

# Flood Preparation and Recovery for Drinking Water Systems



Drinking Water Program

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# Floods

## Public Health and the Environment

### 1.1 Flood Types

- Riverine** - Periodic overbank flow of rivers and streams.
- Flash** - Quickly rising small streams after heavy rain or rapid snowmelt.
- Urban** - Overflow of storm sewer system usually due to poor drainage following heavy rain or rapid snowmelt.
- Coastal** - Flooding along coastal areas associated with severe storms, hurricanes or other events.

Many areas of the state are at risk of flooding from heavy rains, spring ice jams, rapid snow melt, tidal storm surges and wave run-up. Floods account for approximately 40% of the state's disaster emergencies. Most floods are of the Riverine variety, as defined above. The South-central, Western, and Interior Regions of the state are especially prone to spring flooding during breakup of the rivers, and summer and fall rainfall events. Coastal areas of the state, especially the Western Region, are prone to storm driven waves that can flood a community. Floods can also cause natural and environmental emergencies such as erosion and landslides.

Many existing populated areas are known to be located within flood vulnerability zones. Consequences to property and people can include a disruption of vital services such as water, sewer, power, gas, communication, transportation, damage or destruction of roadways, buildings, structures, bridges, port and harbor facilities, airports, and vehicles.

The Alaska Department of Environmental Conservation (DEC) is available to provide technical assistance on environmental issues associated with floods. See the list of DEC Drinking Water Program offices at the back of this information packet.

Flood waters may impact drinking water system infrastructure (wells, intakes, and treatment plants) with contaminants carried by surface waters or saturated soil. Contaminants may include bacteria, viruses, protozoa, or petroleum products from fuel spills in nearby areas. These forms of contamination may constitute a hazard to public health. Shallow wells near a river or flood area, may be at increased risk even when the wellhead itself has not been flooded. DEC advises that precautionary measures be taken before and after the flood to protect your well and drinking water system.

# Before the Flood

## 2.1 Flood Preparation Guidance for Public Drinking Water Systems

**With Advanced Notice, Secure the Facility Prior to the Flood**

### *Keep Water Out*

- Sand bag if possible around structures and at building entrances. Keep in mind that the effectiveness of sandbags is limited when they are frozen.
- Plug floor drains to prevent entrance of water from the drain system. Preferably, inflatable plumbing plugs should be used but if they are not available some utilities have used water plug cement for this purpose. (Note: This would require effort to restore the drain following the flood.)



### *Secure Water and Chemical Storage Tanks / Safeguard Chemical Supplies*

- Chemical supplies (hypochlorites, fluoride, corrosion control additives, etc.) and chemical solution tanks should be removed from areas of imminent flooding and stored in a secure location. However, if chemical solution tanks cannot be removed, raise the tank above the expected level of floodwater and secure the tank to reduce the chance of flotation or overturning.
- Water storage tanks should be completely filled with water to be ballasted against flotation.
- Pressurized chlorine (i.e., chlorine gas) cylinders should be removed from areas of imminent flooding if at all possible. If the containers must remain in a flood warning area, they should be disconnected from any piping, closed, and process piping closed and secured. Any open-ended joints should be capped or blinded. A one-ton chlorine container will float if empty or near empty. Securing the chlorine containers against flotation will be needed to resist the buoyant forces of "empty" containers (i.e., empty of adequately pressurized product, although still containing chlorine gas.) The buoyant uplift force on an empty container can be estimated based on the tare weight of the container (between 1300 and 1650 pounds, depending on the manufacturer), and the weight of displaced water (estimated at 1900 pounds, based on a container design capacity of 1800 pounds of water) to be between 250 and 600 pounds (weights per Chlorine Institute, 1997, and Columbiana Boiler, 1995).

### *Surface Water Intake Preparation*



- During a flooding event, debris often increases within associated surface water bodies. Surface water intakes are at risk of becoming damaged or blocked. Ensure water storage tanks are filled to capacity and make provisions for temporary intakes in case the intake requires flushing or is completely blocked.

Intake structures and water treatment plants along rivers may be subject to damage from ice flows. If possible, remove the intake structure before the flood.



## ***Water Well Preparation***

- Ensure that the land surrounding the well is sloped away so that surface water does not flow towards the well. If re-grading around the well casing is required be sure that the casing terminates at least 12 inches above grade after the re-grading.
- Well casings must extend at least 12 inches above ground; the casing may have to be extended to meet this requirement. Additionally, consider extending the casing above the 100-year flood level or alternatively sealing the top of the casing and extending the vent above the 100-year flood level.
- Consider protecting the area over the water line between the well and the treatment facility with sand bags because a recently constructed or improperly backfilled trench may provide a flow path for the flood water to the well casing.
- Ensure that the integrity of the surface seal outside the casing is maintained and in good shape. Check that there has been no settling of the soil or that no cavity has developed around the outside of the well casing where surface water would be able to flow down to the aquifer. Fine bentonite chips can be used to make an impervious seal around the well casing (some digging may be required to ensure the seal is installed to as deep as possible).
- The well must have a tight fitting waterproof cap. Many wells have unsealed caps or sanitary seals with vent holes. Some wells require vents for proper operation. If the well is not used for the duration of the flood event the vent holes should be plugged. To further reduce risk, carefully wrap the cap and well casing with durable sheet plastic and duct tape to form as tight a seal as possible. Sand bags can be placed around the well to protect the well and plastic from debris. When sealing the well cap and protecting the well, remember that any sealing material will need to be removable in order to allow future servicing of the well.
- For pumps at risk of becoming flooded, shut off the power just prior to impact. Be aware of the potential to contaminate the distribution system due to a loss of pressure if there is not an adequate supply of stored water.
- Wells along rivers may be subject to damage from ice flows. Consider placing sandbags or bollards along the upstream side of the well for added protection.
- Ensure that any stand-by or abandoned wells in the area are also protected. Standby wells should be sealed to avoid as much impact to the water source as possible. In addition, an abandoned well is an environmental liability and should be permanently decommissioned to ensure it will not act as a source of groundwater pollution now or in the future. Flood waters entering an abandoned well can contaminate an active well and the associated aquifer. If there is not enough time to do this now, it should be a priority after the flood; measures should be taken to temporarily seal the well from flood waters using sheet plastic and duct tape.



## ***Secure Heating Fuel Tanks***

- Secure small fuel containers, fuel tanks, and barrels that are used to store fuel so they do not float away. Above ground tanks, including propane tanks, may shift or fall causing fuel lines to kink, weaken or break, and fittings may be loosened or break. If you have a buried fuel tank, water may seep into the tank and contaminate the fuel. Owners should close the valves on the tanks that are not currently in service and on tanks that are being taken out of service in preparation of a flooding event. Vents should be plugged temporarily if possible. If you

have any questions on the integrity of your tanks, fuel lines, tank stand, the fuel itself or need help moving or returning the tank to service, please contact your fuel supplier. If the flooding has caused a fuel, oil, or other hazardous substance spill, report it to the DEC immediately. Contact information has been provided in the back of this pamphlet.



## ***Secure Electrical Assets***

- Remove generators and motors not in use to a safe location and make preparations for quick removal of those in service. It is recommended that generators and motors be equipped to accommodate quick removal with disconnect fittings rather than conventional pigtails.
- If flood waters are anticipated to inundate areas where electronic controls are housed, shutdown SCADA system components, programmable logic controllers (PLCs), computers, and other field instruments. Shutdown any backup uninterruptible power supply (UPS) systems because the UPS could maintain sufficient current to the equipment to destroy the instrumentation package when inundated by the flood waters. NOTE: Shutting off these components will mean your system should post a Boil Water Notice since your normal treatment processes may be offline.
- Shutdown all transformers; identify and locate possible temporary and replacement equipment.

## ***Secure Other Assets***



- Move mobile equipment (heavy equipment, ATVs, etc) to higher ground to prevent damaged by flood waters or debris.

## ***Sampling and Disinfection Preparations***



- Maintain an adequate supply of coliform bottles to support sampling of the varying components of the system for at least a week.

If the system is routinely disinfected with chlorine, increase the chlorine level to ensure the chlorine residual remains at 0.2mg/L or higher throughout the distribution system.

## ***Customer Notification***

- Public Water Systems are often placed on a Boil Water Notice during a flooding event. In order to ensure the public water system is prepared to issue the notice as soon as possible, a Precautionary Boil Water Notice will often be sent to the water system prior to the flood waters reaching the community. The Boil Water Notice and the Precautionary Boil Water Notice will advise consumers that a loss in pressure to less than 20 PSI due to a power loss, line break, or any other situation has the potential to allow pathogenic contamination into the drinking water. It is extremely important that the water system contacts the DEC as soon as possible if the water system is negatively impacted during a flood event. The department will assist the system with site specific guidance and inform them of the requirements for the specific situation.



# After the Flood

Once the flooding has subsided, the Public Water System owner or operator must contact the DEC Drinking Water Program immediately. DEC staff will provide information on disinfection of the water system, sampling requirements, as well as any Boil Water Notices that are required.

\*\*\*If you suspect fuel contamination in the water source do not run the system, as the fuel contamination could spread throughout the treatment and distribution system, potentially damaging various components of the water system infrastructure\*\*\*

## 3.1 Disinfection of Wells and Small Water Distribution Systems

**PLEASE NOTE: This procedure should not be done in the following situations:**

- ❖ Flood waters have not completely receded or the potential for flooding still exists
- ❖ The ground water level has not returned to a stable level
- ❖ The septic system has been flooded

During the disinfection procedure the water will not be drinkable so plan to do it late at night or at other times when there is little need for water.

1. Obtain one-half gallon of household bleach (unscented) which contains 5-6% sodium hypochlorite. Large diameter or very deep wells may require more bleach. Dilute the chlorine in a large bucket of water.



2. Remove the sanitary seal and pour the chlorine solution down the well casing. Using a clean hose, run water down the casing until you smell chlorine in the water from the hose. Turn off the hose and replace the sanitary seal.



3. Open each tap in the distribution system until you smell chlorine and then close the tap. Do the same for hot water taps and flush toilets until you smell chlorine. You are trying to get the chlorine solution to all parts of the plumbing. If there are any in-line filters, they should be removed and replaced with new filters after the disinfection is complete.



4. Allow the chlorine to sit in the pipes for at least two (2) hours, preferably overnight.



5. Open all taps and flush out the chlorine solution until you can no longer smell it at any of the taps. Your well and distribution system should now be disinfected.

6. Follow-up sampling should be done after all trace of chlorine is gone to ensure that the disinfection procedure was successful. DEC Drinking Water personnel will advise the public water system (PWS) of their sampling requirements.



**NOTE:** Large amounts of chlorine can damage the resin in water softeners; if there is a softener it should be bypassed before beginning the disinfection process. You should contact the manufacturer or distributor for the correct method for disinfecting the softener.

**NOTE:** Chlorine disinfection will not eliminate fuel contamination in your well water.

If you have any questions please contact your local DEC office for additional information; contact information is in the back of this packet.

## 3.2 Emergency Disinfection of Your Personal Drinking Water Supply if Potable Water is not Available

- **In times of crisis, follow advice from local officials.** Local health departments or public water systems may urge consumers to use more caution or to follow additional measures in addition to the information provided here.
- **Look for other sources of potable water in and around your home.** When your home water supply is interrupted by natural or other forms of disaster, you can obtain limited amounts of water by draining your hot water tank or melting ice cubes. In most cases, well water is the preferred source of drinking water. If well water is not available and river or lake water must be used, avoid sources containing floating material and water with a dark color or an odor. Generally, flowing water is better quality than stagnant water.
- **Examine the physical condition of the water.** When emergency disinfection is necessary, disinfectants are less effective in cloudy, murky or colored water. Filter murky or colored water through a clean cloth or allow it to settle before disinfection of the water. It is better to both settle **and** filter. After filtering until it is clear or allowing all dirt and other particles to settle, draw off the clear water for disinfection. Water prepared for disinfection should be stored only in clean, tightly covered containers that are not subject to corrosion.
- **Choose a disinfection method.** Boiling and chemical treatment are two common methods used to effectively disinfect small quantities of filtered and settled water.
- **Boiling is the surest method to make water safe to drink and kill disease-causing microorganisms like *Giardia lamblia* and *Cryptosporidium*, which are frequently found in rivers and lakes.** If not treated properly and neutralized, *Giardia* may cause diarrhea, fatigue, and cramps after ingestion. *Cryptosporidium* is highly resistant to disinfection. It may cause diarrhea, nausea, and/or stomach cramps. People with weakened immune systems are likely to have more severe and more persistent symptoms than healthy individuals. Boil filtered and settled water vigorously for two minutes. To improve the flat taste of boiled water, aerate it by pouring it back and forth from one container to another and allow it to stand for a few hours or add a pinch of salt for each quart or liter of water boiled.

*If boiling is not possible, chemical disinfection of filtered and settled water collected from a well, spring, river, or other surface water body will still provide some health benefits and is better than no treatment at all.*

- **When boiling is not practical, certain chemicals will kill most harmful or disease-causing organisms.** For chemical disinfection to be effective, the water must be filtered and settled first. Chlorine and iodine are two chemicals commonly used to treat water. They are somewhat effective in protecting against *Giardia* but may not be effective in controlling more resistant organisms like *Cryptosporidium*. Chlorine is generally more effective than iodine in controlling *Giardia* and both disinfectants work much better in warm water.
- **You can use a non-scented, household chlorine bleach to disinfect water.** Do not use non-chlorine bleach to disinfect water. Typically, household chlorine bleaches will be 5.25% available chlorine. Follow the procedure and safety guidelines written on the label. When the necessary procedure is not given, find the percentage of available chlorine on the label and use the information in the following table as a guide. (1/8 teaspoon and 8 drops are about the same quantity.)

Available Chlorine	Drops per Quart/Gallon of Clear Water	Drops per Liter of Clear Water
1%	10 per Quart - 40 per Gallon	10 per Liter
4-6%	2 per Quart - 8 per Gallon (1/8 teaspoon)	2 per Liter
7-10%	1 per Quart - 4 per Gallon	1 per Liter



(If the strength of the bleach is unknown, add ten drops per quart or liter of filtered and settled water. Double the amount of chlorine for cloudy, murky or colored water or water that is extremely cold.)



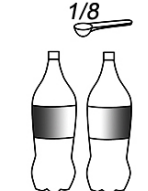
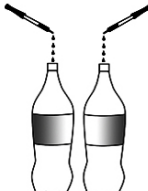
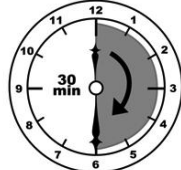


- **Mix the treated water thoroughly and allow it to stand, preferably covered, for 30 minutes.** The water should have a slight chlorine odor. If there is no lingering chlorine odor, repeat the dosage and allow the water to stand for an additional 15 minutes. If the treated water has too strong a chlorine taste, allow the water to stand in a clean, covered container for a few hours or pour it from one clean container to another several times.
- **You can use granular calcium hypochlorite to disinfect water.** Add and dissolve one heaping teaspoon of high-test granular calcium hypochlorite (approximately ¼ ounce) for each two gallons of water or 5 milliliters (approximately 7 grams) per 7.5 liters of water. The mixture will produce a stock chlorine solution of approximately 500 milligrams per liter, since the calcium hypochlorite has available chlorine equal to 70 percent of its weight. To disinfect water, add the chlorine solution in the ratio of one part of chlorine solution to each 100 parts of water to be treated. This is roughly equal to adding 1 pint (16 ounces) of stock chlorine to each 12.5 gallons of water or approximately ½ liter to 50 liters of water to be disinfected. To remove any objectionable chlorine odor, aerate the disinfected water by pouring it back and forth from one clean container to another.
- **You can use chlorine tablets to disinfect filtered and settled water.** Chlorine tablets containing the necessary dosage for drinking water disinfection can be purchased in a commercially prepared form. These tablets are available from drug and sporting goods stores and should be used as stated in the instructions. When instructions are not available, use one tablet for each quart or liter of filtered and/or settled water to be purified.
- **You can use tincture of iodine to disinfect filtered and settled water.** Common household iodine from the medicine chest or first aid kit may be used to disinfect water. Add five drops of 2 percent tincture of iodine to each quart or liter of clear water. For cloudy water add ten drops and let the solution stand for at least 30 minutes.
- **You can use iodine tablets to disinfect filtered and settled water.** Purchase commercially prepared iodine tablets containing the necessary dosage for drinking water disinfection at drug and sporting goods stores. Use as stated in instructions. When instructions are not available, use one tablet for each quart or liter of filtered and settled water to be purified.

**ONLY USE WATER THAT HAS BEEN PROPERLY DISINFECTED FOR DRINKING, COOKING, MAKING ANY PREPARED DRINK OR FOR BRUSHING TEETH**

**Summary and Illustration of Key Points**

<p>Filter murky or colored water through a clean cloth or allow it to settle. It is better to both filter and settle.</p>	
<p>Boiling is the surest method to make water safe to drink and kill disease-causing microorganisms like <i>Giardia lamblia</i> and <i>Cryptosporidium</i>, which are frequently found in rivers and lakes.</p>	

<p>To improve the flat taste of boiled water, aerate it by pouring it back and forth from one container to another and allow it to stand for a few hours or add a pinch of salt for each quart or liter of water boiled.</p>	
<p>When boiling is not practical, certain chemicals will kill most harmful or disease-causing organisms. Chlorine, in the form of unscented household bleach, and iodine are two chemicals commonly used to treat water.</p>	
<p>You can use non-scented, household chlorine bleach that contains a chlorine compound to disinfect water. (1/8 teaspoon and 8 drops are about the same quantity.)</p>	
<p>You can use tincture of iodine to disinfect filtered and settled water. Common household iodine from the medicine chest or first aid kit may be used to disinfect water.</p>	
<p>Tincture of iodine. For cloudy water add ten drops and let the solution stand for at least 30 minutes.</p>	

### 3.3 Cleaning & Disinfection of Small Water Holding Tanks for both Residential and Public Water Systems (approximately 3,000 gallons or less)

Household water storage tanks frequently test positive for high levels of bacteria even if they have not been subject to sewage contamination. Even if your water is coming from an approved source, you may need to clean and sanitize your household system periodically.

➤ ***IF YOU HAVE ACCESS TO THE INSIDE OF YOUR TANK***



(Uses a smaller volume of water that can be disposed of in a septic system; the chlorine concentration is higher with a shorter disinfection time.)

1. Plan to clean your tank when the water level in it is low.
  - Add 1 or 2 cups of unscented household bleach per 25 gallons of water remaining in the tank.
  - Make sure that if you have a sewage holding tank, it has been pumped to prevent overflow and allow venting during the water tank disinfection procedure.
2. Turn on the faucets in the house to allow bleach solution to be distributed throughout the water system.
  - You may need to do them one at a time, starting with the one farthest (longest pipe) from the water tank.
  - Once you smell bleach coming from the tap, the sanitizing solution has filled your system and you can turn off faucets. Allow the chlorinated water to sit in your pipes for at least 2 hours but preferably overnight. Remember that the water will not be usable during the entire procedure.

3. Make a spray bottle of bleach water by mixing 1 teaspoon of household bleach per quart of water.
  - Spray down the insides of tank thoroughly with this solution.
  - Make sure that the room is well ventilated so that you are not breathing in too many bleach fumes.
  - If there is a lot of debris settled at the bottom of the tank, try to dip or siphon the last of the water out of the tank instead of sending it through the system.
4. At end of the “sit time” of at least 2 hours, open faucets to flush solution through again. If the tank is not already empty, run your taps until tank is drained.
5. Fill tank with fresh water. Open taps until fresh water flushes through.

➤ ***IF YOU DO NOT HAVE ACCESS TO THE INSIDE OF YOUR TANK***

*(Uses a large volume water that should not be disposed of into a septic system; the chlorine concentration level is lower and disinfection time is longer.)*

1. Add 1/2 cup of unscented household bleach for each 100 gallons of tank volume. (i.e. a 500 gallon tank would need 2 1/2 cups of bleach)
2. Fill the water tank with clean water.
3. Run each faucet in the distribution system until you can smell bleach.
4. Connect a clean hose to a faucet and run water back into the tank through the tank fill pipe.
5. Run the water back into the tank for 15 to 30 minutes to ensure good mixing in the tank.
6. Turn off the water and let it sit for at least 6 hours but preferably overnight.
7. Run the water to drain the chlorinated water out of the tank. You may want to run the water using a hose out onto a gravel or area of soil so you do not overload your wastewater system or kill the vegetation. Be careful that you do not run the chlorinated water into any river, stream, or lake. Chlorine is toxic to fish!

If you have any questions please contact your local DEC office for additional information, contact information is in the back of this pamphlet.

### **3.4 Cleaning & Disinfection of Large Water Holding Tanks**

Disinfect and flush per AWWA Standard C652 or contact DEC for assistance.

### **3.5 Fuel Contamination**

Fuel spills from underground or above ground fuel tanks or from fuel containers can flow easily and far in flood waters. Any fuel storage should be maintained away from a well or surface water source. A visible sheen and/or fuel odor can indicate fuel contamination in the water. If you detect a fuel spill near your water source, contact your local DEC office to report the spill. You may be required to get the water tested to see if it may be contaminated with petroleum products that could pose a health risk to you and your consumers.

# Other Environmental Health Issues Related to Floods that could Impact Drinking Water Quality

## 4.1 Onsite Sewer Systems

If flooding has impacted your property, DEC recommends that precautions be taken to reduce any threats to public health and the environment from impacted onsite sewer systems. Onsite sewer systems and holding tanks may be damaged due to flooding and/or high groundwater levels. Those with onsite sewer systems that have been flooded or are in the vicinity of flood waters should inspect and clean their system as follows:

- Check for any evidence of sewage on the ground. If found, keep people (especially children) and pets away from the contaminated areas. Disinfect the area by following the instructions below for cleaning up spills outdoors.
- Check for any changes in the ground surface that might indicate movement or damage to any part of the system. Raised areas may indicate that the septic/holding tank may have floated upward due to buoyant forces. If this has occurred, damage to the tank and/or piping is likely. Depressed areas may indicate a collapsed tank, or that the upper soils have sunk downward into the drain field. The system should be checked for damage by a qualified system installer or a professional engineer.
- Floodwaters may have raised the groundwater to levels at or near the ground surface in many locations. Onsite sewer systems do not provide proper wastewater treatment under these conditions. Use of systems under these conditions may lead to groundwater contamination, surfacing of sewage, and/or sewage backing up into your home. All of these conditions pose a significant health threat. It may take some time for the surrounding ground to dry up enough for the drain field to recover and resume its normal absorption capability. During the time when the groundwater level is above or near the level of the drain field area of your sewer system, your system will not function properly. During this period, avoid discharging wastewater to your onsite sewer system. When use of your sewer system is resumed, DEC recommends that you closely monitor its performance and limit water use for at least 30 days.
- Once the flood waters and groundwater levels have receded, the septic tank may be pumped, which can give the drain field a resting period before introducing additional wastewater to the drain field from the tank. Prior to pumping a septic or holding tank, the homeowner should verify that their tank is anchored down to prevent floatation when pumped, and that groundwater levels have receded enough to prevent further inflow of groundwater into the tank, and/or damage to the tank and piping when pumped out.
- Cleanout pipes and monitoring tubes should be inspected to assure those joints and connections have not been damaged and that caps are in place.

For more information regarding disinfection procedures and sewer system monitoring to detect damage, call your local DEC office.

The following are recommended procedures for cleaning up untreated or inadequately treated sewage spilled to the ground surface.

## 4.2 Standard Procedures for Cleaning Up Domestic Wastewater Spills Outdoors

### 1. *In all conditions:*

- If the area where the spill occurred is accessible to the public or domestic pets, the contaminated area must be clearly marked or cordoned off to restrict access.
- Protective clothing (at a minimum, rubber or latex gloves and rubber boots) should be worn when cleaning up a sewage spill. Dispose of gloves and wash rubber boots when leaving spill site. Keep children and interested bystanders away from cleanup activities.
- Please note that hydrated lime is a caustic material and can be dangerous to handle and apply. Lime should only be used or applied by people experienced in using this material.
- Do not mix cleaning or disinfecting products or chemicals. Cleaning products can react with one another to produce toxic vapor or liquid substances.

### 2. *In non-freezing conditions when sewage is a mixture of liquid and solid material the following steps should be taken:*

- If the spilled material cannot be recovered using hand tools, a commercial vacuum/pump truck should be called to remove all visible liquid and solid material.
- When the area is visibly clean, either a chlorine and water solution (using Clorox or an equal bleach) or hydrated lime should be applied to the spill area to disinfect it. To make a 5% chlorine solution, add 3/4 cup Clorox bleach to one (1) gallon of water. You can verify the chlorine concentration by using test paper available at food supply warehouses or chemical supply companies. Only use bleach that has “sanitizes” or “kills germs” on the label.
- If the spill occurred in a heavily populated area and odor may be an issue or within 100 feet of surface water, hydrated lime should be applied to the area in place of chlorine bleach. Enough hydrated lime should be applied to raise the pH to at least 12. By raising the pH to 12 for at least 1 hour, the area will be disinfected. You can test the pH by using litmus paper obtained at a chemical supply facility. Lime is a caustic material; access to the area treated with lime must be restricted during the disinfection process.
- After the spill area has been cleaned and disinfected (24 hours after the chlorine solution or hydrated lime has been applied), the barriers may be removed and access to the area restored.



### 3. *In freezing or frozen conditions.*

- An attempt should be made to clean up the spill before it becomes completely frozen.
- If possible, the frozen sewage should be removed down to the natural ground surface (or at least one inch below the spilled sewage if on thicker ice) and the recovered material disposed of properly. This could require that approval be obtained from the local government for disposal in a permitted landfill. An acceptable alternative solution is to stock pile the frozen sewage in an approved lined containment area until conditions are more favorable for transport and disposal. Each spill site and situation is different;

please contact your local DEC office for recommendations regarding constructing an acceptable containment area. If the material thaws, the liquid must be properly handled and disposed of at a permitted wastewater treatment and disposal facility. Keep in mind that frozen and/or thawed sewage may still contain active, harmful bacteria, cysts and viruses.

- When the area is visibly clean, either a chlorine and water solution (using Clorox or an equal bleach) or hydrated lime should be spread across the spill area to disinfect. You can verify the chlorine concentration by using test paper available at food supply warehouses or chemical supply companies.
- If the spill occurred in a heavily populated area and odor may be an issue or within 100 feet of surface water, hydrated lime should be applied to the spill area in place of chlorine bleach. The hydrated lime will raise the pH to 12, which will disinfect the area. By raising the pH to 12 for at least 1 hour, the area will be disinfected. You can test the pH by using litmus paper obtained at a chemical supply facility. Because lime is a caustic material, access to the area treated with lime must be restricted during the disinfection period.
- When the spill area has been cleaned and disinfected (24 hours after the chlorine solution or hydrate lime has been spread), the barriers can be removed and access to the area restored.

### NOTIFY YOUR LOCAL DEC OFFICE WHEN CLEANUP IS COMPLETE

## 4.3 Standard Procedures for Cleaning Up Domestic Wastewater Spills Inside Buildings

**Note:** Access to the spill area must be restricted until 24 hours after cleanup is completed.

- If sewage is on nonabsorbent floor material like tile, vinyl, concrete or other non-absorbent surfaces, cleanup of the visible water and semi-solid materials should be accomplished using a vacuum or mop and by using the proper concentrations of sanitizers to disinfect. Make sure that the sanitizer is of the proper concentration and that all affected areas are thoroughly sanitized.
- If the sewage is on an absorbent floor material, such as carpet, the material that has absorbed the sewage should be vacuumed to remove as much waste as possible.
- Do not mix cleaning/disinfecting products or chemicals. Cleaning products can react with each another to produce toxic vapors or liquid substances.

The following is a list of common sanitizers:

- Chlorine: For chlorine solutions, the chlorine concentration should be in the range of 50 to 1000 parts per million (ppm) or (mg/l) for disinfecting surfaces of appliances and food preparation areas and 200 ppm (mg/l) for walls and floors. You can verify the chlorine concentration by using test paper available at food supply warehouses or chemical supply companies. As a rule of thumb, add 3/4 cup Clorox Bleach to one (1) gallon of water. Only use bleach that has "sanitizes" or "kills germs" on the label.
- Alternative disinfectants: Other disinfectants, which include iodine and quaternary solutions, must be used according to the manufacturer's specifications/recommendations if used for disinfecting sewage spills.

**Note:** Using chlorine or alternate disinfectants on absorbent materials (such as carpet) may cause damage to the material and loss of color may occur.

It is extremely difficult to adequately sanitize carpet, carpet pad, and absorbent flooring materials. DEC recommends that saturated flooring materials be removed and disposed of at a permitted solid waste disposal facility. Contact DEC for more information.

## 4.4 Solid Waste Disposal



Cleanup of flood impacted property can expose you to potential hazards or hazardous materials. Filter masks and protective clothing are highly recommended. Many household items soaked with floodwater, such as clothing, bedding, linens, leather goods, books, papers, appliances, furniture, rugs and carpets, can be salvaged by cleaning and disinfecting. These items, and other solid waste debris, can also be disposed of at the local landfill. Household hazardous materials, such as kitchen and bathroom cleaning products, paints, solvents, batteries, and asbestos containing material, need to be properly handled and disposed of.

For more information on what can be disposed of in the local landfill, contact your local landfill operator or your local DEC office.

## 4.5 Fuel/Oil/Hazardous Substance Spills



If a flood has caused a release of fuel, oil, or other hazardous substance, report the spill to your local Fire Department or Village Public Safety Officer, and call DEC immediately.

## 4.6 Propane Tanks

Propane suppliers recommend customers contact them for an inspection of the tank and fittings prior to reusing the system. The tank may have shifted which can cause fuel lines to kink or weaken or there may be loosened or damaged fittings that may be unsafe. Valves should be turned off and remain closed until the propane supplier inspects the system.



## 4.7 Home Heating Fuel Tanks

Heating oil suppliers recommend customers contact them for an inspection prior to reusing their system. If you have an above ground fuel tank, the tank may have shifted or fallen from the stand causing fuel lines to kink or weaken, or there may be loosened or damaged fittings and filters. If you have a buried fuel tank, water may have seeped into the tank and contaminated the heating oil. You should contact your fuel supplier to have the contents of the tank checked. If you have questions on the integrity of the tank, fuel lines, tank stand, or the fuel, or need assistance in moving the tank or returning it to service, contact your fuel supplier.

If the heating tank spilled and you have soil or water contamination, report the spill to DEC Spill Prevention and Response. Contact information is located in the back of the pamphlet.

## 4.8 Food

If you have food items that have been in contact with floodwaters, and are not in watertight containers, they should be thrown away. Root vegetables can be used, but they should be thoroughly washed in clean water, peeled and cooked before eating.

Canned foods should be checked carefully for leaks. Any questionable cans should be thrown out. Containers with tight seals should be washed first and then disinfected by soaking for approximately 15 minutes in chlorine water. Adding one tablespoon of household bleach to one gallon of water can make this solution. Chlorine is poisonous, so be careful not to breathe the vapors or swallow any of the chlorine water. After sterilizing the container, be sure to rinse it thoroughly in fresh water.

If you have a freezer, either a chest or upright, which was covered with floodwaters, chances are the food inside has been damaged through seepage. All of this food should be thrown away. If the electricity has been cut off, but no floodwater has seeped into the freezer, the food will last for awhile depending on the amount of food in the box. A fairly full freezer should last two or three days without much loss of quality or flavor. Partially thawed meat should be refrozen at once. If meat has been completely thawed, it should be used at once, or may be cooked and refrozen. Any meat, poultry, fish, or containers of fruit and vegetables that show any sign of spoilage should be thrown away.

## Contact Information

### DEC Drinking Water

Fairbanks	451-2138
Anchorage	269-6066
Kenai Area Office	262-3408

### DEC Wastewater

Anchorage	269-7519	555 Cordova St., Anchorage, AK 99501
Fairbanks	451-2109	610 University Ave., Fairbanks, AK 99709
Juneau	465-5306	410 Willoughby Ave., Suite 303, Juneau, AK 99801
Kenai	262-3408	43335 Kalifornsky Beach Rd., Ste. 11, Soldotna, AK 99669
Wasilla	376-1871	P.O. Box 871064, Wasilla, AK 99687

### DEC Spill Prevention and Response

Anchorage	269-3063
Fairbanks	451-2121
Juneau	465-5340

Outside normal business hours, call 1-800-478-9300

EPA DW - Office of Water 4606-M EPA 816-F-06-027 [www.epa.gov/safewater](http://www.epa.gov/safewater)

### DEC Approved Microbiological Analysis Labs

<http://dec.alaska.gov/applications/eh/ehllabreports/certmicrolabs.aspx>

### DEC Approved Chemical Analysis Labs

<http://dec.alaska.gov/applications/eh/ehllabreports/certchemlabs.aspx>

## References

[www.epa.gov/safewater](http://www.epa.gov/safewater)

[www.alaska.gov](http://www.alaska.gov)

[www.awwa.org/Resources](http://www.awwa.org/Resources)

<http://dec.alaska.gov/eh/fss/index.htm>