

"Emergency Water Solutions: Ensuring Clean Drinking Water in Crisis Situations"

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August 2024

1. How much water should I store?

- FEMA guidelines is to store 1 gallon of water per person per day as a minimum
- It really depends on:
 - What is the duration of the emergency I want to prepare for
 - How many people (including pets) do I need to provide for
 - What are the physical limitations on storage space
 - What activities will people depending on my stored water be performing
 - What are the temperature ranges I need to consider
 - What are other needs for clean water besides just hydration

2. What happens if I run out of my stored water in an emergency?

Four choices

1. Wait for someone to rescue you
2. Locate and use the closest available surface water source and take your chances
3. Have an emergency plan in place to treat available surface water to make it safe for human consumption.
4. Die

3. What makes water unsuitable/unsafe for human consumption?

Water is sometimes referred to as the universal solvent, due to its ability to dissolve many substances, and its critical role in biological and chemical processes. Because of this water can easily become contaminated with substances that are detrimental to human health.

While not all contaminants are harmful, they can be placed in three general categories:

1. Particulate—silt, sand, clay, organic particles (fecal matter), algae or any substance in water that reduces the transmission of light through a sample.
Particulate contamination in water is characterized by its degree of cloudiness and can affect the taste, can harbor pathogens and chemical contaminants and reduce the effectiveness of subsequent disinfection and filtration.
2. Microbiologic—bacteria, protozoa, helminths, viruses, spores
Water naturally contains many living things. Most are harmless or even beneficial, but others can cause illness. Living things that cause disease are also known as pathogens. This contamination (depending on the organism) in water can cause a range of health issues, some of which can be both immediate and severe enough to be life threatening.
3. Chemical—heavy metals, inorganic compounds, herbicides, pesticides, pharmaceuticals, volatile organic compounds (benzene, methylene chloride, carbon tetrachloride), fertilizer, toxins and endotoxins.
Chemical contaminants can have a wide range of health effects depending on the chemical, its concentration and the total amount ingested. Harmful chemicals in water are usually in low concentration and unlike microbiological contamination, most chemicals in drinking water pose a health concern only after years of exposure.

4. What happens if I drink water that is contaminated?

Consuming surface water that has not been treated can have a) no effect, b) cause physical illness within a short time (hours or days), or c) physical impairment after repeated exposure after a long time (years).

A person's reaction to impure water depends on the following conditions:

1. Contaminant type
 - a. Biologic (Pathogenic or harmless)
 - b. Chemical (toxicity and solubility)
2. Contaminant concentration
 - a. Distance from source
 - b. Dilution factor
 - c. Relative infective dose
3. Age and relative health of the person
 - a. Infants, children or elderly
 - b. Immunocompromised

Although there are several contaminants in water that may be harmful to humans, **the first priority is to ensure that drinking water is free of pathogens.** The greatest risk to public health from microorganisms in water is associated with drinking water that is contaminated with human and animal feces.

5. How can I test to make sure surface water is safe for human consumption?

Microbiological: There is no simple, inexpensive testing protocol or apparatus to determine if surface water is free of microbiologic contaminants.

Microbial testing relies on:

1. Absence of indicator microbes
2. Requires samples to be sent to a lab or field tested in a portable lab

All surface water sources (streams, ponds, rivers, lakes, collected rainwater, etc. should be assumed to be microbiologically contaminated with pathogens.

Chemical: There are kits available that use test strips for some chemical contaminants including chlorine, nitrates, pH and dissolved solids.

6. Are there physical indicators that help to select the best surface water source to use?

When identifying a surface water source suitable for treating for drinking water, look for the following physical indicators:

1. Clear Water
2. Flowing Water
3. Natural Filtration
4. Absence of Contaminants
5. Stable Ecosystem
6. Proximity to Pollution Sources

7. What are 5 methods to make surface water sources safer for human consumption?

1. Boiling
 - a. Boil water for at least 1 minute (3 minutes at higher altitudes above 6,500 feet) to kill bacteria, viruses, and parasites.
2. Filtration
 - a. Portable Filters: Use portable water filters designed to remove bacteria, protozoa, and some viruses, chemicals, heavy metals and particulate.
3. Chemical Disinfection
 - a. Chlorine: A proven, inexpensive and effective method to disinfect water suspected of having pathogens including bacteria, viruses and some parasites and helminths. Chlorine also has a residual effect meaning it continues to disinfect for a period after the initial treatment.
4. Ultraviolet (UV) Light
 - a. Use portable UV light devices to disinfect water by exposing it to UV light for a specified period.
5. Distillation
 - a. Boil water and collect the steam in a clean container. The steam condenses back into liquid water, leaving most contaminants behind.

Combining Methods

For greater effectiveness, especially in heavily contaminated water, combine multiple methods (e.g., filter then boil, or filter then chemically disinfect) to ensure the water is safe to drink.

Always consider the source and quality of the water and choose the most appropriate method or combination of methods to ensure safe drinking water in an emergency.

8. What are the good, better, or best surface water sources for emergency water?

When considering surface water sources for emergency drinking water, it's essential to prioritize based on the likelihood of contamination and ease of treatment. Here's a breakdown of good, better, and best sources:

Good Sources

These sources are acceptable but may require more extensive treatment:

1. Lakes and Ponds
2. Rainwater Collection
3. Man-Made Reservoirs

Better Sources

These sources are generally safer but still need treatment:

1. Streams and Rivers (Downstream)
2. Mountain Streams
3. Springs

Best Sources

These sources are usually the safest and require the least amount of treatment:

1. Headwaters of Streams and Rivers
2. High-Elevation Mountain Streams
3. Natural Springs (Protected)

9. What equipment/supplies should I have to ensure I have adequate emergency water for personal and household use.

1. Equipment and supplies to treat your preferred and available water source to make it safe for human consumption.
2. Containers to transport potentially contaminated surface water to your treatment and domicile location.
3. Clean and secure containers to store water that has been treated for future consumption.
4. Spare parts and supplies for your treatment processes.
5. Optional—test strips, meters to determine water quality.