



# **A GUIDE TO FLOODED BASEMENTS**

**Public Works Department  
September 2007**

## **FLOODED BASEMENTS: A HOMEOWNER'S GUIDE**

Many homes in Park Ridge were built with basements to provide extra room for storage and space for utilities. These basements were built without flood control systems. Since the 1960's flood control systems are a building code requirement. Often basements are improved or remolded and come to represent a substantial investment for the owner. Because the basement is below ground level, a very shallow flood can become seven (7) feet deep, resulting in property damage, loss of heating and electricity for the rest of the house, polluted water in the home and threat to health and safety.

The first section of this booklet introduces ways to prevent this hazard and protect your basement. The second and third sections cover things to do after your basement has flooded. Even a small amount of advance planning and preparation can reduce the damage caused when a basement floods.

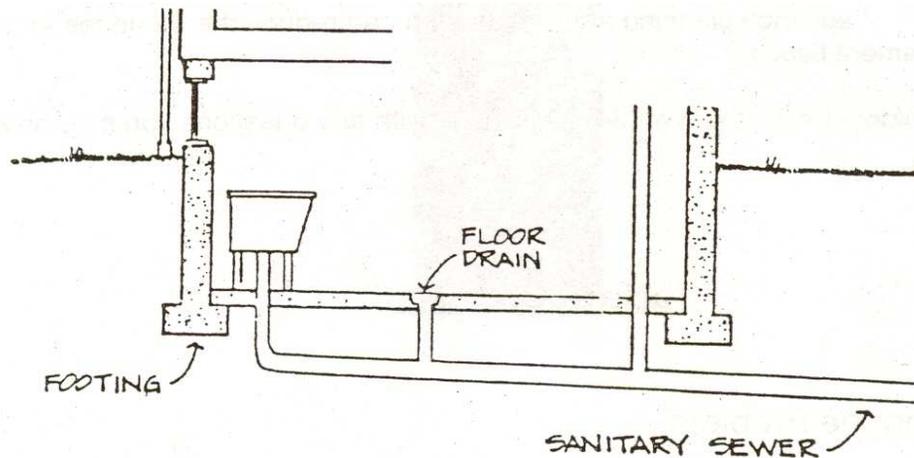
Contact the Public Works Department at (847) 318-5228 or the Environmental Health Department at (847) 318-5281 with any questions.



## FIXING THE PROBLEM

### Basement Construction

Most basements built in Park Ridge are designed as shown below. Footings are laid or poured on a gravel bed and designed to withstand the entire weight of the building. Walls are extended up to support the upper stories. However, it is important to note the walls and the floor are typically designed only to be strong enough to hold back dirt. After a while the house may settle particularly if it is on unstable soil. This will result in some cracks appearing in the walls and the floor.

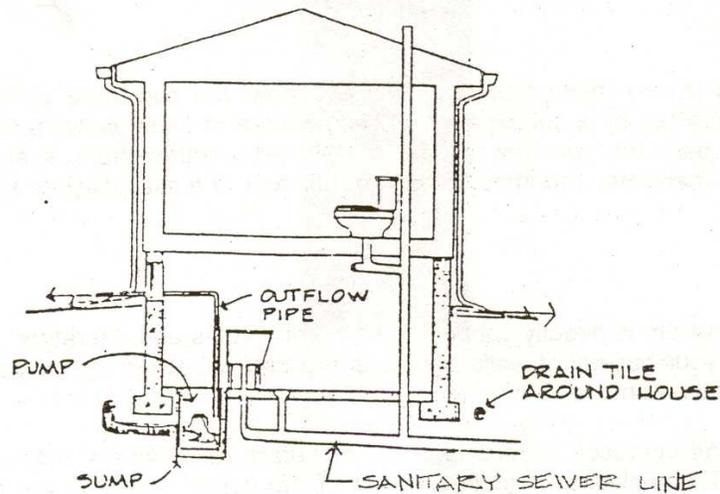


*Typical Basement Construction (without a Flood Control System)*

When water comes in contact with the walls or floor, it may leak through the cracks that have formed and get into the interior of the building. If there are no cracks large enough to permit the water to go through, water pressure will build up on the walls, possibly creating cracks or breaks. The deeper the water level, the greater the water pressure put on the walls and floor.

One consideration you must keep in mind is the “head” of water that threatens your basement. “Head” is the height of water related to a specific point such as your basement floor. The greater the head, that is the deeper the water, the more water pressure there will be. Studies by the U. S. Army Corps of Engineers have concluded that masonry walls such as block or brick are not built to withstand water pressure from a head greater than three (3) feet deep.

Subsurface drainage systems are constructed to reduce the head created by ground water against your walls. As shown on the next page, drain tiles are laid on or outside of the footings around the building. Sometimes drain tiles are laid underneath the floor near the footing.

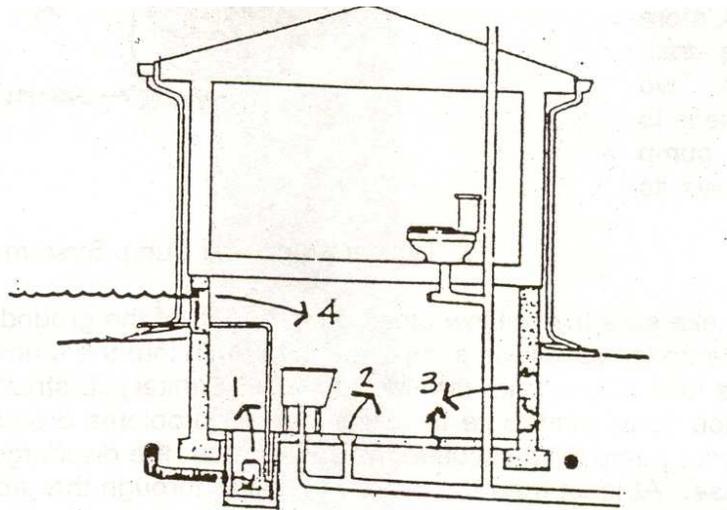


*Typical Subsurface Drainage System (Without a Flood Control System)*

If there is a low spot on the lot, the tiles are run out to it, allowing gravity to take the water away from the building. Regulations allow only one method of draining a drain tile: Ground water drains into the tiles and then to a sump from which it is pumped out onto the top of the ground as shown above. Drainage is not allowed to enter the street sewer system from these tiles.

There are four (4) ways water can get in to your basement:

- Through the drainage system's sump.
- Backing up through the sewer lines under the house.
- Seeping through cracks in the walls and floor.
- Over the surface of the ground through windows and doorways.



*Sources of Basement Water*

The rest of this booklet will review these four problems and how you can cope with them. Remember: you could be affected by a combination of two or more of these water problems. For example, when sewers back up, you may not be able to tell whether there is seepage through cracks in the floor. Therefore, you should check out all four of these possible sources of water and their solutions.

### **Sump Backup**

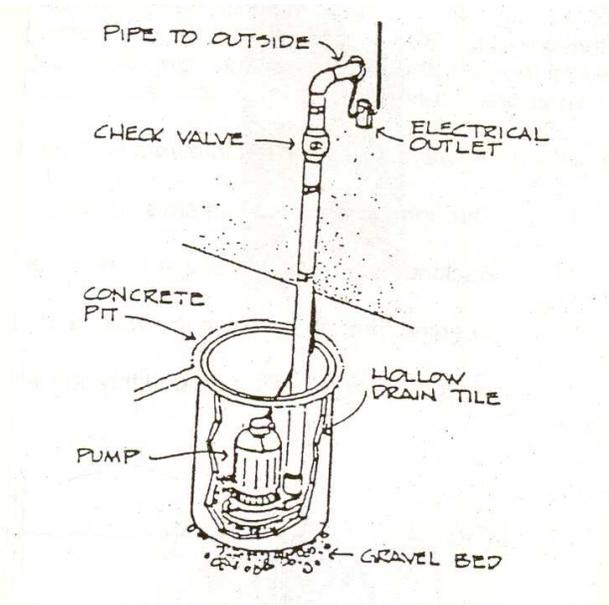
The sump in your drainage system is directly connected to the drain tiles and therefore, to the water in the ground outside your basement walls. A sump will back up when the pump fails, when the power fails or when the pump is overloaded.

Proper pump maintenance and operation according to the manufacturer's owner's manual can prevent the first condition. This includes periodic cleaning of the debris screen, even during high water. A clogged intake is as bad as having no pump.

One of the most common causes of basement flooding is not pump failure, but electrical failure. Power losses often accompany severe storms. Backup systems with batteries or generators are available commercially and experienced flood victims will tell you they are well worth the cost.

**Safety Note:** Be sure your backup generator exhausts to the outdoors. Just like your car engine, a gasoline-powered generator creates deadly carbon monoxide gas.

Pump overload occurs when there is too much head, i.e., there is more ground water coming into the drain tiles than the pump can handle. Two precautions can be taken. One is to have a second, or even third, pump on hand. Each one should have its own outflow pipe.



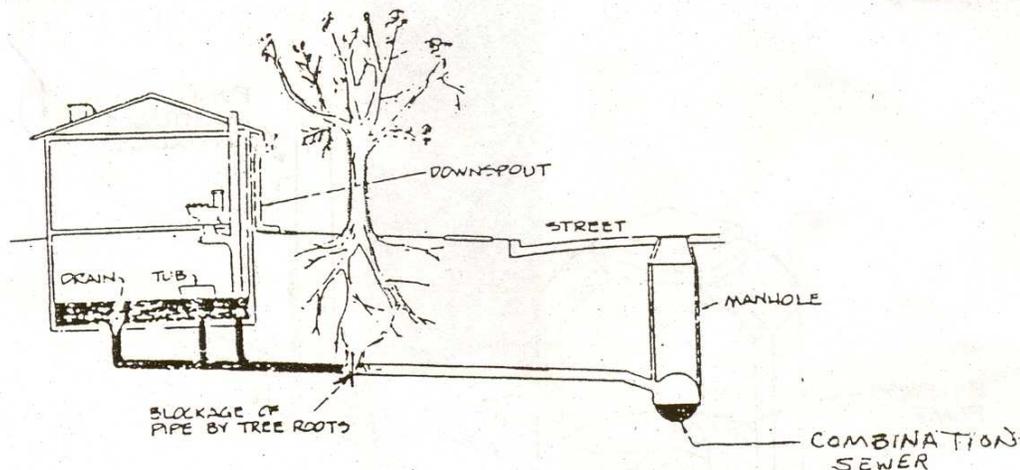
*Typical Sump and Pump System*

The second precaution is to make sure the outflow pipes drain on top of the ground, well away from the house. The City Code no longer allows sump pumps to drain into the municipal sewer systems because they overload the City's and the Metropolitan Water Reclamation District's facilities. Furthermore, such a connection could contribute to sewer backup problems discussed in the next section. To avoid using your pump to recirculate the same water, the discharge should be away from the side of the house---at least then the water must filter through the ground before you pump it out again. City Code requires the drain tile discharge not be within 5' of the property line and must be directed such that this discharge does not cause a nuisance to adjoining property.

## **Sewer Backup**

Although more common in older areas that have a combined sanitary and storm sewer system, sewer backup can occur where there are separate systems. Either a problem in your line or an overloaded municipal system can cause it.

The thing to check first is whether the sewer lines on your property are broken, clogged with roots or debris, or directly connected to your downspouts or footing drain sump pump. If you flush a toilet while the shower and washing machine are draining and water backs up into your basement, you know the lines cannot carry a large volume of water. If this is the cause of your flooded basement, the problem can be fixed with relative ease. Disconnect the downspouts and sump pump outlet pipe (rain and ground water are clean and do not need sewage treatment). City Code does not allow direct connections to the sewer systems from downspouts, sump pumps, etc. Plumbers have the ability to run a camera down your sewer and video the sewer from the inside. This helps eliminate the guesswork. Rod out the line or repair the break. Consider repairing a broken clay pipe with cast iron pipe. If help is needed, contact a plumber or contractor.



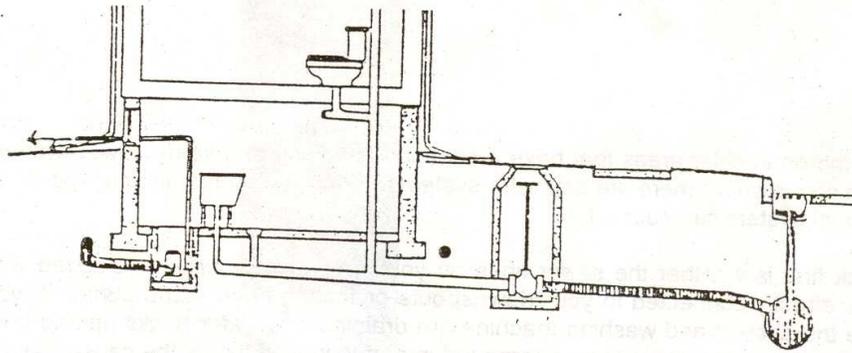
*Broken Sewer Line*

If your line is okay, the problem may be that the City sewer system cannot handle the high volume of water that comes with heavy rain or flooding. Understand the sewer system was designed with basements as a relief to overflowing sewers. This was through the use of floor drains and protected basement floors and walls from increased pressure.

Older homes have floor drains and not back flow prevention for this very reason. There are two ways to protect against this type of backup: a backup valve or an overhead sewer.

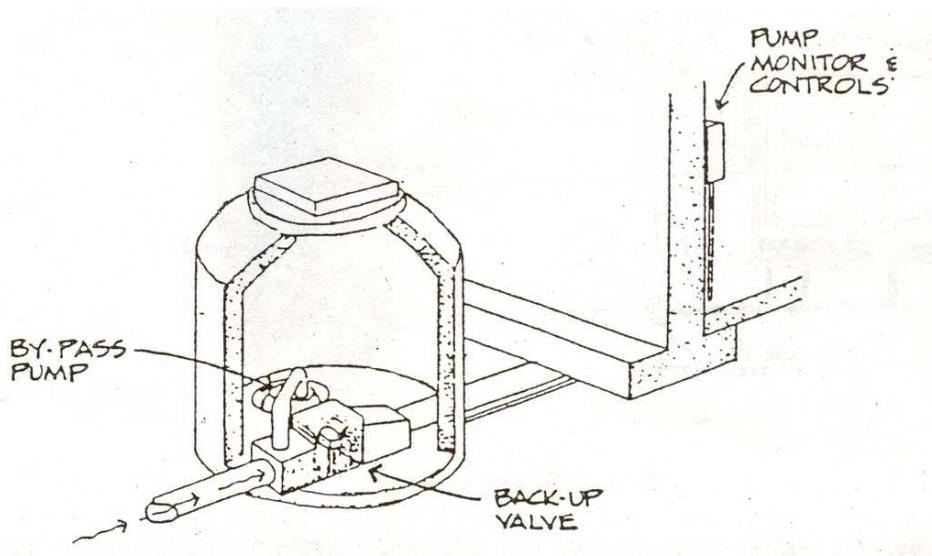
### Valve

A backup valve installed in the sewer line will not permit the sewer to backup into your basement. The valve should be placed outside your house where it would be easier to install and maintain. The valve can be manual, check or balanced.



*An in-line valve will stop sewage backup outside your house.*

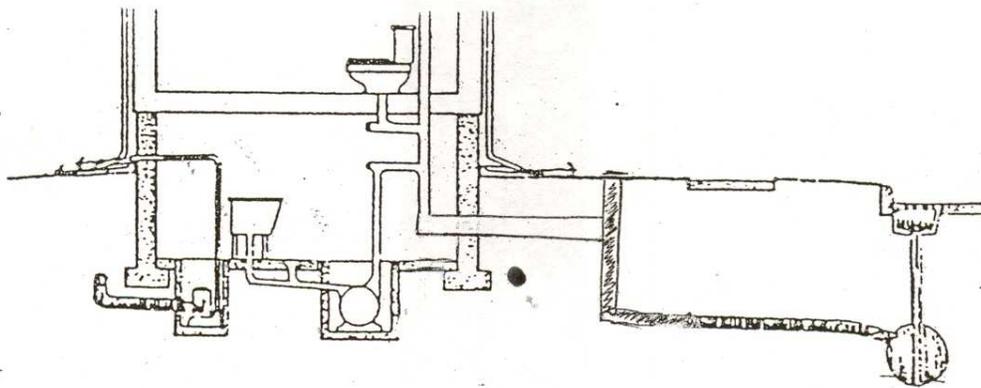
Valves can be jammed open by debris. This is less likely in a balanced valve. Check valves and manual valves have been known to “freeze up” if they are not maintained periodically. All types of valves should have a manhole or other access so they can be cleaned out or repaired. Because a valve closes your sewer line, you cannot use your sewer during high water unless you have a bypass pump.



*Some companies sell valves with bypass pumps.  
Water will not flow to the house, but sewage can still be pumped out.*

## Overhead Sewer

Your sewer line can be rebuilt so that all house sewage drains to a sump. Sewage is then pumped up to the height of the street sewer system's manhole or inlets. From this height, it flows by gravity into the system. The sewer system will backup onto the street before it could get high enough to backup into your house. Just as with a drainage system sump pump, overhead sewers require a backup system in case of power failure.



*Overhead Sewer System*

## Pressure

Typically the sewer pipe under your house is made of cast iron and the pipe in your yard is made of clay. Sewer lines operate by gravity and are not designed to withstand pressure. Pressure is created when the pipes become filled up. A plug, open standpipe, or overhead sewer will not relieve this pressure because there is still head in the lines.

The best way to deal with pressure is to minimize the amount of sewer line exposed to it. This can be done by installing a backup valve in your front yard. If a break occurs, it will be relatively easy to dig up your yard to repair it, rather than try to fix a break under your basement floor.

## Seepage

Whether from heavy local rains and water standing in your yard, broken sewer lines or surface flooding the ground around your house can become saturated with water. If there are cracks in your wall or floors, saturated ground will allow seepage of water into your basement. This may be very difficult to ascertain if the basement walls have been covered with paneling or other finishing.

The best way to deal with seepage is to ensure that the walls are waterproof and to relieve the ground water through subsurface drain tiles. Cracks can be repaired and the walls can be waterproofed from inside or outside. Waterproofing on the outside of the wall is more effective because ground water pressure forces the sealer into the foundation. The best technique is to dig a ditch around the basement wall and apply a commercial sealant.

This can be done by the handyman (many home maintenance manuals have instructions for this) or a commercial waterproofing company.

In either case, ask the supplier or company to provide references of area buildings that have used their technique or materials. Because the work is hidden, and sloppy work may not appear for several years; there have been many instances of shady contractors doing basement waterproofing.

The drain tile system has proven very effective in dealing with ground water. Water is kept away from the walls by draining down to the drain tiles. Water flows to the sump and is pumped out. Therefore, one of the best protections against seepage is to ensure you have a drain system and sump pump that work properly.

### **Surface Flooding**

The most serious type of damage to your basement will come from floodwaters on top of the ground. This is caused from overflow of a nearby stream or, if your building is unfortunately located in a low spot, from the collection of runoff from heavy rains.

One of the first responses to this sort of flooding is to seal up the openings such as the windows. This can be done by replacing windows with glass blocks.

The biggest problem with closing the direct openings to your basement is that water will still stand on the ground next to your house and will likely seep down along the walls. This will result in seepage, which was dealt with in the previous section. However, unlike other seepage problems, surface flooding will deliver more water than your sump pump can handle. Furthermore, the extra height (“head”) puts extra pressure on your basement, possibly resulting in more cracks or even a collapsed wall or floor.

**Safety Note:** Stay out of a basement during surface flooding. Water pressure can cause sudden collapse of the walls or floor.

Split levels, bi-levels, and houses with the basement floor no more than three or four feet below ground level are probably strong enough to deal with this especially if the walls are built of concrete. However, if the difference in flood heights and the floor of the basement is greater than three feet and the wall is made of block masonry, the best precaution is to keep the water from reaching the walls.

In some areas, houses were built over the garages with the garage floor three or four feet below ground level. Following heavy local rains, water collects in the streets and then flows down the driveway into the garage putting three to four feet of water in the house’s lowest floor. This can be handled by sandbagging around the driveway when it rains.

The safest approach is to keep the surface water away from the building.

## **SELECTING A CONTRACTOR**

Areas recuperating from the disruption of a flood are often prime targets for less-than-honest business activities. Any work on plumbing, water wells and septic tanks must be done by a contractor who is licensed by the Illinois Department of Public Health. The City Code has additional requirements. The following tips are recommended:

- Check first with your own local contractor. If he cannot help you, ask him to identify other reliable local contractors.
- Know the contracting company's name, the salesperson's name and the addresses and phone numbers of both. Ask the contractor for references and check them out to your own satisfaction.
- Make sure the contractor has adequate insurance coverage.
- Check on a contractor's reputation through the Better Business Bureau. Have complaints been filed against the contractor previously?
- Do not sign a contract when a salesperson has pressured you. Federal law requires a 3-day "cooling off" period for unsolicited door-to-door sales of more than \$25. If you want to cancel such a contract within three business days of a contract signing, send your cancellation by registered email. Other types of sales may have contracts with varying decisions clauses.
- Question contractors who offer "special low rates" for disaster victims or one who says your home will be a "model home". Ask for complete financial details in writing and for an explanation of any differences from regular prices. Sales are worthwhile and they do exist, but be sure you are getting the services and products for which you are paying.
- If a guarantee accompanies the contract, make certain it is in writing. It should cover what is guaranteed, who is responsible for the guarantee (the dealer, the contractor, the manufacturer), what is covered beyond the written guarantee, and the duration of the guarantee. A reputable contractor should not mind having the guarantee reviewed by a lawyer.
- After your final decision, the terms of the contract are binding on you and on the contractor. Obtain a copy of the final contract, signed by both parties and do not accept anything as final if it is not in writing in the contract. Never sign a blank contract or one with blank spaces. Seek a lawyer's assistance if necessary, especially if considerable expenditures are involved.
- Never sign completion papers before the work is complete or if you are not satisfied with the job as specified in the contract. A reputable contractor will not pressure you or threaten you to sign papers indicating that a job is complete before it actually is. You may want to have the contractor get a performances bond to insure completion.
- Beware if you are asked to pay cash on the spot instead of a check mailed to the contracting company. Follow the financial terms of the contract.
- If you are the victim of fraud or other improper contract, file a written complaint with the Illinois Attorney General's Consumer Protection Division. Include photocopies of all relevant documents such as the contract and cancelled checks.

## **AFTER THE FLOOD**

The following is information provided by the Illinois Department of Public Health to help flood victims protect themselves against diseases and other hazards in the days and weeks following a flood.

After the flood, the physical devastation to personal property and the community is obvious. These tragic consequences can be compounded by injuries or illness if certain precautions are not taken to protect your personal health and safety.

## **PERSONAL PRECAUTIONS**

### **Hygiene**

Following a flood, it can be difficult to maintain good hygiene and cleanliness. Doing so is imperative, however, if the risk of disease is to be minimized.

One of the most important things you can do to prevent the spread of waterborne disease is to always wash your hands with plenty of soap and clean, warm, running water. This is particularly important:

- Before preparing or eating food, handling a baby, smoking, or any other activity that involves touching something that may enter a person's mouth. Adults should make sure children do the same.
- After toilet use
- After handling articles contaminated with floodwater or sewage
- When no regular safe water supply is available, use bottled, boiled or chemically disinfected water for washing hands and brushing teeth.
- Keep wash clothes and dishtowels clean. Bacteria can remain on towels and clothes, so wash linen often with clean water and soap.



Parents need to take special care that their children follow these precautions. Do not allow children to play in floodwater or in areas that have been flooded. Wash their hands frequently, especially before meals. Contaminated toys should be disinfected in a solution of 1 ounce of bleach (1/8 cup) in 2 gallons of water.

### **Protective Clothing**

When entering an area that is or has been flooded, it is important to wear protective clothing, such as boots, rubber gloves and long sleeved shirts, to help reduce contact with contaminated items. Take care not to step on nails or other protruding items.

## **Illness/Injury**

Floodwater may contain fecal material from overflowing sewage systems, and agricultural and industrial byproducts. While skin contact with floodwater does not by itself pose a serious health risk, ingesting anything contaminated with floodwater can cause disease.

Although disease outbreaks are rare after flooding, floodwater can contain various bacteria, viruses and other infectious organisms that may cause disease. If you are in a flood area and become ill, report your condition to your physician or local health department. The symptoms of most waterborne illnesses are similar – nausea, vomiting, diarrhea, abdominal cramps, muscle aches and fever. Individuals may need to seek medical attention if these symptoms are severe or persist.

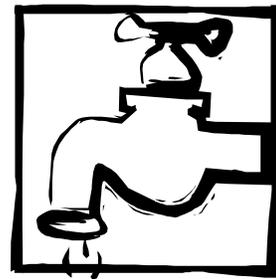
If you have any kind of cut, burn or infection on your hands, be sure to use plastic or rubber gloves if you must be in contact with floodwater. If open sores become exposed to contaminated water, disinfect the area(s) with soap and clean water to control infection. If a wound develops redness, swelling or drainage, immediately seek medical attention.

One of the most serious problems that can arise from skin contact with floodwater is tetanus. The tetanus bacterium typically enters the body through places where the skin is broken, so it is very important to protect these areas. Anyone sustaining a puncture wound or who has a wound that becomes contaminated with feces, soil or saliva should have a doctor determine whether a tetanus booster is necessary. Specific recommendations for vaccinations should be made on a case-by-case basis.

## **DRINKING AND COOKING WATER**

Public and private water supplies may be contaminated in a flood. After a flood, consider all water unsafe. Listen for public announcements on the safety of your area's water supply and follow the instructions of local authorities.

Private water well should be pumped out, allowed to recharge naturally, disinfected and the water tested before drinking or being used for cooking. If you need assistance in having your well water analyzed, contact the local health department for information. In areas without local health departments, persons can contact the nearest Illinois Department of Public Health regional office.



The safest approach is to drink and cook with bottled water or water previously stored in the refrigerator. If you have to use tap water, boil it vigorously for at least one minute. If you cannot boil it, add five drops of household bleach to each gallon of water. Mix

thoroughly and allow to stand for 30 minutes. This method should be used only with water that is clean in appearance and free of odor.

Do not use contaminated water to make ice, brush your teeth or wash dishes. If there is a shortage of safe drinking water, use clean disposable eating utensils, plates and napkins.

## **FOOD SAFETY**

Generally, do not eat any food that has come in contact with floodwater. If the safety of any food or beverage is questionable, follow this simple rule: **When in doubt, throw it out.**

### **Canned Goods**

Carefully examine all canned and bottled goods that have been submerged or come in contact with floodwater. Some cans or bottles may be safe to use after a good cleaning. Follow these guidelines:



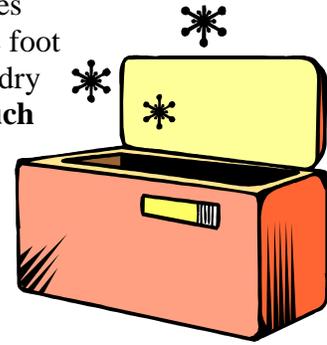
- After being under water, containers with cork-lined lids or caps, screw tops or pop-tops are nearly impossible to clean thoroughly around the opening. Any major temperature changes can actually cause contaminants to be sucked into such containers. They should be discarded.
- If they appear undamaged, tin cans are usually safe. Wash in bleach water (1/4-cup bleach in 1 gallon of water) for one minute, and then dry to prevent rusting.
- If cans have pitted rust spots that cannot be buffed off with a soft cloth, contamination may have entered through corroded holes in the walls of the can. Discard these cans.
- Cans with ends that bulge or spring in and out when pressed should be discarded immediately. This usually means bacteria are growing inside and producing gas that expands the can. **Do not taste the contents of such cans.**
- If a can is crushed, dented or creased, closely examine it to see if it is safe to use. A dent may weaken the seam and allow contamination. If a dent or crease is very sharp, the contents may be contaminated. Discard these cans. **Do not taste.**

### **What To Do When Your Freezer Fails**

When the electricity is off, a fully stocked freezer will keep food frozen two days if the door remains closed. A half-full freezer can keep foods frozen about one day. What can you do so if electric service will not be reconnected within one or two days?

- Keep the freezer door closed.
- If your friends have electricity, divide your frozen foods among their freezers.
- Seek freezer space in a store, church, school, or commercial meat locker or freezer that has electrical service.

- Know where you can buy dry and block ice. Dry ice freezes everything it touches: 25 pounds of it will keep a 10-cubic foot freezer below freezing for three to four days. When using dry ice, though, be sure to take several precautions. **Never touch dry ice with bare hands.** Also, do not stick your head into a freezer that contains dry ice. It gives off carbon dioxide, which replaces oxygen. So leave the door open a short time before examining your food.
- If food is still “cold-to-the-touch,” it may be cooked and eaten immediately, or refrozen.



### **What to Do When your Refrigerator Fails**

When power goes off in the refrigerator, you can normally expect food inside to stay safely cold for four to six hours, depending on the temperature of your kitchen.

- You can normally expect food inside to stay safely cold for four hours, depending on the temperature of your kitchen.
- Add block ice to the refrigerator if the electricity is off longer than four to six hours.
- High-protein foods (dairy products, meat, fish, poultry) should be consumed as soon as possible if power is not restored immediately. They cannot be stored safely at room temperature.
- Fruits and vegetables can be kept safely at room temperature until there are obvious signs of spoilage (mold, slime, wilt). In fact, with good ventilation, vegetables will last longer at room temperature. Remove them from the refrigerator if electrical service may not resume soon.

### **CLEANUP**

Flooded indoor areas must be scrubbed with warm soapy water. Pay particular attention to food-contact surfaces (counter tops, pantry shelves, refrigerators, stoves, cutting boards, etc.) and areas where small children play. Then rinse with a solution made by adding ½ cup (4 ounces) of laundry bleach to each gallon of water.

Wash all linens and clothing in hot water or have them dry cleaned. Items that cannot be washed or dry cleaned, such as mattresses and upholstered furniture, should be air dried in the sun and then vacuumed and sprayed thoroughly with disinfectant. Steam clean all carpeting.

If there has been a back-flow of sewage into the house, remove and discard any absorbent household material, such as wall coverings, cloth, rugs and sheetrock. Be sure to wear rubber boots and waterproof gloves during the cleanup.

If no toilet facilities are available, deposit body waste in a watertight receptacle used for that purpose only. Place a small amount of water in the receptacle before it is used to

make emptying easier. Dig a trench or pit and empty the contents of the receptacle into this pit as soon as possible after each use. Cover the waste in the trench after each use with a small layer of dirt, ashes or lime. Also empty the water used to wash the receptacle into the pit or trench. When closing the trench, cover it with at least 12 inches of earth.

## **OTHER PRECAUTIONS**

### **Gas Lines**

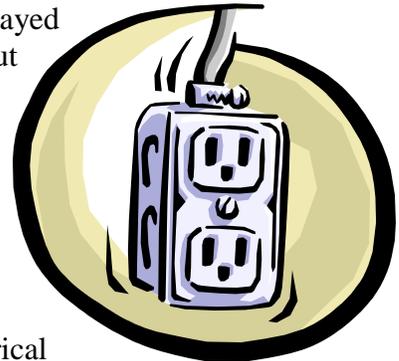
When returning to your home, check immediately for leaking gas Pipes. Do this by smell only. If you must have light, use battery powered flashlights or lanterns. **DO NOT** turn lights on or off and do not use candles, oil or gas lanterns, or torches because, if gas lines are broken, and explosion could occur.

If you smell gas or suspect a leak, turn off the main gas valve at the meter, open all windows and leave the house. Notify the gas company, the police or fire department. Do not re-enter the house until you are told it is safe to do so.

### **Electricity**

Your electrical system also may be damaged. If you see frayed wiring or sparks, or if there is an odor of something burning, but no visible fire, you should immediately shut off the electrical system at the circuit breaker.

Consult your utility company before using electrical equipment, including power generators. Be aware that it is against the law and a violation of electrical codes to connect generators to your home's electrical circuits without approved, automatic interrupt devices. If a generator is on-line when electrical service is restored, it can be a major fire hazard. In addition, improperly connecting a generator to your home's electrical circuits may endanger line workers helping to restore power.



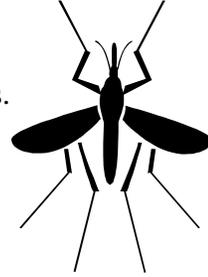
If any of your electrical appliances are wet, first turn off the main power switch, then unplug the appliances, dry it out, reconnect it and finally turn on the main power switch. If fuses blow when the electric power is restored, turn off the main power switch again and then inspect for short circuits in your home wiring, appliances and equipment.

**Caution: Do not do any of these things if you are wet or standing in water.**

Outdoors, exercise extreme caution if you find yourself around power lines. Do not touch downed power lines, particularly those in water, or objects that are in contact with down power lines.

## Mosquitoes

The large amount of pooled water that remains after a flood provides an ideal breeding ground for mosquitoes. While the majority of these mosquitoes will be merely pests, some can carry communicable diseases.



To protect yourself from mosquitoes you should:

- Be sure door and window screens are tight fitting and in good repair.
- Wear long-sleeved and long-legged clothing.
- Check to see that your mosquito repellent contains DEET, a chemical commonly found in these products. When outdoors, apply repellent sparingly to exposed skin or clothing, as indicated on the product's label.
- Drain standing water in old tires, tin cans, birdbaths, yard ornaments or other places where mosquitoes might breed.

## **OTHER HAZARDS**

### Swift Flowing Water

Do not enter swiftly flowing water, regardless of your ability to swim. You risk drowning even in swiftly moving shallow water. Do not rely on cars or other vehicles to protect you from floodwaters. People are more likely to drown inside a vehicle.

Even **shallow standing water** holds hazards. Small children can drown in standing water. You should avoid wading in standing water because it may hide glass or metal fragments.

### Animals

Many wild animals are forced from their natural habitats by flooding. Take care to avoid these animals because they may carry rabies. Many domestic animals also are without homes after a flood. Remember, both wild and domestic animals are disoriented when displaced. Do not corner any animal control authorities.

Rats may be a problem during and after a flood. Secure all food supplies and have any animal carcasses in the vicinity removed by local animal control authorities or private rendering companies.

If you are bitten by any animal, seek immediate medical attention. If bitten by a snake, first try to accurately identify the type of snake. If it is poisonous, seek medical care immediately so that the correct anti-venom may be administered.

## **Chemical Hazards**

When returning to your area, be aware of potential chemical hazards you may encounter during flood recovery. Floodwater may have buried or moved hazardous chemical container. These containers may harbor solvents or other industrial chemicals.

Propane tanks or drums, including those from gas grills, should not be moved. Contact your police or fire department for assistance. Car batteries, when submerged in water, may still contain an electrical charge. They should be moved with extreme caution using insulated gloves.