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**PUBLIC HEALTH  
FLOOD RECOVERY INFORMATION**

**After a flood, there are some basic facts to remember that will help protect the health and safety of your family and your employees.**

**The following information will help you and other flood victims prevent disease and injury and maintain good health following a flood.**

**This packet contains information on the topics listed below:**

- **HOW TO DISINFECT A FLOODED WELL**
- **WELL WATER SAMPLING AND TESTING**
- **HOW TO PURIFY DRINKING WATER**
- **SEPTIC TANK AND SEWAGE DISPOSAL SYSTEM FUNCTION**
- **DISEASE PREVENTION**
- **PROPERTY CLEANUP TIPS**

## HOW TO DISINFECT A FLOODED WELL

### **After floodwaters have receded:**

1. Pump the well water to the ground until the water looks relatively clean.
2. Stop the pump.
3. Pour 2 to 6 gallons of fresh liquid household bleach (Clorox, Purex, etc.) into the well.
  - Some wells have openings that may be used for this purpose; however, it may be necessary to lift the pump.
  - The bleach must be added between the well casing and the suction pipe of the pump.
4. Reseal the well and do not operate the pump for 30 minutes.
  - After the 30-minute period, open all of the taps, faucets and hydrants, then surge the well by starting and stopping the pump several times.
5. Keeping every tap, faucet or hydrant in the water piping system open;
  - Start the pump and let the water flow until clean water with a strong smell of chlorine comes out of each outlet.
6. Close all of the taps, faucets and hydrants so the pump will stop.
  - Let the well stand without pumping for at least 24 hours.
7. After the 24-hour period, open all taps faucets and hydrants.
  - Start the pump and pump water through the system until all of the chlorine odor is gone.
  - Stop the pump and close all taps, faucets and hydrants.
8. To complete the well disinfection process, the well water must be tested for bacteriological quality before being used for human consumption.
  - **Please Note: A water sample cannot be taken if the well is not properly sealed or there is evidence of chlorine in the well. All chlorine must be flushed out of the well prior to sampling.**
9. You may wish to use a water-well or pump contractor to disinfect your well, they are listed in the telephone directory yellow pages under “**Water Well Drilling and Pump Contractors.**”
10. If a **pump** is lifted, removed or replaced during the well disinfection or well restoration process (loosening the sanitary seal between the pump and well casing), **a Pump Permit must be obtained from the Environmental Health Department.**
  - Environmental Health staff may perform the Pump Permit inspection at the time of bacteriological water sample collection.

**IF YOU HAVE ANY QUESTIONS OR NEED ASSISTANCE WITH THE WELL DISINFECTION PROCEDURE, PLEASE CONTACT THE ENVIRONMENTAL HEALTH DEPARTMENT AT 468-3420, 8:00 A.M. TO 5:00 P.M., WEEKDAYS.**

**WELL WATER SAMPLING AND TESTING**

- After flooding has subsided, the San Joaquin County Public Health Laboratory will provide free initial bacteriological quality testing as a communicable disease prevention service for rural residents whose private wells were flooded.
  - **Please contact the Environmental Health Department at 468-3420, 8:00 a.m. to 5:00 p.m., weekdays, to schedule an appointment for your well water to be sampled and tested.**
- Commercial state-certified laboratories provide bacteriological and chemical water sampling and testing services for a charge.
  - These laboratories are listed in the telephone directory yellow pages under “**Laboratories-Analytical.**”
- **Please Note:** If a **pump** is lifted, removed or replaced during the well disinfection or restoration process (loosening the sanitary seal between the pump and well casing), a **Pump Permit must be obtained from the Environmental Health Department.**
  - **Environmental Health staff may perform the Pump Permit inspection at the time of bacteriological water sample collection.**

**IF YOU HAVE ANY QUESTIONS OR NEED ASSISTANCE, PLEASE CONTACT THE ENVIRONMENTAL HEALTH DEPARTMENT AT 468-3420, 8:00 A.M. TO 5:00 P.M., WEEKDAYS.**

**HOW TO PURIFY DRINKING WATER**

1. In flooded areas, the Environmental Health Department rural residents supplied by private wells are advised to use boiled tap water or bottled water for drinking and cooking purposes as a safety precaution.
  - All tap water used for drinking or cooking should be boiled rapidly for at least one (1) minute. This is the preferred method to make sure that the water is safe to drink.
  - An alternative method of purification for residents that do not have gas or electricity available is to use fresh liquid household bleach (Clorox, Purex, etc.) as described below in the chart below.
2. Residents supplied by public water systems will be notified by the appropriate agency and/or water purveyor if drinking water safety precautions become necessary.

**PURIFICATION METHODS**

**Boiling:** Boil rapidly for at least one (1) minute. To improve taste, pour from one container to another several times to aerate.

**Purification Tablets:** Available at most drug stores. Follow directions on package.

**Bleach Purification:** \*Liquid household bleach (sodium hypochlorite 5.25%) can be used. Add according to the table below. Mix thoroughly and let stand for 30 minutes before using.

| AMOUNT OF WATER | CLEAR WATER    | CLOUDY WATER |
|-----------------|----------------|--------------|
| 1 QUART         | 2 DROPS        | 4 DROPS      |
| 1 GALLON        | 8 DROPS        | 16 DROPS     |
| 5 GALLON        | ½ TSP          | 1 TSP        |
| 50 GALLON       | 1 TBSP (3TSP)  | 2 TBSP       |
| 100 GALLON      | 1 OZ (2 TBSP)  | 2 OZ         |
| 500 GALLON      | 2 OZ           | 4 OZ         |
| 1,000 GALLON    | 4 OZ (1/2 CUP) | 8 OZ         |
| 5,000 GALLON    | 16 OZ (2 CUPS) | 32 OZ        |
| 10,000 GALLON   | 32 OZ (1 QT)   | 64 OZ        |

\*Note: If liquid swimming pool chlorine (10% available chlorine) is used, use half (½) of the amounts shown on the chart above.

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**SEPTIC TANK AND SEWAGE DISPOSAL SYSTEM FUNCTION**

1. During and after periods of flooding, households that utilize septic tank systems may find the septic tank and drain fields are filled with floodwater.
  - When this happens, toilets, showers and sinks will not drain.
2. Until the land area over the septic system is dry, discontinue using these fixtures.
  - This will prevent sewage from backing up into the house.
3. Once the floodwaters have receded, the level of water in the septic tank can be checked by uncovering the tank lid and checking the contents.
  - Water levels up to the top of the tank indicate the drain fields are not leaching water into the soil and the septic system is not functioning properly.
4. Until the floodwaters have receded and the septic system is draining properly, use of a **chemical toilet** is recommended as an alternative sewage disposal method.
  - Chemical toilet rental companies are listed in the telephone directory yellow pages under “**Toilets-Portable.**”
5. You may wish to use a septic system contractor to evaluate and/or repair your septic system. They are listed in the telephone directory yellow pages under “**Septic Tanks & Systems.**”
6. **Liquid Waste Disposal System Construction and Destruction Permits** must be obtained from the Environmental Health Department for repair, modification or replacement of septic tanks, drain fields (leach lines or filter beds) and to document proper abandonment (destruction) of septic systems that will no longer be used.

**IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT THE ENVIRONMENTAL HEALTH DEPARTMENT AT 468-3420, 8:00 A.M. TO 5:00 P.M., WEEKDAYS.**

**DISEASE PREVENTION**

1. It is critical for you to remember to practice basic hygiene during the emergency and recovery period. **Always wash your hands with soap using non-contaminated clean water or an alcohol-based hand sanitizer:**
  - **Before preparing or eating food**
  - **After toilet use**
  - **After participating in flood cleanup activities**
  - **After handling articles contaminated with flood water or sewage**
2. Floodwaters may contain silt, raw sewage, oil and chemical wastes.
  - Although skin contact with floodwater does not, by itself, pose a serious health risk, there is some risk of disease from eating or drinking anything contaminated with floodwater.
  - Residents must assume that floodwaters probably contain disease-causing organisms.
3. People who believe they may have swallowed sewage-contaminated waters should consult a health care provider.
4. People with severe fever or diarrhea symptoms should see a health care provider.
5. During cleanup of contaminated areas, surfaces and articles:
  - Protective clothing should be used.
    - Most importantly, these should include waterproof gloves (preferably the household or utility type) and rubber boots.
    - If available, coveralls or other work clothes are also recommended.
  - Open wounds, cuts or abrasions may become infected. Contact a health care provider if infection occurs.
6. No special immunizations are generally necessary after exposure to flood waters, however, **tetanus** immunization and boosters should be up to date.
  - It is very important to keep personal immunization records and to present them for review by medical personnel when considering boosters.
  - All adults should receive tetanus boosters every 10 years.
  - If you sustain a puncture wound in relation to contaminated water or articles, and your last tetanus booster was more than 5 (five) years ago, see a health care provider, urgent care center or **Public Health Services** for a booster.

**IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT PUBLIC HEALTH SERVICES AT 468-3822, 8:00 A.M. TO 5:00 P.M., WEEKDAYS.**

## CLEANUP TIPS

### ➤ *Lawns and Gardens*

1. Disinfect contaminated soil or ground surfaces by using calcium oxide (CaO) or lime.
  - Lime is a caustic disinfecting powder for exterior areas, available at hardware or nursery supply stores.
  - Mix lime into contaminated soil layers with shovels or other tools.
2. Keep children and pets off these areas for a few days to allow the sun time to dry the vegetation and kill germs that are present.

### ➤ *Sidewalks and Driveways*

1. Thoroughly wash down sidewalk and driveway surfaces with a hose.
2. If water supplies are limited, use a solution of bleach and water and apply with a broom or stiff brush.
  - A solution of 2 oz of bleach to 5 gallons of water is an effective disinfectant.
  - Allow the solution to remain on the surface for at least 10 minutes.

### ➤ *Building and Dwelling Restoration<sup>1</sup>*

The following guidelines address restoration of contaminated areas in order to protect the health of occupants and to prevent allergic reactions or exposure to pathogens.

1. Clean-up activities should begin as soon as possible.
2. The longer the contamination is allowed to persist, the greater the potential for microbial growth and resulting damage.
3. Occupants and workers involved in cleaning and decontamination should take extra precautions to protect themselves with rubber gloves, protective goggles, and boots.
  - If respirators are not used, at least a quality dust mask should be worn to minimize inhalation of biological aerosols.
4. After water removal has been accomplished, **initially decontaminate all affected materials with a disinfectant solution.**
  - This will not be the final disinfection, but is meant to reduce gross contaminants.
5. Evaluate all affected surfaces for porosity or infiltration potential.
6. Focus on the more porous materials and surfaces first, especially those that are highly saturated. Low porosity surfaces such as painted wall surfaces can be dealt with later.

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<sup>1</sup> Based upon an article by Michael A. Berry, et al., *Suggested Guidelines for Remediation of Damage from Sewage Backflow into Buildings*, Journal of Environmental Health, October 1994.

7. Highly porous materials such as carpeting, mattresses and upholstery should be removed and discarded.
8. Semi-porous materials such as linoleum, vinyl wall-covering, wood furniture or painted drywall board should be cleaned, disinfected, or replaced as part of the initial clean-up process.
9. Any insulation behind the wallboard that is saturated should be removed as it can become a reservoir for moisture and mold, and a source of bioaerosols or allergic reactions long after the floodwaters are gone.
10. Sub flooring should be cleaned, disinfected, dried and resealed before carpet or linoleum is reinstalled.
11. After heavy organic matter such as raw sewage, silt and debris has been removed from the building, **all affected areas and materials must be cleaned and a second application of disinfectant applied to all surfaces.**
  - Cleaning may include the use of shovels, squeegees, wet vacuums and moisture extraction machines.
12. It is important to dry out the interior of the building as quickly as possible using the heating/air conditioning unit (HVAC), auxiliary fans, carpet dryers and dehumidifiers.
  - Try to achieve an **indoor relative humidity of 40%** as quickly as possible in order to minimize mold, mildew and bacterial growth.
13. After the restoration has been accomplished, it is important to **monitor all occupants for sickness, allergic or sensitivity reactions.**
  - A lack of such problems is a measure of how effective your cleaning and disinfecting procedures were.
14. When selecting chemicals for use during the clean-up process, choose those chemicals that are classified as **disinfectants**, as these are designed to kill or inactivate potential pathogenic microorganisms and molds.
  - It is also important to use the appropriate chemical agent for the type of surface being treated and the suspected contaminant present.
    - a. Phenolic Compounds are stable, broad spectrum, readily available and leave a residue, which will continue to destroy pathogens and molds after the initial clean up. Care is needed as these compounds may cause inhalation reactions, as well as eye and skin irritations. Pine oil disinfectants can generally be purchased at the grocery store in the cleaning section.
    - b. Quaternary Ammonium Chloride Compounds (Quats) are capable of killing gram-positive bacteria and molds, while inactivating gram-negative bacteria and some viruses. These compounds have a pleasant odor and are generally excellent cleaners. Ammonium chloride compounds are safer to use than phenolic compounds and cause less irritation to the mucus membranes. Quats can usually



be found in janitorial and restaurant supply stores specializing in commercial cleaners and sanitizers.

- c. Hypochlorite – household bleach and swimming pool chlorine are effective against bacteria, viruses and molds. Disadvantages are that these compounds are somewhat corrosive, and they remove color from many interior fabrics. Use should be in a well-ventilated room to minimize eye and nose irritation. Do not mix bleach with other household cleaners such as ammonia or toilet bowl cleaner because a chemical reaction will occur that irritates the eyes and nose and may even be poisonous in high concentrations.

➤ ***Food Safety Precautions***

1. DO NOT USE any food or food containers from flooded homes.
  - Properly discard in solid waste containers.
2. Wash hands thoroughly with soap and water or alcohol-based hand sanitizers before preparing food.
3. Clean and disinfect all eating utensils, cookware and food contact surfaces such as counters or cutting boards before use
  - A disinfectant solution can be prepared by mixing 2 teaspoons of liquid household bleach to one gallon (4 quarts) of water.
  - Cabinets and other surfaces can be disinfected with a pine type or non-chlorine bleach solution. Always follow the instructions on the container.

**IF YOU HAVE ANY QUESTIONS REGARDING THE ABOVE CLEANING AND DISINFECTION GUIDELINES, PLEASE CONTACT THE ENVIRONMENTAL HEALTH DEPARTMENT AT (209) 468-3420, 8:00 A.M. TO 5:00 P.M., WEEKDAYS.**