOXES AND JUNCTION BOXES (refer to 4.5)

Fittings	X		NEMA FB 1-2007(R2010), <i>Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing (EMT) and Cable</i>
Outlet and Junction Boxes	X		NEMA OS 1-2008 (R2010), <i>Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports</i> NEMA OS 2-2008, <i>Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports</i>
Conduit and Tubing		X	

Equipment	Replace Equipment	May be Reconditioned (Contact the manufacturer.)	Additional Standards Reference (if available)
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WIRE, CABLE AND FLEXIBLE CORDS (refer to 4.6)

Wire or cable listed for dry locations (such as NM-B)	X		
Wire or cable that is suitable for wet locations (Provided the ends of the wire or cable have not been exposed to water and the wire is not damaged.)		X	

AFCIs, GFCIs, SURGE PROTECTIVE DEVICES AND WIRING DEVICES (refer to 4.7)

Arc Fault Circuit Interrupters (AFCI) and Ground Fault Circuit Interrupters (GFCI)	X		
Surge Protective Devices (transient voltage surge suppressors, surge arresters, lightning arresters)	X		
Wiring Devices (switches, receptacles, dimmers, etc.)	X		

OTHER DEVICES

Cable Tray (refer to 4.8)		X (Replace damaged labels.)	
Fire Pump Controllers		X	NEMA ICS 15-2011, <i>Instructions for the Handling, Installation, Operation, and Maintenance of Electric Fire Pump Controllers Rated Not More Than 600V</i>
Luminaires (lighting fixtures), ballasts and LED Drivers (refer to 4.9)	X		
Motors (refer to 4.10)		X	ANSI/IEEE 43-2000, A2 and A3
Signaling, Protection and Communications systems (refer to 4.11)	X		

4 THE HAZARDS ASSOCIATED WITH WATER DAMAGED ELECTRICAL EQUIPMENT

4.1 Electrical Distribution Equipment

Electrical distribution equipment usually involves switches and low-voltage protective components such as molded case circuit breakers and fuses within assemblies such as enclosures, panelboards and switchboards. These assemblies can be connected to electrical distribution systems using various wiring methods.

The protective components are critical to the safe operation of distribution circuits. Their ability to protect these circuits is adversely affected by exposure to water and to the minerals, contaminants, and particles, which may be present in the water. In molded case circuit breakers and switches, such exposure can affect the overall operation of the mechanism through corrosion, through the presence of foreign particles, and through loss of lubrication. The condition of the contacts can be affected and the dielectric insulation capabilities of internal materials can be reduced. Further, some molded case circuit breakers are equipped with electronic trip units and the functioning of these trip units can be impaired.

Water may affect the filler material of fuses and will degrade the insulation and interruption capabilities. Distribution assemblies contain protective components together with the necessary support structures, bus work, wiring, electromechanical or electronic relays and meters. Exposure to water can cause corrosion and insulation damage to all of these areas. In the case of exposure of distribution assemblies to water, contact the manufacturer before further action is taken.

4.2 Motor Control Equipment

Motor circuits include motor control devices such as motor starters and contactors, together with overcurrent protection components such as overload relays, circuit breakers, and fuses are often assembled into motor control panels and motor control centers as well as individual enclosures. Motor control centers contain both control and protective components together with support structures, bus work and wiring.

The protective components are critical to the safe operation of motor circuits and their ability to protect these circuits is adversely affected by exposure to water, and to the minerals, contaminants, and particles, which may be present in the water. For molded case circuit breakers, such exposure can affect the overall operation of the mechanism through corrosion, through the presence of foreign particles, and through loss of lubrication. The condition of the contacts can be affected, and the dielectric insulation capabilities of internal materials can be reduced. Further, some molded case circuit breakers are equipped with electronic trip units, and the functioning of these trip units can be impaired.

Water may affect the filler material of fuses and will degrade the insulation and interruption capabilities.

Corrosion, loss of lubrication and insulation quality can also be expected in contactors and starters. Solid-state motor controllers, adjustable speed drives and those electromechanical contactors or starters with integral electronic circuitry will be more severely affected by water.

4.2.1 Adjustable Speed Drives

Adjustable Speed Drives generally contain electronic components. See section 4.11 for information on equipment with electronic components. For other components of an adjustable speed drive, the ability to refurbish those components will depend on the type of component involved and the extent of the damage. The manufacturer of the drive must be consulted prior to any attempt to refurbish the equipment.

4.2.2 Motor Control Centers

Motor control centers contain many different components including fuses, circuit breakers, controllers, overload relays, adjustable speed drives and components such as bus work, insulators and enclosures.

Many of these components are covered in other parts of this document and should be referenced for additional information on those components.

For the bus work and structural assembly, exposure to water can cause corrosion and insulation damage. For these assemblies contact the manufacturer before further action is taken.

4.3 Power Equipment

Power equipment involves low voltage or medium voltage protective devices within an overall switchgear assembly. The assembly may also contain cabling, bus work with appropriate insulators, current transformers, electromechanical or electronic relays, and metering. Reliable operation of the protective devices is vital to system safety. These devices can be adversely affected by water. In the case of low voltage power circuit breakers and medium voltage circuit breakers and switches, the operation of the mechanism can be impaired by corrosion, by the presence of particles such as silt, and by the removal of lubricants. The dielectric properties of insulation materials and insulators will degrade, and, for air circuit breakers, the condition of the contacts can be affected. Further, low voltage power circuit breakers usually incorporate electronic trip units; the functioning of these units will be impaired. Similarly, the functionality of electronic protective relays and meters can be impaired. See section 4.11 for additional information on electronic components.

Water may affect the filler material of fuses and will degrade the insulation and interruption capabilities.

Low voltage power circuit breakers and medium voltage breakers are designed to be maintainable with the possibility of replacing contacts in air circuit breakers. Therefore, it may be possible to reuse such circuit breakers provided the refurbishing is performed in close consultation with the manufacturer. This includes cleaning and drying techniques, lubrication advice, and thorough testing prior to the reapplication of power. However, discard and replace the electronic trip units of low voltage power circuit breakers, and electronic protective relays and meters in any power equipment.

Replace fusible units of fused equipment. The remainder of the apparatus may be suitable for refurbishing in close consultation with the manufacturer.

In all cases, great attention must be paid to the thorough cleaning, drying, and testing of insulators and insulation material.

The power equipment can be expected to contain additional electronic units such as solid-state relays. These units can also be vital to the correct functioning of the protective device, and great care is needed in the cleaning and testing of such units. A first recommendation is to return the devices to the manufacturer. If this is not possible, the manufacturer should be consulted on the correct selection of cleaning agents that remove impurities without damaging the conformal coating. The manufacturer shall also be contacted for the specific testing required of sophisticated electronic equipment containing, for example, microprocessors.

The overall power equipment assembly (switchgear) may be able to be reconditioned provided careful steps are taken in the cleaning, drying and testing of the equipment prior to applying power. This requires input and advice from the manufacturer. An area of particular concern is the maintenance of the dielectric properties of insulation. In the field application of medium voltage equipment, standoff insulators are subjected to a wide variety of high voltage surges. Such insulators may need replacement.

4.4 Transformers

Exposure of transformers to water can cause corrosion and insulation damage to the transformer core and winding. The ability of the transformer to perform its intended function in a safe manner can also be impaired by debris and chemicals, which may be deposited inside the transformer during a flood. Water and contaminants will also damage the transformer fluids.

4.5

4.5.1 Outlet Boxes and Fittings

Outlet boxes and fittings, whether metallic or nonmetallic, for use in indoor dry locations have not been evaluated for effects of exposure to conditions described in “Use of this Publication”. The presence of known or unknown corrosive agents in flood water in particular can affect the physical properties of nonmetallic materials and the required corrosion protection for electrical equipment according to NEC Section 300.6. Therefore, replacement of outlet boxes and fittings in accordance with original installation requirements is recommended.

4.5.2 Conduit and Tubing

In the case of flooding, fire-fighting activities or other instances of unusual water exposure, conduit and tubing must be carefully inspected to determine if the mechanical and electrical integrity of the conduit/tubing system has been compromised. Flood waters, in particular, may be contaminated with oil, chemicals, sewage and other debris that could enter the conduit/tubing and prevent a clear path for the replacement of conductors or cables. As part of the inspection process, assure that the interior of the conduit/tubing is clear. In addition, contaminants may also affect the physical properties of metallic and nonmetallic materials and the corrosion protection for electrical equipment as required in NEC Section 300.6. Since every situation has unique circumstances the services of an experienced evaluator should be used. The manufacturer can also be consulted for additional assistance.

4.6 Wire, Cable and Flexible Cords

When any wire or cable product is exposed to water, any metallic component (such as the conductor, metallic shield, or armor) is subject to corrosion that can damage the component itself and/or cause termination failures. If water remains in medium voltage cable, it could accelerate insulation deterioration, causing premature failure. Wire and cable listed for only dry locations may become a shock hazard when energized after being exposed to water.

Any recommendations for reconditioning wire and cable in Section 1.0 are based on the assumption that the water contains no high concentrations of chemicals, oils, etc. If it is suspected that the water has unusual contaminants, such as may be found in some floodwater, the manufacturer should be consulted before any decision is made to continue using any wire or cable products.

4.7 AFCIs, Wiring Devices, Ground Fault Circuit Interrupters (GFCI) and Surge Protective Devices

Sediments and contaminants contained in water may migrate into the internal components of installed electrical products and remain there even after the products have been dried or washed by the user. These may adversely affect the performance of those products without being readily apparent to the user community. Also, electrical products, such as AFCIs, GFCIs and surge protective devices, contain electronic circuitry and other components, which can be adversely affected by water resulting in the device becoming non-functional or a hazard to the user. Air drying and washing of water damaged products of this type should not be attempted.

4.8 Cable Tray

Carefully inspect the cable tray system to determine if its mechanical and/or electrical integrity has been compromised. Repair or replace any damaged portions per original installation requirements. Remove all debris from the cable tray. If any labels warning against the use of the cable tray as a walkway have been damaged, obtain new labels from the manufacturer and apply as required.

4.9 Luminaires (Lighting Fixtures), Ballasts and LED Drivers

Fluorescent, high-intensity discharge, incandescent and LED luminaires are not intended for submersion in water except for those that are listed as submersible luminaires. Flooded luminaires and associated equipment may be damaged by corrosive materials, sediment, or other debris in the water. Corrosion of metallic parts and contamination of internal circuitry may prevent the equipment from operating properly.

4.10 Motors

Motors that have been flooded by water may be subjected to damage by debris or pollutants. This may result in damage to insulation, switches, contacts of switches, capacitors and overload protectors, corrosion of metallic parts, and contamination of the lubricating means and should be evaluated by qualified personnel.

4.11 Electronic Products, Including Signaling, Protection, Communication Systems and Industrial Controls

Equipment used in signaling, protection and communication systems generally contain electronic components, and the exposure of such equipment to water or corrosives can adversely affect the reliability of those systems. Contamination by pollutants or debris in flood waters may cause corrosion of components of the system, shorting or alteration of printed circuits, or alteration of circuit characteristics. Since some of these types of installations are classified as life safety systems, it is important that the reliability of those systems be maintained.

Where such systems are damaged by water, replace components of these systems or return the equipment to the manufacturer for appropriate cleaning, recalibration, and testing. Manufacturers of these systems should be contacted for information on specific equipment.

DISCLAIMER:

The standards or guidelines presented in a NEMA standards publication are considered technically sound at the time they are approved for publication. They are not a substitute for a product seller's or user's own judgment with respect to the particular product referenced in the standard or guideline, and NEMA does not undertake to guarantee the performance of any individual manufacturer's products by virtue of this standard or guide. Thus, NEMA expressly disclaims any responsibility for damages arising from the use, application, or reliance by others on the information contained in these standards or guidelines.

Procedures and Guidelines: Exterior Surfaces

Overview

Exterior soils can be clay particulate and hydrocarbon based. The best approach to removing exterior soils is by using a pressure washer at a pressure acceptable for the surface that is being cleaned. If there is evidence of paint, discontinue pressure washing and use manual cleaning.

- Building exterior
- Vehicle
- Sidewalk
- Ornamental stonework
- Decking
- Patio
- Patio furniture
- Outdoor play structures

Procedures for Cleaning of Food Service Operation:

ALWAYS REFER TO PRODUCT LABELING FOR COMPLETE PRODUCT INFORMATION

Precautions:

- Prevent inhalation of cleaning chemicals during application
- **REGULATIONS FORBID DISCHARGE TO STORM DRAINS OR STORM SEWERS AND APPLIES TO PRODUCTS ON THE FOLLOWING PAGE.**

Cleaning Procedures:

The following products are good cleaners for particulate and hydrocarbon soils. They are soft metal compatible. Several contain builders which boost soil removal but must be rinsed off to avoid filming of dark surfaces and glass.

Cleaning

Top-Down Cleaning:

Equipment and walls must be cleaned from the top down.

Application:

1. For most efficient cleaning, apply with pressure washer.
2. Rinse surfaces to prevent filming
3. Remove all excess soil from area to be cleaned by sweeping, brushing or wiping.

4. Clean the area by foaming or spraying product onto exterior surfaces such as concrete, parking lots, bricks, decks, floors, walls, vehicles, or any other soiled areas.
5. Leave product on the area until the solution penetrates the soil, do not allow drying. On heavy soil areas, a brush may be used.
6. Thoroughly rinse the area.
7. Remove solution from the area by wet vacuum.
8. Allow to air dry.

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Quik Fill 89 Industrial Degreaser	0.5	4	8
Oasis 902 Exterior Multi Surface Foaming Degreaser	3	6	12
Oasis 904 Exterior Heavy-Duty Deodorizer	1	3	6
Peroxide Multi Surface Cleaner	4	2	4

Procedures and Guidelines: Flooring

Overview

Flooring contaminated by a flood, sewage back-up or potable water leak where water has penetrated beneath the surface of resilient flooring and has an odor or visible mold must be removed and discarded. If any of the flooring is not removed within 24 hours of water damage occurring, then microbial growth will occur. In those cases, extra precaution must be used during the removal process because microorganisms can be released into the air or water which can lead to human illness. Hard flooring may be salvageable by drying, cleaning and then decontaminating. Decontamination and rinse water for product mix must be potable or efficacy may be compromised. Minimally, cleaning water must be chlorine treated.

Procedures for Cleaning and Disinfection of Floors

Personal Precautions:

If the affected area has developed a strong odor or visible mold growth, microorganisms may be present and can be released into the air or water upon removal. Therefore, all people must be removed from the area. The workers must use appropriate respiratory protection (such as an N95 NIOSH rated particle mask), gloves and coveralls. Personnel hygiene is important as well. Hand soap and hand sanitizers must be used at frequent intervals and whenever eating, drinking or changing jobs to control soil load which may harbor bacteria.

Standing water in areas that have been contaminated by surface water have an increased potential to carry disease causing organisms. Therefore, the same precautions must be followed in these conditions.

Cleaning Procedures:

Resilient Flooring (vinyl, linoleum, laminates):

As previously stated, resilient flooring must be removed and discarded when contaminated water gets underneath it or when odor or visible mold is present. If it has been wet for more than 24 hours, it must be removed and discarded under controlled conditions. The underlying area must be treated according to the procedure listed later in this document for hard flooring.

If the flooring has been wet for less than 24 hours and there is no noticeable odor or mold, then it can be salvaged by drying and then applying a neutral disinfectant cleaner as directed on the product label. Disinfectant products are listed in the following table:

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2

Hard Flooring (ceramic, marble, granite, terrazzo, concrete):

Typically flooring can be salvaged though the following steps:

1. Dry the floor.
2. Clean with a recommended detergent. Recommended products are shown in the following table.

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
High Performance Neutral Floor Cleaner	0.5	1	2
Maxx Dual Action Floor Cleaner	0.25	0.5	1
No Rinse Alkaline Floor Cleaner	1	1.5	2
Oasis™ 902 Exterior Multi Surface Foaming Degreaser	3	6	12

3. Apply disinfectant as directed on the product label. Disinfectant products are shown in the following table.

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2



Procedures and Guidelines: Furniture and Fixtures

Overview

The following types of furniture must be removed and discarded if water damage occurs due to events such as flooding, sewage back-ups and potable water leaks:

- Upholstered
- Hardwood that has become delaminated
- Particle board
- Pressed wafer board
- Soft plastic

If affected items are not removed within 24-48 hours of water damage occurrence, then microbial growth will occur. In those cases, extra precaution must be used during the removal process because microorganisms that may be present and can be released into the air or water which can lead to human illness.

Hardwood that has retained its laminate, hard plastic and metal furniture can be salvaged by drying, cleaning and then decontaminating. Water used for cleaning, rinsing and sanitizing must be potable quality or cleaning efficacy may be compromised. If potable water is not available, the cleaning water may be treated with chlorine.

Procedures for Cleaning and Disinfection of Furniture

Personal Precautions:

If the affected area or items have developed a strong odor or visible mold growth, microorganisms may be present and can be released into the air or water upon removal. Therefore, all people must be removed from the area. Workers must use appropriate respiratory protection (such as an N95 NIOSH rated particle mask), gloves and coveralls.

Personnel hygiene is important as well. Hand soap and hand sanitizers must be used at frequent intervals, especially before eating, drinking, or changing jobs, to remove soils that harbor bacteria. Showering after working in the area is also recommended.

Standing water in areas that have been contaminated by surface water can increase the potential to carry disease causing organisms. Therefore, the same precautions must be followed in these conditions.

Cleaning Procedures:

Upholstered furniture:

All upholstered furniture wetted by contaminated water must be removed and discarded. If it has been wet for more than 48 hours, it must be removed and discarded under controlled conditions. The surrounding areas must then be cleaned and decontaminated according to procedures listed in other sections (Flooring, Walls, etc.).

Particle Board or Pressed Wafer Board:

As previously stated, all particle board or pressed wafer board wetted by contaminated water must be removed and discarded. If it has been wet for more than 48 hours, it needs to be removed and discarded under controlled conditions. The surrounding areas must then be cleaned and decontaminated according to procedures listed in other sections (Flooring, Walls, etc.).

Hard Wood:

As previously stated, all laminated hardwood furniture that has lost its lamination due to water damage from a contaminated source must be removed and discarded. If it has been wet for more than 48 hours, it needs to be removed and discarded under controlled conditions. The surrounding areas must then be cleaned and decontaminated according to procedures listed in other sections (flooring, walls, etc.).

If the lamination has remained intact, then it can be salvaged by allowing it to dry and then cleaning it with a disinfectant cleaner. EPA registered products are listed in the following table:

EPA Registered Product	Use Concentration
Daily Disinfectant Cleaner	0.5 – 2 oz/gal

Plastic:

As previously stated, all soft plastic that has water damage from a contaminated source must be removed and discarded. If it has been wet for more than 48 hours, it needs to be removed and discarded under controlled conditions. The surrounding areas must then be cleaned and decontaminated according to procedures listed in other sections (flooring, walls, etc.).

Hard plastic can be salvaged by:

1. Allow the item to dry.
2. Pre-clean the furniture if visibly soiled. If not visibly soiled, skip to step 3. Recommended cleaning products are shown in the following table:

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Peroxide Multi Surface Cleaner	1	2	4
Oasis™ 902 Exterior Multi Surface Foaming Degreaser	3	6	12

3. Thoroughly rinse detergent and soils from surface. Cover surface with an EPA registered disinfectant as directed on the product label. EPA registered products are shown in the following table.

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2

Metal:

Metal furniture flooded by a contaminated water source can be salvaged by the following steps:

1. Allow the item to dry.
2. Pre-clean the furniture if visibly soiled. If not visibly soiled, skip to step 3. Recommended cleaning products are shown in the following table:

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Peroxide Multi Surface Cleaner	1	2	4
Oasis™ 902 Exterior Multi Surface Foaming Degreaser	3	6	12

3. Thoroughly rinse detergent and soils from surface. Cover surface with an EPA registered disinfectant as directed on the product label. EPA registered products are shown in the following table.

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2

Procedures and Guidelines: Hand Hygiene

Hand Hygiene:

Hand hygiene is critical to the prevention and subsequent control of disease outbreaks. Hands are a primary transmission mode and hygiene must be judiciously implemented. The recommendation is to use soap, scrub well, rinse hands under running potable or treated water and dry with a disposable towel. Optionally follow with a hand sanitizer and rub in well, covering cuticles and between fingers. Washing well and often is the best control. * Use any of our registered hand sanitizers to reduce contamination on hands.

*Due to FDA regulatory guidelines, no hand care products in the United States carry virucidal efficacy claims.

Hand Hygiene Procedures—Best Practices:

1. If potable water is available hand washing is your best defense. Rinse hands under potable running water and then apply hand soap.
2. Scrub vigorously for a minimum of 20 seconds to remove all soil. Pay special attention to the backs of hands, thumbs, fingernails, wrists, and the area between fingers before rinsing with potable running water.
3. For added protection, or if water is not available, use alcohol hand sanitizer. Use enough to fully wet hands.
4. Wash hands often whenever soiled or when switching jobs.

Dispensers and Hand Care Systems:

Any dispensers which were immersed in water or substantially soiled must be disposed of and replaced.

Procedures and Guidelines: Kitchen / Foodservice

Overview

Commercial Kitchen Clean-up:

The following recommendations are for a commercial kitchen. Rinse water, and water used to prepare disinfection or sanitizing solutions must be potable water. Minimally, cleaning water must be chemical, or chlorine treated.

Personal Precautions:

Standing water in areas which have been contaminated by surface water will have increased potential to carry disease causing organisms. An N95 NIOSH rated particle mask must be worn to protect against contaminated water and microorganisms that may become aerosolized during the cleaning procedure.

Personnel hygiene is important and covered in the following section. Hand soap and hand sanitizer must be used at frequent intervals and whenever eating, drinking, or changing jobs to control soil load which may harbor bacteria.

Cleaning Procedures:

Cleaning & Sanitation

All surfaces in kitchen must be cleaned well with a detergent to remove soil contamination. This is followed by a fresh potable water rinse and disinfection.

Top-Down Cleaning

Equipment and walls must be cleaned from the top down. Covering electrical components and controllers is crucial. Cleaning from top down is necessary to prevent physical contamination (by the mobilized soil) of surfaces already cleaned.

Application

For most efficient cleaning, apply with pressure washer or foam device. Use the Ecolab Mobile Dispensing System, Cleaning Caddy, or pressure spray washer. Manually clean any areas with a brush, mop or sponge where pressure spray washer is not practical.

- Equipment, storage cabinets, coolers/ refrigerators and walk-ins must be cleaned inside and outside.
- Cover equipment with cleaning solution quickly under low pressure.
- Working from top to bottom of equipment, clean with pressure washer. Provide manual agitation where needed. Rinse and squeegee to drain or pick up with wet-vac.

- **Potable Water Rinse Flush** with fresh water to remove detergent and soil. Rinse to drain or pick up with wet-vac.

Ecolab Recommended Products			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Quik Fill 89 Industrial Degreaser	0.5	4	8
Peroxide Multi Surface Cleaner	1	2	4
Oasis 902 Exterior Multi-Purpose Foaming Degreaser	3	6	12

Decontamination of Food Contact Surfaces:

General Disinfection

All environmental equipment surfaces must be disinfected according to label directions.

Food Contact Surfaces

All food contact surfaces must be rinsed with an EPA registered hard surface food contact surface sanitizer before returning it to operation.

1. All food contact surfaces may be cleaned with the appropriate cleaning solution to remove bulk soil (follow label instructions for use).
2. Rinse with potable water.
3. Apply EPA registered disinfectant according to label directions for use.

EPA Registered Hard Surface Disinfectants			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2
Rapid Multi Surface Disinfectant Cleaner	4		6
Sink & Surface Cleaner Sanitizer	0.27		0.55

4. Before returning to operation:

- Thoroughly rinse food contact surface with potable water to ensure removal of disinfectant residue.
- Sanitize with an EPA-registered food contact surface sanitizer, according to label directions. Do not rinse after sanitizing.
- Allow surfaces to air dry (do not wipe).

Food Contact Surface Sanitizer	
Cleaning Product	Use Concentration (oz/gal)

	Low	High
Oasis™ 146 Multi-Quat Sanitizer	0.25 (150ppm Quat)	0.67 (400 ppm Quat)
SMARTPOWER™ Sanitizer	0.053 (200ppm Quat)	0.14 (400 ppm Quat)
Sink & Surface Cleaner Sanitizer	0.27	0.55

Dish Machine Cleanup

Recommended Cleanup and Startup Procedure for Commercial Dish Machines

Personal Precautions:

DANGER: Any electrical device which has been fully immersed under water must be replaced. This includes motors, electrical controls, switches, indicator lights, wiring, etc. Failure to do so can result in further damage to the machine or facility, personal injury and/or death. Disconnect the electrical power to the dish machine at the source circuit breaker before performing any cleaning or servicing activities. Be sure to use proper personal protective equipment when exposed to detergent and chemistries.

If possible, please contact your Ecolab associate to inspect the machine if it's been in contact with water.

Cleaning Procedures:

1. Remove large pieces of debris from the machine by hand.
2. Remove sand, dirt, etc. from the bottom of wash tanks and drain accumulator pans using wet/dry vacuum. Do not wash excessive amounts of dirt, sand, etc. down the drain which can cause blockage in the drain system.
3. Remove spray arms, doors, curtains scrap baskets and strainers racks etc. and other removable parts, wash separately. Do not run soiled racks through machine to clean, power wash separately.
4. Re-install strainers
5. Using a bucket of water and a towel, wash down machine using heavy duty detergent such as **Oasis™ 89 Industrial Degreaser Surfaces. Following cleaning surfaces must be rinsed.**
 - Avoid causing further damage to electrical components during this wash down procedure. Do not spray water directly onto motors and enclosures containing electrical controls.

- Keep wash tank strainers and pump strainers in place to help collect debris and prevent it from causing further damage. Clean strainers often during this wash down procedure.
 - Keep drain valves open during this wash down procedure to help flush debris through the machine and drain system.
 - Remove scrap baskets scrap trays and strainers.
 - Rinse entire dish machine to remove product residue.
6. If it is known that an electrical device was not fully immersed under water, it is still critical to inspect each and every electrical device for potential damage from water. If there is any doubt regarding water damage, replace the electrical component.
 7. Inspect mechanical systems (examples: conveyor drive systems, door lifting systems, drain systems, etc.) for any debris which would cause damage or prevent the system from operating correctly. Replace any component which may have experienced excessive corrosion or rusting.
 8. Replace all standard soft parts. (i.e., end caps, curtains, etc.)
 9. Disassemble the pump and inspect the impeller and impeller housing. Remove any debris that may be present.
 10. Inspect all backflow devices (vacuum breaker, airgap, check valve) and remove any dirt or debris that may exist inside the devices. Ensure that the devices are functioning correctly.
 11. Make sure that strainers/filters for the incoming water line to the dish machine are clean and correctly installed in place. Note that some water valves have integral line strainers, and these must also be inspected.

Start-up and Sanitation Procedure

NOTE: Dishmachines are not to be used while a Boil Out Order is in place. All wares must go through a manual warewash process. Once Boil Order is lifted (and water supply is deemed safe to use), then dishmachine use can be resumed.

1. After all the above steps have been completed, perform the normal start up procedures and turn the machine on. Observe the machine and ensure that it is working correctly.
2. **Add an EPA registered sanitizer according to directions for use, make sure tanks reach operating temperature, run the machine to sanitize all the internal surfaces and then drain.**

<i>Recommended Ecolab Product</i>	
Machine Sanitizer	Min Conc. (Chlorine)
Eco San	50 ppm
Ultra-San	50 ppm

SMARTPOWER™ Solid Sanitizer	50 ppm
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3. Fill, run and drain at least two times more with freshwater to help ensure that surfaces are clean, sanitizer is rinsed out, and any remaining dirt or debris is removed from the machine before attempting to wash ware in the machine.

Racks

1. If immersed in flood water, throw away and replace.
2. If not immersed, clean separately with power washer. Do not clean in dish machine if Boil Order is in affect (must manually disinfect, rinse, sanitize).

NOTE: Once boil order is lifted, after manual disinfection, the dish machine can be used to sanitize.

Procedures and Guidelines: Food and Water Safety

Overview

Health alerts and recommendations from the Department of Health and local government must be followed. These may be communicated by radio or television, public broadcast or posting.

Food

Precautions:

Food may not be safe to eat during and after an emergency. Safe water for drinking, cooking, and personal hygiene includes bottled, boiled, or treated water. Your state or local health department can make specific recommendations for boiling or treating water in your area.

- Do not taste food to determine its suitability for use
- Do not prepare food with non-potable water or water that has not been treated
- Use thermometer to determine food temperature for cold storage

Procedures and Guidelines:

Temperature Measurement:

- Digital, dial, or instant-read food thermometers and appliance thermometers will indicate if the food is at safe temperatures.
- Keep appliance thermometers in the refrigerator and freezer at all times. When the power is out, an appliance thermometer will always indicate the temperature in the refrigerator and freezer no matter how long the power has been out.
- The refrigerator temperature must be 40 °F or below; the freezer, 0 °F or lower.
- If you're not sure a particular food is cold enough, test its temperature with a food thermometer.
- Sanitize thermometer with an appropriate EPA registered sanitizer between checking foodstuffs to help prevent cross-contamination.

Identify and throw away food that may not be safe to eat.

- Throw away food that may have come in contact with flood or storm water.
- Throw away food that has an unusual odor, color, or texture.
- Throw away dried or powdered foods that have come in contact with water.
- Throw away perishable foods (including meat, poultry, fish, eggs and leftovers) in your refrigerator when the power has been off for 4 hours or more
- Thawed food that contains ice crystals or is 40-degree F or below can be refrozen or cooked.

- Throw away frozen food which has thawed and has been above 40 degrees Fahrenheit (F) for 2 hours or more.
- Food containers with screwcaps, snap-lids, crimped caps (soda pop bottles), twist caps, flip tops, snap-open, and home canned foods must be discarded if they have come into contact with floodwater because they cannot be disinfected.
- Throw away canned foods that are bulging, opened, or damaged.
- Throw away cans that have come in contact with floodwater or storm water.
 - **Reclamation is NOT RECOMMENDED FOR COMMERCIAL OPERATION:** If reclamation is necessary, remove the labels, wash the cans, and dip them in a solution of 1 cup of bleach in 5 gallons of water. Re-label the cans with a marker.
- While the power is out, keep the refrigerator and freezer doors closed.
- Add block ice or dry ice to your refrigerator if the electricity is expected to be off longer than 4 hours. Wear heavy gloves when handling ice.
- When in doubt, throw it out!

Other Food Safety resources:

The USDA Meat and Poultry Hotline can personally answer food safety questions on weekdays year-round in English and Spanish. Callers to the hotline will be able to speak to a live operator who will be able to provide them with answers to their food safety questions.

The Hotline number is 1-888-MPHotline -1-888-674-6854.

Email mph hotline.fsis@usda.gov

The FDA provides guidelines for hurricane and flood recovery.

<https://www.fda.gov/food/food-safety-during-emergencies/safety-food-and-animal-food-crops-affected-hurricanes-flooding-and-power-outages>

Water

How to Help Make Sure Your Water is Safe:

Listen for public announcements on the safety of the municipal water supply. Flooded, private water wells will need to be tested and disinfected after flood waters recede. Questions about testing must be directed to your local or state health departments.

Safe water for drinking, cooking, and personal hygiene includes bottled, boiled, or treated water. Your state or local health department can make specific recommendations for boiling or treating water in your area. Here are some general rules concerning water for drinking, cooking, and personal hygiene. Remember:

- Do not trust water which has been transported in fire trucks or reusable containers as safe, potable water unless specifically labeled as Drinking Water or Potable Water.
- If you use bottled water, be sure it came from a safe source. If you do not know that the water came from a safe source, you must boil or treat it before you use it. Use only bottled, boiled, or treated water until your supply is tested and found safe.

- Do not use contaminated water to wash dishes, brush your teeth, wash and prepare food, wash your hands, make ice, or make baby formula.
- If possible, use baby formula that does not need to have water added.
- Use a bleach solution to rinse water containers before reusing them. Use water storage tanks and other types of containers with caution. For example, fire truck storage tanks and previously used cans or bottles may be contaminated with microbes or chemicals. Do not rely on untested devices for decontaminating water.
- When boiling water is not practical, you can treat water with chlorine tablets, iodine tablets, or unscented household chlorine bleach (5.25% sodium hypochlorite):
 - If you use chlorine tablets or iodine tablets, carefully follow the directions that come with the tablets.
 - If you can't boil water, add 1/8 teaspoon (approximately 0.75 mL) of newly purchased, unscented liquid household bleach per gallon of water. Stir the water well, and let it stand for 30 minutes before you use it.

Note: Treating water with chlorine tablets, iodine tablets, or liquid bleach will not kill parasitic organisms.

Procedures and Guidelines: Food Handling and Kitchen Hygiene for Temporary Field Foodservice Operation

The importance of establishing and enforcing a high standard of sanitation and safe food handling practices cannot be understated. While most foodservice workers generally accept and apply safe handling and sanitation practices, ignorance or neglect can have serious consequences such as food poisoning and spoilage. In the aftermath of a natural disaster, establishing sanitary temporary field foodservice operations to feed displaced citizens and emergency relief workers requires extra special attention to food safety. This procedure provides guidelines and information on establishing field foodservice operations and the necessary sanitation practices. This information is not intended to violate or supersede regulations or requirements of any legal authority.

1. Temporary food service operations are divided into two general classes:

- a. Restricted Operations. Restricted operations are temporary food establishments where only potentially hazardous food (PHF) requiring limited preparation, such as hamburgers and frankfurters, are prepared or served. Foods held at unsafe temperatures will be discarded and leftovers are prohibited. The preparation or service of other PHF is prohibited, except restricted operation facilities can serve PHF that are:
 1. Prepared and packaged in a food establishment and under conditions meeting the requirements of this chapter (e.g., central kitchen or commissary).
 2. Obtained in individual portioned containers or packages from approved sources.
 3. Stored at an internal product temperature of 41°F or below, or 140°F or above in equipment meeting the requirements of this chapter.
 4. Served directly in the unopened, individual serving container or package in which it was obtained.
- b. General Operations. Non-restricted operations will comply with all of the requirements of this procedure. Any waivers must be requested in writing from the preventive medicine or health code authority.

2. Equipment

- a. Locate and install equipment to prevent food contamination and facilitate cleaning.
- b. Protect against contamination of food contact surfaces of equipment by consumers, food service personnel and other contaminating agents. Provide effective shields and sneeze guards for equipment.

3. Single-service Articles

Temporary food establishments without adequate facilities for cleaning and sanitizing tableware will only use individually wrapped, single-service articles.

4. Water

- a. Provide adequate potable water for food preparation, cleaning and sanitizing utensils and equipment, and for hand washing. Provide a potable water heating system capable of producing adequate hot water for cleaning and sanitizing on the premises. If adequate hot water is not available, the scope of food service operations will be limited to the preparation and service of foods that do not require cleaning and sanitizing of equipment and utensils. The Preventive Medicine Authority may authorize alternative procedures for cleaning and sanitizing equipment and utensils.
- b. Temporary food establishments without permanent water supplies must have potable water for cleaning and hand washing.
- c. Potable water must be from commercial potable water trailers, temporary connection to building water supply, or in clean sanitary containers or hoses.
- d. Hoses used to carry water for food preparation, drinking water, ware washing and hand washing must be made of food grade material approved for potable water. (Use of garden hoses is prohibited except for general area cleanup, e.g., for washing down floors and picnic tables). Temporary connections to potable water supply shall not violate plumbing codes. The hose bib shall be connected with a vacuum breaker or other backflow prevention device.

5. Sewage

All sewage will be disposed of in a sanitary sewer.

6. Hand Washing

Provide a convenient hand washing facility for employee hand washing. The facility should have running potable water, soap, and individual paper towels. The Preventive Medicine Authority may approve field expedient hand washing facilities. Food service personnel shall follow hand washing guidance provided in this chapter.

7. Floors

When provided, floors will be constructed of concrete, asphalt, tight wood, or other similar cleanable material, be graded to drain, and kept in good repair. The preventive medicine authority may approve using dirt or gravel as sub-flooring provided floors are:

- a. Graded to drain
- b. Covered with clean, removable platforms or duckboards, or other suitable non-absorbent materials effectively treated to control dust.

8. Walls and Ceilings of Food Preparation Areas

When required by the PMA, walls and ceilings of temporary food preparation areas shall meet the following standards:

- a. Construct walls and ceilings of wood, canvas, or other material that protects the interior of the establishment from the weather and dust.
- b. Construct walls and ceilings of food preparation areas in a way that minimizes the entrance of insects.
- c. Use at least 16-mesh to the inch screening material for walls, doors, or windows.
- d. Make counter service openings as small as possible for the particular operation conducted. Provide these openings with tight-fitted solid or screened doors or windows, or other construction to restrict the entrance of flying insects.
- e. Surface outdoor walking and driving areas with concrete, asphalt, gravel or other material authorized by the preventive medicine authority to effectively minimize dust, facilitate maintenance and prevent muddy conditions and pooling of water.
- f. Provide adequate number of covered trash containers. Line trash cans with plastic bag(s).
- g. Minimize exposed utility lines, water and waste lines and pipes. Install lines to minimize obstruction for cleaning and minimize safety hazards.

9. Food service equipment must be maintained in good operating condition and

Serviced when required. Equipment which is no longer used or is unserviceable must Be removed from the galley spaces. Utensils and food contact surfaces of equipment must be cleaned and sanitized. The use of disposable eating utensils is encouraged. The benefits of reduced disease risk, and water/fuel savings outweigh the solid waste disposal disadvantage.

- a. Utensils and equipment used in production line, processing, or continuous operations must be cleaned and sanitized as follows:
 - 1. Each time there is a change in processing between types of raw animal products such as beef, fish, lamb, pork, and poultry.
 - 2. Each time there is a change from raw to ready-to-eat foods.
 - 3. After any substantial interruption of operations in which contamination may have occurred.
 - 4. Throughout the day at intervals necessitated by food temperature, type of food, and food particle accumulation.
 - 5. After final use each working day.
- b. Utensils and food contact surfaces of equipment used in non-continuous food operations must be cleaned and sanitized:
 - 1. After each use.
 - 2. After a substantial interruption of operations in which contamination may have occurred.

10. Preventive food safety measures in the aftermath of natural disasters

- a. During and following natural disasters, particularly floods, food may become contaminated by surface water that has itself been contaminated by pathogenic bacteria from sewage and wastewaters from sewer systems, septic tanks, and latrines as well as from farms and farm animal. The following issues must be investigated:
 1. The protection of food requires attention along the food chain, including the primary production sectors.
 2. While much of the normal agricultural production may be adversely affected by flooding, there may be areas where food can still be harvested or where food has been stored safely post harvesting.
 3. If agricultural produce is harvested from an area affected with flooding it may be contaminated with microorganisms (from raw sewage or decaying organisms) and chemicals in the flood waters. While it is possible to reduce the potential hazard associated microorganisms by thoroughly cooking the produce, such actions may not remove chemical hazards. Therefore, only harvest food from affected areas where it is necessary and where you can be confident that chemical contamination has not occurred. Also ensure the product is properly identified as being harvested from an affected area.
 4. Similarly agricultural produce that was stored in the affected areas at the time of the disaster may also be affected by the flood waters. Such food must be treated as with food harvested from affected areas.
 5. If crop fields have been contaminated by human excreta, following floods or damage to sewerage systems, an assessment must be carried out rapidly to assess the contamination of crops and to establish measures, such as delayed harvesting and thorough washing and cooking, to reduce the risk of transmitting fecal pathogens.
 6. Foods that have not been affected must be protected against exposure to other sources of contamination and not kept under conditions in which bacterial growth may occur.
- b. Safe and hygienic warehouse management must be observed:
 1. Storage structures must have good roofs and ventilation. Products must be kept at away from walls and off the floor. Pallets, boards, heavy branches, bricks, or plastic bags or sheets must be placed underneath them. Bags must be piled two-by-two crosswise to permit ventilation.
 2. Spilled food must be swept up and disposed of promptly to discourage rats.
 3. Fuel, pesticides, bleach, and other chemical stocks must never be stored together with food.
 4. If spray operations for pest control are needed, they must be carried out by qualified technical staff, under the close supervision of the national authority. Wearing of protective gear to reduce exposure of the operators to toxic chemicals is essential.

11. Safe food handling during food distribution and preparation must be assured.

During emergency response operations, largescale distribution of imported or locally purchased food items as well as mass field preparation of cooked food frequently occurs. In field food service operations, kitchen hygiene and food safety are essential. In this context special attention must be brought to the following:

- a. Keep Clean – (prevent the growth and spread of dangerous microorganisms)
 - 1. All foods used in food distribution and mass feeding programs must be fit for human consumption (as well as being nutritionally and culturally appropriate) The quality and safety of all items must be controlled before importation or local purchase and any unfit items be rejected.
 - 2. Stocks must be regularly inspected and any suspect stocks must be separated from other stocks and samples be sent to a suitable laboratory for analysis; in the meantime, they must not be used.
 - 3. Kitchen supervisors, cooks and ancillary personnel must be trained in personal hygiene and the principles of safe food preparation.
 - 4. Kitchen supervisors must be trained to be able to recognize potential hazards and apply appropriate food safety measures; the personal hygiene of personnel involved in food preparation must be monitored.
 - 5. Employees and volunteers preparing food must not be suffering from an illness with any of the following symptoms: jaundice, diarrhea, vomiting, fever, sore throat (with fever), visibly infected skin lesions (boils, cuts, etc.), or discharge from the ears, eyes or nose.
 - 6. Cleaners must be employed to keep the kitchen and surrounding areas clean; they must be properly trained and their work supervised and there must be adequate facilities for waste disposal.
 - 7. Water and soap must be provided for personal cleanliness, and detergent for cleaning utensils and surfaces which must also be sanitized with boiling water or a sanitizing agent, e.g., bleach solution.
 - 8. Foods must be stored in containers that will prevent contamination by rodents, insects, or other animals. Protect kitchen areas and food from insects, pests, and other animals.
 - 9. Hot and/or cold holding of food may have to be improvised.
 - 10. Wash your hands with soap and water after toilet visits, before and after handling raw food and before eating.
 - 11. Avoid preparing food directly in surroundings flooded with water.
 - 12. Keep fecal material away from food-preparation areas (separate kitchen and toilet areas).
 - 13. Avoid eating food raw if it may have been flooded, e.g., vegetables and fruits.
 - 14. Floors and work surfaces must be kept clean and sanitary.
 - 15. Garbage must be disposed of and trash areas must be kept clean.
- b. Additionally:
 - 1. Dishwashing machines or sinks must be operated only with potable water. This is a national public health code requirement which must not be circumvented

- without special authority from the local health department. Under no circumstances can a commercial machine be operated with contaminated water.
2. In order to sanitize dishes / utensils in a hot water sanitizing dual temperature dishmachine (separate wash and rinse water temperatures), the FDA Food Code Manual requires that the surface temperature of the utensil reach 160 degrees F as measured by an “irreversible registering temperature indicator”. To accomplish this, the machine wash temperature must be at minimum, 150- or 160-degree F depending on the type of indicator. The rinse manifold temperature must be at a minimum of 180-degree F.
 3. For manual pot and pan washing, reinforce the third sink sanitizer procedure. Sustain this procedure until normal water service is restored to provide additional insurance against contamination and food borne illness transmission.

Procedures for a 3-compartment sink are described in the 2017 FDA Food Model Code under:

4-301.12 Manual Warewashing, Sink Compartment Requirements.

- (A) Except as specified in (C) of this section, a sink with at least 3 compartments shall be provided for manually washing, rinsing, and SANITIZING EQUIPMENT and UTENSILS.
- (B) Sink compartments shall be large enough to accommodate immersion of the largest EQUIPMENT and UTENSILS. If EQUIPMENT or UTENSILS are too large for the WAREWASHING sink, a WAREWASHING machine or alternative EQUIPMENT as specified in (C) of this section shall be used.
- (C) Alternative manual WAREWASHING EQUIPMENT may be used when there are special cleaning needs or constraints and its use is APPROVED. Alternative manual WAREWASHING EQUIPMENT may include:
 - (1) High-pressure detergent sprayers.
 - (2) Low- or line-pressure spray detergent foamers.
 - (3) Other task-specific cleaning EQUIPMENT.
 - (4) Brushes or other implements.
 - (5) 2-compartment sinks as specified under (D) and (E) of this section; or
 - (6) Receptacles that substitute for the compartments of a multi-compartment sink.
- (D) Before a 2-compartment sink is used:
 - (1) The PERMIT HOLDER shall have its use APPROVED; and
 - (2) The PERMIT HOLDER shall limit the number of KITCHENWARE items cleaned and SANITIZED in the 2-compartment sink, and shall limit WAREWASHING to batch operations for cleaning KITCHENWARE such as between cutting one type of raw MEAT and another or cleanup at the end of a shift, and shall:
 - (a) Make up the cleaning and SANITIZING solutions immediately before use and drain them immediately after use, and
 - (b) Use a detergent-SANITIZER to SANITIZE and apply the detergent-SANITIZER in accordance with the manufacturer’s label instructions and as specified under § 4-501.115, or

- (c) Use a hot water SANITIZATION immersion step as specified under 4-603.16(C).

(E A 2-compartment sink may not be used for WAREWASHING operations where cleaning and SANITIZING solutions are used for a continuous or intermittent flow of KITCHENWARE or TABLEWARE in an ongoing WAREWASHING process.

Specific equipment cleaning procedures may vary. However basic guidelines apply.

1. Remove excess soil and debris
2. Brush, wipe, scrub surfaces with a suitable cleaning solution.
3. Rinse with clean potable water.
4. Sanitize food contact surfaces with an EPA Registered approved hard surface food contact surface sanitizer prior to reusing.

Ecolab Product Recommendations for Mass Field Foodservice Operations:

<i>Food Contact Surface Sanitizer</i>		
Cleaning Product	Use Concentration (oz/gal)	
	Low	High
Oasis™ 146 Multi-Quat Sanitizer	0.25 (150ppm Quat)	0.67 (400 ppm Quat)
SMARTPOWER™ Sanitizer	0.053 (200ppm Quat)	0.14 (400 ppm Quat)
SMARTPOWER™ Sink & Surface Cleaner Sanitizer	0.27	0.55

<i>Manual Warewashing Detergents</i>		
Cleaning Product	Use Concentration (oz/20gal)	
	Low	High
Monsoon	2	6
Pantastic	2.5	7
Scout	1	3
Solitaire	0.75	2
SMARTPOWER™ Manual Detergent	0.75	1.66

12. Inspecting and salvaging food

- a. Food industries, slaughterhouses, markets, and catering establishments must be inspected to ensure their safe operation. Particularly attention must be given to those handling perishable products, such as milk. Steps must be taken so that foods that have been adversely affected are not marketed.
- b. When salvaged foods are fit for consumption and sold, they must be labeled accordingly and consumers must be clearly informed of measures they need to take to render them safe.
- c. In areas that have been flooded, whatever intact foods remain must be moved to a dry place, preferably away from the walls and off the floor.

- d. Any food stocks found to be unfit for human consumption must be disposed of. Condemned food may be marked with a harmless dye, such as gentian violet to ensure that the item will not be used for human consumption.
- e. When salvaged foods are deemed fit for consumption and sold, they must be labeled accordingly. If necessary, consumers must be clearly informed of measures they need to take to render them safe.

13. Assessing and using salvaged prepackaged food

- a. Discard canned foods with broken seams, dents, or leaks, and jars with cracks.
- b. Undamaged canned goods and commercial glass jars of food are likely to be safe. However, if possible, you must sanitize the containers before opening them for use. To do this, wash the jars and cans thoroughly. This may result in loss of labels so mark contents on can or jar lid with indelible ink before washing. Finally, immerse containers for 15 minutes in a solution of 2 teaspoons of chlorine bleach per quart of room temperature water. Air dry before opening.
- c. Foods that are exposed to chemicals must be thrown away. The chemicals generally cannot be washed off the food. This includes foods stored in permeable containers like cardboard as well as screw-top jars and bottles which are difficult to clean.

14. Assessing and using salvaged refrigerated food

- a. Inspect refrigerators to determine if they have been affected by the lack of electricity or flood waters. Where refrigerators and cold food have not been directly affected, they may be a suitable source of safe food.
- b. Where power is not available, try to use refrigerated food before it is held in the danger zone (5-60°C) for more than two hours, especially meat, fish, poultry and milk.
- c. To avoid the loss of meat, fish, poultry and milk, these may be placed in a freezer immediately if they have not reached the danger zone. They may also be cooked and frozen if they are to be kept longer.
- d. Some foods normally stored in the refrigerator can be kept in the danger zone for longer than others. Under emergency conditions it is possible that foods such as butter, margarine, fresh fruits and vegetables, open jars of concentrates and sauces and hard and processed cheeses can be kept and used for a longer period but they must definitely be discarded if they show signs of spoilage (odor, texture, gassiness, moldiness).
- e. To prevent warm air from entering the refrigerator, open it only when necessary.

15. Assessing and using salvaged dry stores of food

- a. Check all food for physical hazards (such as glass) that may have been introduced during the disaster.
- b. The likelihood of mold growth on stored dried vegetables, fruits and cereals is greater in a humid environment and where food has become wet. Mold growth can be associated with chemical toxins.
- c. Intact food must be moved to a dry place, away from the walls and off the floor! Bags must not lie directly on the floor – pallets, boards, heavy branches, bricks, or plastic bags or sheets must be placed underneath them. Bags must be piled two-by-two crosswise to permit ventilation.
- d. Wet bags must be allowed to dry in the sun before storing them.

- e. Damaged bags must be re-bagged and stored apart from undamaged ones. A reserve of good-quality empty bags must be kept for this purpose.
- f. Spilled food must be swept up and disposed of promptly to discourage rats.

16. Provision of Food after a Natural Disaster

- a. After a natural disaster, as soon as families have reestablished their capacity to cook, any food they may be given is usually distributed in dry form for them to prepare and consume in their homes or temporary shelters. People may not always be familiar with all kinds of dry foods so they must be shown how to prepare dry foods.
- b. In addition to safe water for food preparation, a means of washing hands and utensils will be needed.
- c. A shortage of fuel for cooking may also be a major constraint, and this may need to be supplied to ensure adequate cooking and reheating of cooked food.
- d. In some cases, as an alternative to mass feeding, it may be possible to help households by providing shelf-stable rations that do not need cooking or by setting up temporary shared neighborhood kitchens where people can prepare food for their own families or in groups.

17. Response to an outbreak of foodborne disease

It is vital to detect food borne diseases as early as possible. Indications of a food borne disease outbreak that must trigger an investigation include:

- a. Increase in diseased persons visiting clinics
- b. Reports from health workers of food borne disease symptoms,
- c. Reports from pharmacists of an unusual demand for anti-diarrhea agents, anti-emetics or other medication for gastrointestinal problems, e.g., antibiotics
- d. An upsurge in inexplicable customers' complaints to a food supplier, food industry
- e. Reports of unusual death
- f. Unusual absenteeism from schools and the workplace, especially in large industries
- g. Detection may also be through existing communicable disease surveillance systems if the cluster is large enough (and there is no separate food-borne disease surveillance system).

18. Investigation of and response to a suspected food safety emergency involves:

- a. Timely treatment of exposed people
- b. Removal (recall) of the contaminated food from circulation. This must be coordinated by the national food safety agency in collaboration with the food industry and other food providers.
- c. Rapid identification of the causative agent and the suspected foods by patient interviews and by appropriate diagnostic laboratory testing.
- d. Epidemiological investigation to identify the causative agent, the responsible food and the manner of contamination including collection, transport and processing of samples; collation of information about sources of contamination and coordination with law enforcement, food safety regulatory authorities, industry, emergency medical response agencies, and (when imported food may be involved) quarantine and customs agencies (swift communication among all these entities is essential).

- e. Timely provision of information to the public on food-related risks and the actions they must take to minimize those risks; the information must be conveyed in a manner that is culturally appropriate and does not cause unnecessary anxiety.
- f. The effectiveness of response depends to a great extent on preparedness including:
 - The capacities for investigation and verification, and
 - Coordination between relevant government and other agencies that contribute to managing the public health consequences.

Procedures and Guidelines: Laundry

Overview

Laundry Clean-up:

Dependent on extent of exposure the following recommendations are for On-Premises Laundry Operations. Cleaning must be performed using potable water.

Procedures for Cleaning of Laundry Machines and Linen

Personal Precautions:

Standing water in areas which have been contaminated by surface water will have increased potential to carry disease causing organisms. An N95 NIOSH rated particle mask must be worn to protect against contaminated water and microorganisms that may become aerosolized during the cleaning procedure.

Personnel hygiene is important and is covered in another section. Hand soap and antimicrobial hand sanitizers must be used at frequent intervals, and especially before eating, drinking or changing jobs, to remove bacteria.

If there is a chemical spill, see Section VIII below.

Cleaning Procedures:

DANGER: Any electrical device that has been fully immersed under water must be replaced. This includes motors, electrical controls, switches, indicator lights, wiring, etc. Failure to do so can result in further damage to the machine or facility, personal injury and/or death. Disconnect the electrical power to the laundry machine at the source circuit breaker before performing any cleaning or servicing activities.

All surfaces on a laundry machine must be cleaned well with a detergent (see product recommendations below) to remove soil and physical contamination. This is to be followed by a freshwater rinse.

Cleaning Procedure:

1. Remove large pieces of debris from the machine by hand.
2. Remove sand, dirt, etc. from the wash wheel by hand or using a wet/dry vacuum. Do not wash excessive amounts of dirt, sand, etc. down the drain to prevent clogging or damage.
3. Clean outside and inside of washers manually with a brush or sponge
Equipment must be cleaned starting at the top of the machine and working downwards. Cleaning from top down is necessary to prevent physical contamination (by the mobilized soil) of surfaces already cleaned. Do not expose electrical components to water.

Ecolab Recommended Products			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Oasis™ 66 Heavy Duty Bathroom Cleaner Disinfectant	8	10	8
Oasis™ 902 Exterior Multi Surface Foaming Degreaser	3	6	12
Oasis™ 904 Exterior Heavy-Duty Deodorizer	1	3	6
Peroxide Multi Surface Cleaner	1	2	4
Rapid Multi Surface Disinfectant Cleaner	4		6
Orange Force™	Ready to Use		
Power Force	Ready to Use		

Rinsing

Rinse all surfaces using fresh potable water to remove detergent and soils. Please follow the product labeling for directions for use.

Cleaning Procedure for Dispensers

DANGER: Any dispenser that has been fully immersed under water must be replaced. This includes electrical controls, switches, indicator lights, wiring, etc. Failure to do so can result in further damage to the equipment or facility, personal injury and/or death. Disconnect the electrical power to the dispenser at the source circuit breaker before performing any cleaning or servicing activities.

In case falling (fresh) water (such as rain) has contacted the dispenser, the equipment is likely salvageable. The process we recommend for equipment in this type of situation is:

- Completely disconnect equipment from all power sources
- Perform a visual inspection to ensure that the equipment is in good shape and has not been subjected to immersion in water
- Ensure that the equipment is fully dried out
- Flush out all contacts
- If dispenser operates using a potable water supply (e.g., Solid Central Laundry System, flush manifold, etc.) disconnect incoming water supply from the dispenser and purge water lines to make sure the incoming water is clean. Clean any water filters or screens or water valve strainers of any debris.
- Replace squeeze tubes in EcoStar1500 and ALCS600-type dispensers.
- Flush all chemical lines and product/solution discharge tubing to the laundry machine.
- Reconnect to power sources and check equipment for proper function

Start-up Procedure for Washers and Dispensers

After the machine has been cleaned and allowed to dry, perform the following steps to restart the machine:

1. If it is known that an electrical device was not fully immersed under water, it is still critical to inspect each and every electrical device for potential damage from water. If there is any doubt regarding water damage, contact a qualified service technician.
2. Inspect all backflow devices (vacuum breaker, air gap, check valve) and remove any dirt or debris that may exist inside the devices. Fill that the devices are functioning correctly.
3. Make sure that strainers/filters for the incoming water line to the laundry machine are clean and correctly installed in place. Note that some water valves have integral line strainers and these must also be inspected.
4. After the above steps have been completed, perform the normal start up procedures and turn the machine on. Observe the machine and ensure that it is working correctly. Fill and draw wash wheel at least two times to help ensure that any remaining dirt or debris is removed from the machine before attempting to wash linen in the machine.
5. Check product dispenser functions. If dispenser is not functioning, replace dispenser or use powder products for manual dispense.

Product list for manual dispense (powders):

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Royal Brite	8	12	16

Cleaning Procedure for Linen:

If linen has been submerged in contaminated surface water, the linen may be contaminated not only by bacteria, but also by toxic chemicals such as heavy metals (e.g., mercury, chromium, etc.) and/or toxic organics (e.g., pesticides, solvents, etc.). Such contaminants cannot be removed from the linen by laundry procedures and thus all contaminated linen needs to be replaced.

If linen has been flooded by non-contaminated surface water (such as rainwater), wash with heavy-soil wash formulas and use an EPA registered laundry sanitizer (Advacare 120 Sanitizer/Sour - 6114299) to remove mold and mildew. You may also want to use EPA registered Laundri Bacstat Liquid Soft (6117418) in the final rinse (5oz/cwt) to inhibit growth odor causing bacteria from wet contamination.

Cleaning Procedures for Laundry Carts and Storage Shelves

Laundry carts and storage shelves made from hard plastic, vinyl, rubber, or metal can be cleaned and disinfected using products and procedures listed under “Cleaning of Furniture”.

Laundry carts with canvas baskets can be cleaned by removing the canvas from the cart and laundering using a heavy-soil mops/rags wash formula. Discard & replace if exposed to “contaminated” surface water.

Operation of Other Laundry Equipment

For cleaning procedures for other laundry equipment such as dryers, ironers, folders, etc., contact the qualified service technician.

Laundry Product Disposal and Chemical Spills

For handling of flooded laundry products, see “Product Spillage Procedures”.

Procedures and Guidelines: Walls

Overview

Drywall, plaster, or insulation that is water damaged due to events such as flooding, sewage back-ups and potable water leaks must be removed and discarded. If any of the items are not removed within 24 hours of water damage occurring, then microbial growth will occur. In those cases, extra precaution must be used during the removal process because microorganisms can be released into the air or water which can lead to human illness.

Block walls and other hard surfaces must be washed with a good cleaner, rinsed, sanitized with an EPA registered bleach and then a no-rinse EPA registered disinfectant must be applied. Water used for cleaning, rinsing and disinfection must be potable quality or cleaning efficacy may be compromised. If potable water is not available, the cleaning water can be treated with chlorine. However, chlorine-treated water must not be used with acidic cleaning products – toxic chlorine vapors will be released.

Procedures for Cleaning and Disinfection of Walls

Personal Precautions:

If the drywall, plaster, or insulation has developed a strong odor, microorganisms may be present and can be released into the air or water upon removal. Remove all people from the area before tearing it down. Workers must use appropriate respiratory protection (such as an N95 NIOSH rated particle mask), gloves and coveralls. Hygiene of personnel is important as well. Use hand soap and hand sanitizers at frequent intervals, especially when eating, drinking, or changing jobs, to remove soils that harbor bacteria. Showering after work in the area is also recommended.

Standing water in areas that have been contaminated by surface water will increase the potential to carry disease organisms. In these conditions, follow the same precautions listed for wet drywall, plaster and insulation.

Cleaning Procedures:

As previously mentioned, all drywall, plaster and insulation need to be removed and discarded. Hard surfaces, such as block walls, must be cleaned well with a detergent to remove soil and physical contamination. This must be followed by a freshwater rinse and disinfection. If area is not soiled, cleanup with a one-step germicidal detergent such as Neutral Disinfectant Cleaner or Peroxide Multi Surface Cleaner & Disinfectant is acceptable.

Top-Down Cleaning

Walls must be cleaned from the top down. Cleaning from top down is necessary to prevent physical contamination (by the mobilized soil) of surfaces already cleaned. Covering electrical components and controllers is crucial.

Application

When possible, clean the area with a pressure washer, such as Oasis, Out-Back, Oasis Caravan, or pressure spray washer. Manually clean any areas with a brush, mop or sponge where pressure spray

washer is not practical or available. Recommended Institutional detergent cleaners are listed in the table below. After applying the product, flush with fresh water to remove residual detergent and soil. Rinse to drain or pick up with a wet vacuum.

<i>Ecolab Recommended Products</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Quik Fill 89 Industrial Degreaser	0.5	4	8
Oasis 902 Exterior Multi Surface Foaming Degreaser	3	6	12
Oasis 904 Exterior Heavy-Duty Deodorizer	1	3	6
Peroxide Multi Surface Cleaner	1	2	4

Decontamination of Hard Surfaces

After cleaning and rinsing, bleach (such as EPA registered sanitizer XY-12) must be applied according to label directions for use and allowed to dry. Then the area must be covered with a disinfectant according to label directions for use (see Institutional product list below). The disinfectant must not be rinsed off.

<i>EPA Registered Hard Surface Disinfectants</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2
Rapid Multi Surface Disinfectant Cleaner	4		6

WATER FILTRATION AND SOFTENING: Protocol for Boil Water Advisories (BWA) and Water Quality Disruptions

This document is intended to provide technical guidance for Ecolab customers with filtration and softening systems during and after events causing municipal water quality disruptions. The procedures here are only guidelines and must not supersede any local and state health guideline procedures for boil water alerts. Responsibility for compliance is solely on the restaurant owner/operator.

This applies to accounts with water-fed equipment. The following is an example of such equipment:

Post mix beverage dispensers

Coffee and tea machines

Ice machines

Drinking fountains

Steamers and combi ovens

Softeners

BWA DEFINITION

Local municipalities may issue a public notice known as a Boil Water Alert, Boil Water Order, or Boil Water Advisory, as a result of situations that impact the potability or drinkability of a water supply. Typically, a BWA is associated with natural disasters, such as floods, hurricanes, or tornadoes, but can also be caused by physical failures, or treatment failures within the municipal water treatment facility or water distribution system. The contamination could be bacterial, viral, or chemical in nature or a combination of the above.

COMMUNICATION

A BWA is communicated via a public announcement by the local water or health authority. (Ref. *EPA 816-R-00-010 Public Notification Handbook June 2000*). There are 10 required elements of a BWA Notification:

- 1.) Description of the contamination
- 2.) When the contamination occurred
- 3.) Potential health effects
- 4.) What population is at risk
- 5.) Whether alternate supplies must be used
- 6.) What actions consumers must take
- 7.) What is being done to correct the situation
- 8.) When the system is expected to return to compliance
- 9.) Contact name, number, and address for more detailed information
- 10.) Standardized distribution language for customers.

ACTION PROCESS

Once a Boil Water Advisory, Boil Water Alert, or Boil Water Order has been issued, the owner/operator must immediately discontinue the use of all consumable water fed equipment, and during this time only bottled or canned product must be sold.

The following outlines the process to follow once the boil water advisory has been officially lifted. The individual store owner or representative is responsible to follow the protocol outlined below:

EQUIPMENT PREPARATON

- Drain all water contained in all water-fed equipment.
- If a water softener is present, place on bypass.
- Remove all filter cartridges and discard.
- Scrub the sumps to remove biofilm.
- Follow up with a sanitation procedure. **Do not install new cartridges until the BWA is officially lifted, the system has been flushed, and the sumps are sanitized.

- For icemakers, destroy all ice made prior to the BWA. Remove any water treatment device and flush the service line. Run two complete ice making cycles, discard all this ice and clean the ice reservoir.
- Remove all debris, such as silt and particulate matter from inside and outside of the appliance.
- Clean the interior and exterior surfaces with an EPA registered sanitizing cleaner, such as EcoSan or UltraSan. **Check that all parts are compatible for specific sanitizer.
- Equipment valves must be flushed with a safe water source.
- Silt and particulate matter may be present in the system before flushing and therefore, all valves must be calibrated after flushing.

FLUSHING AND SANITIZING INSTRUCTIONS

- The city may perform a hydrant flush in the area; the following must be performed after this operation.
- Flush water lines at all sinks and faucets for a minimum of 30 minutes. Multiple cycling of equipment such as carbonators, ice machines, and other dispensers is mandatory during the flushing process. At this time, all equipment must be cleaned and sanitized, inside and out.
- After the all clear is given by the municipal, state, or local health officials, replace all filtration systems with new cartridges.

PROCEDURE FOR HIGH-CAPACITY FILTRATION SYSTEMS



Example of High-Capacity System

- 1.) Locate and turn off water supply valve which feeds the High-Capacity Filtration system. Verify that water supply is turned off to High-Capacity Filtration System before proceeding.
- 2.) Remove and dispose of cartridges.
- 3.) Remove the pressure gauge from the top of the system. Wipe down pressure gauge with an EPA approved sanitizer. Set pressure gauge aside to dry. (Do not immerse the pressure gauge.)
- 4.) Disconnect High-Capacity system at inlet and outlet plumbing fittings and remove the entire system from the wall by sliding it off of the slide track.
- 5.) Immerse the entire system (all components from the ball valve to the tee fitting) in an EPA approved sanitizing solution. Keep system immersed for 5 minutes.
- 6.) Rinse entire system with potable fresh water. Apply 2-3 wraps of Teflon tape to pressure gauge threads and reinstall pressure gauge.
- 7.) Reinstall and reconnect system, using **new High-Capacity Filtration cartridges**. For details on how to install the High-Capacity Filtration system, refer to the High-Capacity Filtration Quick Start Guide (available for download on EcoNet.)
- 8.) Run equipment fed down line from the filtration system for several minutes to purge any air from the system. (Note: Consult the original equipment manufacturer for startup requirements related to specific equipment.)

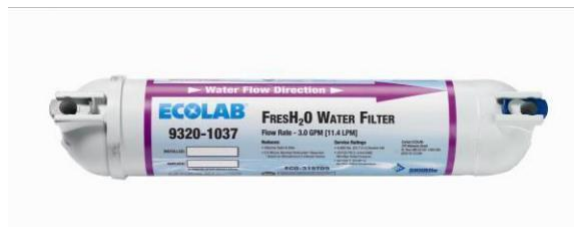
PROCEDURE FOR MODULAR FILTRATION SYSTEMS



Example of Modular Filtration system (twin system)

- 1.) Locate and turn off water supply valve which feeds the Modular Filtration system. Verify that water supply is turned off to Modular Filtration system before proceeding.
- 2.) Remove filter cartridges from stainless steel housings and dispose of cartridges.
- 3.) Remove the pressure gauge from the top of the Modular Filtration system. Wipe down pressure gauge with an EPA approved sanitizer. Set pressure gauge aside to dry. (Do not immerse the pressure gauge.)
- 4.) Disconnect Modular Filtration system at inlet and outlet plumbing fittings and remove the entire system from the wall by sliding it off of the slide track.
- 5.) Immerse the entire system (all components from the ball valve to the tee fitting) in an EPA approved sanitizing solution. Keep system immersed for 5 minutes.
- 6.) Rinse entire system with potable fresh water. Apply 2-3 wraps of Teflon tape to pressure gauge threads and reinstall pressure gauge.
- 7.) Reinstall and reconnect Modular Filtration system, using **new modular filter cartridges**. For details on how to install the Modular Filtration system, refer to the Modular Filtration Quick Start Guide (Beloit part # 9320-2103, also available for download on EcoNet.)
- 8.) Run equipment fed down line from the Filtration system for several minutes to purge any air from the system. (Note: Consult the original equipment manufacturer for startup requirements related to specific equipment.)

PROCEDURE FOR CAPSULE FILTERS



Example of Capsule filter

- 1.) Close inlet and outlet modular ball valves at both ends of the Capsule filter. Verify that water supply is turned off to Capsule filter before proceeding.

- 2.) Disconnect capsule by removing 90-degree ball valve fittings from either end of the capsule.
- 3.) Remove capsule filter from mounting clips and dispose of old capsule filter.
- 4.) Install **new capsule filter** by inserting capsule filter into mounting clips and reinserting 90-degree ball valve fittings into both ends of the capsule.
- 5.) Open the inlet and then the outlet modular ball valves at both ends of the Capsule filter.
- 6.) Run equipment fed down line from the Capsule filter for several minutes to purge any air from the system. (Note: Consult the original equipment manufacturer for startup requirements related to specific equipment.)

PROCEDURE FOR LEGACY FILTRATIONS SYSTEMS



Example of Legacy Filtration system (single sump)

- 1.) Switch Legacy Filtration bypass head to 'Bypass'.
- 2.) Remove and dispose of filter cartridges.
- 3.) If the interior of the sumps are dirty, clean with detergent or use the triple sink at the account to remove heavy soil and biofilm.
- 4.) **To sanitize the sump, fill the small hollow post at the bottom of all sumps using EPA approved sanitizer. (10.0" sump post = 2.5 milliliters, 20.0" sump post = 7.5 milliliters.)
- 5.) Fill the sump to the top with fresh water and let stand for 1 minute.
- 6.) Drain and flush the sump with potable fresh water three times.
- 7.) Insert **new filter cartridges**, and fill sump with water to minimize air in the system.
- 8.) Install the sumps and new cartridges to the housing head and switch the Legacy Filtration bypass head to 'Filter'.
- 9.) Run equipment fed down line from the Legacy Filtration system for several minutes to purge any air from the system. (Note: Consult the original equipment manufacturer for startup requirements related to specific equipment.)

**Note: These stated quantities are for sanitizing the sump only; the beverage representative may use the sumps to deliver more sanitizer into the beverage system (i.e., carbonator, plumbing, booster tank, beverage tower, coffee maker, etc.).

*** 10.0-inch sump holds 950 milliliters of water.
20.0-inch sump holds 2200 milliliters of water.

PROCEDURE FOR WATER SOFTENING SYSTEMS



- 1.) Make sure the resin is fully regenerated (force regeneration, if necessary, before continuing).
- 2.) Remove and discard any remaining salt in the brine tank.
- 3.) Scrub the empty brine tank with an EPA approved sanitizing solution.
- 4.) Place 4 ounces of bleach for every 1 cubic foot of resin into the brine tank. (i.e., For a 3 cubic foot system, place 12 ounces of sanitizer in the brine tank.)
- 5.) Start the regeneration cycle and run until there is chlorine in the purge water. (Use a test strip to confirm the presence of chlorine.) Once chlorine is detected in the purge water, stop the regeneration cycle.
- 6.) Allow the sanitizing solution to soak in the water softening tank for an hour.
- 7.) After the sanitizing solution has soaked in the water softening tank for an hour, force complete system regeneration.

Reference – Infectious Disease Information

CDC: After a Hurricane: Key Facts About Infectious Disease

Although infectious diseases are a frightening prospect, widespread outbreaks of infectious disease after hurricanes are not common in the United States.

Rare and deadly exotic diseases, such as cholera or typhoid, do not suddenly break out after hurricanes and floods in areas where such diseases do not naturally occur.

Communicable disease outbreaks of diarrhea and respiratory illness can occur when water and sewage systems are not working and personal hygiene is hard to maintain as a result of a disaster.

- Decaying bodies create very little risk for major disease outbreaks.
- Short bouts of diarrhea and upset stomach and colds or other breathing diseases sometimes occur in developed countries, such as the United States, after a natural disaster, particularly among large groups of people in a shelter. Basic hygiene measures like frequent hand washing or use of an alcohol hand gel, especially after using the restroom or changing diapers and before eating, can help prevent these diseases.
- Diseases like cholera or typhoid are rare in developed countries, and do not typically occur after a natural disaster. Unless a disease is brought into a disaster area from elsewhere, any outbreaks that occur are almost always from diseases that were already in the disaster-affected area before the disaster struck.
- Unless a disease is brought into a disaster area from elsewhere, any outbreaks that occur are almost always from diseases that were already in the disaster-affected area before the disaster struck.
 - **Because cholera and typhoid are not commonly found in the U.S., it is very unlikely that they would occur after a flood/hurricane**
- Communicable disease outbreaks can occur when sanitation and hygiene are compromised as a result of a disaster.
- As has been the case in past hurricanes, the U.S. Department of Health and Human Services quickly sets up tracking systems that monitor illnesses in hurricane-affected areas. In the unlikely event that a disease outbreak occurs, these systems provide an early warning that enables prompt public health response.

For more information, visit www.bt.cdc.gov/disasters, or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY).

Infectious Diseases – Norovirus

What is it? Why must I be concerned? What can be done about it?

Norovirus is widely known for causing outbreaks of illness among large numbers of people housed in close proximity to each other. Noroviruses cause acute gastroenteritis: nausea, frequent and violent vomiting, and/or diarrhea. Other symptoms include low-grade fevers, chills, headaches, muscle aches and fatigue. Onset occurs in as little as 12 hours from exposure, but commonly takes 24 to 48 hours after ingesting the virus. The illness usually lasts one to two days, and in most cases, recovery occurs without problems unless the person becomes dehydrated from the illness. This is a higher risk in very young, elderly or immunocompromised persons.

Noroviruses are present in feces or vomit of infected people at very high levels (millions per gram). Noroviruses are extremely contagious due to the low infectious dose. This means that low-level contamination of food and water can lead to outbreaks. People may infect others by shedding the virus from the time they start feeling ill until at least three days - and possibly up to 2 weeks - after recovery. There are presently no vaccines to prevent infections and no antiviral medicines available that treat norovirus infection. The most common vectors of infection are person to person, either directly or indirectly or through contaminated food. Norovirus particles can be carried by aerosols over distances longer than three feet to land on surfaces. Others may become ill by touching these contaminated surfaces and then touching their mouths or having direct contact with an infected person.

A large norovirus outbreak, likely involving person-to-person spread, impacted more than 1,000 people in the Houston Astrodome when it housed Hurricane Katrina evacuees. Inadequate sanitary conditions, the lack of adequate hand-washing facilities, delays in cleaning and decontaminating soiled areas and bedding, and close proximity of people contributed to the spread.

The primary control of norovirus relies on the exclusion of ill individuals from food and hospitality settings. Food handlers who have recently recovered from norovirus illness should be given non-food handling tasks. Normal cleaning and sanitizing procedures are typically not sufficient to inactivate the virus; rather, aggressive disinfection protocols are needed. Prompt attention to disinfection is needed to reduce the magnitude of norovirus outbreaks. Hand hygiene is critical to help prevent and control virus outbreaks. This is a primary transmission mode and must be judiciously implemented. Washing hands well and often is the best control. Due to the persistence of the virus, bare hand contact with ready to eat food is not recommended. Food items that may have become contaminated with norovirus should be immediately discarded. The virus does not multiply in foods or in the environment but can persist on contaminated surfaces and survives freezing. Norovirus is also relatively heat stable, though cooking foods to 70°C (158°F) for five minutes or boiling for one minute was shown to destroy feline calicivirus, the surrogate for norovirus recognized by EPA for products that have disinfection claims against norovirus.

Here is a link to our Micro Risks fact sheet on norovirus that includes a short video:
<http://www.ecolab.com/expertise-and-innovation/microbial-risks/norovirus>

Product	VRE	E. Coli	Legionella	Odor Causing Bacteria	MRSA	Fungicide	Norovirus	Rhinovirus	Influenza A Virus	Influenza B Virus
Rapid Multi Surface Disinfectant Cleaner	X	X		X	X		X	X	X	X
Daily Disinfectant Cleaner	X	X	X	X	X	X	X		X	
TB Disinfectant RTU	X	X		X	X	X	X	X	X	

An Introduction to Mildew Causes and Prevention

Mildew and musty odors can be costly to the hospitality industry due to discoloration of surfaces, destruction of fabrics, unsightly appearance and allergic reactions.

So, what is mildew?

Mildew is a generic term used to describe the growth of microorganisms, mold in particular, on any surface resulting in discoloration, objectionable odor or degradation. Mold can grow in almost any environment that is warm and moist. There are more than 64,000 types of mold, and most produce airborne spores. Spores are the reproductive segment of mold, similar to seeds from a plant. Spores cannot be seen by the naked eye and are present *everywhere*. There can be as many as 3000 to 5000 spores per cubic meter of air we breathe.

PRINCIPLES OF MILDEW PREVENTION

- f* Keep surfaces clean and dry.
- f* Protect surfaces with EPA registered disinfectant cleaning products specifically designed for mildew control: Daily Disinfectant Cleaner, 66 Heavy Duty Alkaline Bathroom Cleaner & Disinfectant, and TB Disinfectant Cleaner Germicidal Solution Ready to Use.

Frequently Asked Questions:

1. How do I prevent mildew growth in the tub and shower area?

The tub and shower area must be cleaned thoroughly ONCE A WEEK with an EPA registered product from the previous list followed by a freshwater rinse and thorough drying with a **CLEAN** towel. The key to controlling mildew is to control the amount of soil on the surface and to keep the surface dry.

2. What causes the colorful mildew stains?

Mildew stains, whether it be the black stains in grout or the orange and pink stains on the shower wall, are the result of the mold *breaking down the surface* it is growing on.

4. How do I get rid of the mildew stains?

Chlorine products such as LEMON LIFT or GEL PRO are often effective in bleaching the stains to make the surface appear clean. NOTE: Bleaching must be a *separate* step from mildewcide or mildewstat treatment. Some stains cannot be bleached or cleaned – they are the result of mildew growing on the *inside* of a surface. In these cases, the surface must be removed and thoroughly treated and dried or replaced. Lemon Lift and Gel Pro are not for use as mildewcides and mildewstat treatments.

5. Why does mildew keep coming back?

Mold spores are present everywhere. They are able to survive extreme conditions of no moisture, no food, and less than adequate chemical treatment until they find a moist, warm area in which to grow.

Infectious Diseases –*Escherichia coli* (*E. coli*)

What is it? Why must I be concerned? What can be done about it?

Escherichia coli has been recognized as a common place microorganism found in the intestinal tract of humans and other warm-blooded animals. This species has served as an indicator for fecal contamination in water, food and so on. Now *E. coli* has emerged as a food-borne pathogen.

Symptoms are severe stomach pain, fever in roughly one-third of the cases and severe diarrhea that can last for at least two days which can lead to bloody diarrhea. Symptoms generally occur within three days of ingestion which is the time needed for the toxin to produce symptoms in the patient. People at risk for serious illness are children under the age of 10 years and elderly people. There are serious complications that can arise if the symptoms go untreated. The disease can be spread as long as the patient is shedding the organism in the stool.

E. coli is thought to be typically transmitted by food particularly through ingestion of improperly cooked meat. More recently the pathogen has been found to be spread through fruits and vegetables as the organism is in the fertilizer used in production and the food is not properly washed prior to use. Also, bacteria on hands of daycare providers after diapering can be spread if thorough washing has not occurred.

The pathogenic cycle can be stopped with proper cooking of meat or poultry, washing raw foods properly prior to consumption, thorough hand washing during the cooking process and in child or elderly care settings. Using antimicrobial products such as food contact surface sanitizers, (i.e., **Oasis[®] 146**) hard surface disinfectants, (i.e., **Peroxide Multi Surface Disinfectant Cleaner or Sink & Surface Cleaner Sanitizer**) as well as antimicrobial hand soaps will aid in reducing the pathogenic cycle.

Technical Review: *Stachybotrys* mold

What is *Stachybotrys*? How do I know if it is in my building?

Stachybotrys is a greenish-black slimy mold. It grows on cellulose containing materials (cardboard, ceiling tile, fiberboard, gypsum board, paper) that have gotten very wet for more than a few days. If not cleaned up and dried, the fungus may grow and spread. It does not grow on plastic, concrete, vinyl, or ceramic tile. *Note: not all black mold is Stachybotrys, but moldy buildings are not healthy and must be cleaned.*

How is a person exposed?

Stachybotrys may produce several toxic chemicals (mycotoxins). The toxins can be present in spores that are released into the air when the mold dries up. People may then breathe the spores into their lungs.

How dangerous is it?

Symptoms of exposure are typically mild in healthy adults (coughing, runny nose, irritated eyes). In infants, elderly, or the immune suppressed, exposure can be life threatening (lung bleeding). Given the serious potential threat to human health, it is essential that contaminated environments be cleaned and disinfected.

How do I clean moldy surfaces?

Make sure that the source of moisture is eliminated before cleaning up. Consult your local health department if large areas (more than 30 square feet) are contaminated. During clean up, many spores can be released into the air. To prevent health affects during clean up use a HEPA filter respirator (may be purchased from a hardware store). It is not necessary to wear protective clothing during small abatements; normal clothes washing and drying at high temperatures is sufficient to kill latent spores

If the area cannot be cleaned (wet broken ceiling tiles), is too damaged, or is disposable (like cardboard boxes), double bag and discard the items.

If the area can be cleaned, wash the area with a detergent to remove soil, then disinfect with EPA registered products with Fungicidal claims by following the directions for use. Let disinfected areas dry naturally. Drying is important to eliminate mold.

Recommended Procedures: Microbial Decontamination

Overview

The following recommendations are to help our customers minimize the chance of an infectious outbreak incident and meet the necessary challenges if one occurs. No product can guarantee an incident will not occur. These procedures will help minimize risk and have been proven in practical application.

A number of bacteria and viruses may lead to infectious outbreaks. For example, certain food borne illnesses are transmitted from surfaces by contact or by aerosolization of contaminated materials. Hand washing and hygiene is a key component of helping to avoid an infectious outbreak incident.

U.S. EPA registers sanitizers and surface disinfectants are effective against microorganisms specified on the product label. These surfaces and equipment must be disinfected, rinsed and followed by an approved food-contact surface sanitizer before being returned to use.

Procedures for Microbial Decontamination: LODGING

General Housekeeping Standard Procedures – Effective Control

In public buildings special cleaning attention must be given to areas such as restrooms, elevators, escalator handrails, banisters, and other areas with high potential for hand contact. Use procedures recommended by your Ecolab representative or according to Institutional Housekeeping Guidebook.

The following products are for daily maintenance cleaning and disinfecting. Follow label directions for use using the following products for public spaces and hand-contact wipe-down points.

Maintenance: EPA Registered Disinfectants

<i>EPA Registered Hard Surface Disinfectants</i>			
Cleaning Product	Use Concentration (oz/gal)		
	Low	Medium	High
Daily Disinfectant Cleaner	0.5	1	2
Rapid Multi Surface Disinfectant Cleaner	4		6
TB Disinfectant Cleaner RTU	Ready to Use		
Multi-Purpose Disinfecting Wipes	Ready to Use		

Procedures for decontamination of specific surfaces and areas are detailed in the following sections.

Microbial Decontamination: General Instructions suspected Norovirus incident

General Guidelines whenever clean-up is required in a suspect or potential outbreak incident

- Cleaning personnel must wear surgical mask rated by NIOSH at N95 or higher.
- Cleaning personnel must wear disposable gloves while cleaning the room.
- Gloves must be discarded after use.
- Hands must be washed with soap and water or an alcohol-based hand sanitizer.
- Frequently touched surfaces such as light and air control switches, faucets, toilet flush levers, doorknobs, and TV and radio controls must be wiped down with an EPA registered hospital-use disinfectant.
- All surfaces in the bathroom that may have contacted respiratory secretions, urine, or feces must also be disinfected.
- Laundry must be handled while masked and gloved, placed in a laundry bag, kept separate from other laundry, and laundered at a minimum temperature of 160°F (71°C) for a minimum of five (5) minutes.

Specific Procedures per the Incident:

a. Vomitus or Other Body Excretions

Incident of vomitus or other body excretions is a potent form of virus transmission.

EPA Registered Products (Approved for OSHA Blood Borne Pathogen)

Disinfection:

Bio-Hazard Clean-up Kit TB

Disinfectant RTU

Rapid Multi Surface Disinfectant Cleaner (follow use directions to disinfect)

The following procedure for Bio-Hazard Cleanup Kit must be followed:

- Wear disposable gloves and face mask.
- Cover material with tissue or paper toweling until clean-up detail arrives.
- Follow Biohazard Clean-up Kit instructions:
 - Sprinkle adsorbent material on body fluids, wait 1–2 minutes
 - Pick up with scoop and place in disposal bag.
 - Apply disinfectant and wipe area with disinfectant wipe.
- After disinfection and cleanup of the immediate spill area, use the following procedures for proper property clean-up.
- Carefully follow label directions for use of other disinfectants listed in this section.

If spill occurs on carpet or fabric, extract affected area, see Carpets section.

b. Bathrooms, Toilets, Showers and Hard Surfaces

Disinfect with product with proven virucidal effectiveness against viruses listed on the label.

Disinfect according to label directions for use.

EPA Registered Disinfectants:

66 HD Alkaline Bathroom Cleaner Disinfectant
Rapid Multi Surface Disinfectant Cleaner

c. Hallways, Handrails, Doorknobs, TV Controller, Telephone

Disinfect with product with proven virucidal effectiveness against viruses listed on the label.

Disinfect according to label directions for use. Product need not be rinsed off. It is advantageous to use a disinfectant wipe on surfaces which may be affected by excess moisture. Dispose of wipe in sealable bag.

EPA Registered Disinfectants:

Rapid Multi Surface Disinfectant Cleaner
Daily Disinfectant Cleaner
Multi-Purpose Disinfecting Wipes

d. Hand Hygiene

Hand Hygiene is critical to the prevention and subsequent control of virus outbreaks. This is a primary transmission mode and must be judiciously implemented. The recommendation is to use a cleaning compound, scrub well, rinse hands under warm running water and dry with disposable towel. Optionally, follow with alcohol rub or gel and rub in well covering cuticles and between fingers. Washing well and often is the best control. *

Hand Hygiene Procedures:

1. Wash hands vigorously with an antimicrobial hand wash and warm water for at least 20 seconds to remove all soil. Rinse under running water.
2. Dry hands with towel rubbing well.
3. Optionally, follow with alcohol-based hand sanitizer. Rub in well paying special attention around fingernails and between fingers. DO NOT WIPE OFF.
4. Wash hands often whenever soiled or moving from station to station.

Ecolab will make no real or implied claims as to the effectiveness of skin disinfectants against a virus until testing protocols are identified, testing is completed, and FDA allows amendments

to product claims. In the interim, Ecolab concurs with current disinfection and hygiene protocols recommended by CDC.

Procedures for Microbial Decontamination—FOODSERVICE

I. Standard Procedures

The standard procedures for EPA registered food contact surface sanitizing label directions for use must be followed.

II. Decontamination of Food Contact Surfaces

Viruses are transmitted by contact of contaminated surfaces, air, and food borne illness. If a confirmed or suspect virus exposure occur, the following recommendations must be followed for the decontamination of food contact surfaces.

1. Apply EPA registered disinfectant according to EPA registered label directions for use.
2. Thoroughly rinse with potable water to ensure removal of disinfectant residue. Always follow product label direction for use.
3. Sanitize EPA registered food contact surface sanitizer, according to label directions.
4. Do not rinse.
5. Allow surfaces to air dry (do not wipe).

III. Decontamination of Other Areas of the Food Service Facility

All other areas must follow the decontamination procedures listed under Lodging: Decontamination in case of suspected Norovirus incident, or directions located on the CDC website.

Product Ordering Information

See the [Ecolab Disaster Recovery Product Guide](#)