Presentation sponsored by the Third Walnut Creek Mutual (TWCM)
Emergency Preparedness Committee

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FEMA Tips for Managing Water

The following web page explains the essentials of managing water:
https://www.ready.gov/water

FEMA = Federal Emergency Management Agency

Basic Water Tips

- **Allow people to drink according to their needs.** Many people need even more than the average of one gallon per day. The individual amount needed depends on age, physical activity, physical condition and time of year.
- **Never ration drinking water unless ordered to do so by authorities.** Drink the amount you need today and try to find more for tomorrow. Under no circumstances should a person drink less than one quart (four cups) of water each day. You can minimize the amount of water your body needs by reducing activity and staying cool.
- **Drink water that you know is not contaminated first.** If necessary, suspicious water, such as cloudy water from regular faucets or water from streams or ponds, can be used after it has been treated. If water treatment is not possible, put off drinking suspicious water as long as possible, but do not become dehydrated.
- **Do not drink carbonated beverages instead of drinking water.** Carbonated beverages do not meet drinking-water requirements. Caffeinated drinks and alcohol dehydrate the body, which increases the need for drinking water.
- **Turn off the main water valves.** You will need to protect the water sources already in your home from contamination if you hear reports of broken water or sewage lines or if local officials advise you of a problem. To close the incoming water source, locate the incoming valve and turn it to the closed position. Be sure you and your family members know how to perform this important procedure.

Water Storage

- **Buy commercially bottled water** and store it in the sealed original container in cool, dark place.
- **If you must prepare your own containers of water**
  - Purchase food grade water storage containers.
  - Before filling with chlorinated water:
    - **Thoroughly clean the containers** with dishwashing soap.
    - **Sanitize the bottles** by cleaning with a solution of 1 teaspoon of non-scented liquid household chlorine bleach to a quart of water.
- **Water that has not been commercially bottled should be replaced every six months.**

Water Sources: Safe Sources

- **Melted ice cubes.**
- **Liquids from canned goods -** such as fruit or vegetables.
- **Water drained from pipes.** To use the water in your pipes, let air into the plumbing by turning on the faucet in your home at the highest level. A small amount of water will trickle out. Then obtain water from the lowest faucet in the home.
- **Water drained from the water heater.** To use water in your hot-water tank, be sure the electricity or gas is off and open the drain at the bottom of the tank. Start the water flowing by turning off the water intake valve at the tank and turning on the hot-water faucet. After you are notified that clean water has been restored, you will need to refill the tank before turning the gas or electricity back on. If the gas is turned off, a professional will be needed to turn it back on.

Water Sources: Unsafe Sources

- **Radiators** (in a home heating systems).
- **Water from the toilet bowl or flush tank.**
- **Water beds**. Fungicides added to the water or chemicals in the vinyl may make water unsafe to use.
- **Swimming pools and spas**. Chemicals used to kill germs are too concentrated for safe drinking but can be used for personal hygiene, cleaning and related uses.

Cautions about Using Contaminated Water

- **Treat all water of uncertain quality before using it for**
  - drinking,
  - food washing or preparation,
  - washing dishes,
  - brushing teeth or
  - making ice.
- In addition to having a bad odor and taste, **contaminated water can contain microorganisms (germs**) that cause diseases such as
  - dysentery,
  - cholera,
  - typhoid and
  - hepatitis.

Water Treatment Methods

Methods	Kills Microbes	Removes other contaminants (heavy metals, salts, and most other chemicals)
Boiling	Yes	No
Chlorination	Yes	No
Distillation	Yes	Yes

Water Treatment: Boiling

- **Boiling is the safest method of treating water**.
  - In a large pot or kettle, bring water to a rolling boil for one full minute
  - Keep in mind that some water will evaporate.
  - Let the water cool before drinking.
- **Boiled water will taste better if you put oxygen back into it**
  - Pour the water back and forth between two clean containers.
  - This also will improve the taste of stored water.

Water Treatment: Chlorination

- **Use only regular household liquid bleach** that contains 5.25 to 6.0 percent sodium hypochlorite.
- **Do not use scented bleaches, color safe bleaches or bleaches with added cleaners**.
- Because the potency of bleach diminishes with time, **use bleach from a newly opened or unopened bottle.**
- **Add 16 drops (1 teaspoon = 76 drops) of bleach per gallon of water,** stir and let stand for 30 minutes.
  - The water should have a slight bleach odor. If it doesn't, then repeat the dosage and let stand another 15 minutes.
  - If it still does not smell of chlorine, discard it and find another source of water.
- **Other chemicals**, such as iodine or water treatment products sold in camping or surplus stores **that do not contain 5.25 or 6.0 percent sodium hypochlorite as the only active ingredient,** are not recommended and should not be used.

Water Treatment: Distillation

Distillation will kill microbes that resist boiling or chlorination, and distillation also removes heavy metals, salts and most other chemicals.

Distillation involves boiling water and then collection of only the vapor that condenses. The condensed vapor will not include salt or most other impurities.

- **To distill, fill a pot halfway with water**.
- **Tie a cup to the handle on the pot's lid so that the cup will hang right-side-up when the lid is upside-down** (make sure the cup is not dangling into the water).
- **Boil the water for 20 minutes**.
- **The water that drips from the lid into the cup is distilled**.

Where is the connection on your water heater that lets you get safe drinking water out of it in an emergency?

PG&E recently sent out new safety stickers to attach to your water heaters that show emergency numbers to call, and also show where the various lines and connections are located. A copy of one of these is shown below:

- On the left side of the sticker the letter F on the diagram is described as the "Tank flush" connection.
- Instruction number 3 to the right of the hot water tank image talks about attaching a water hose to drain the water, and has an arrow pointing to the connection with the letter F label.

If your water heater uses gas, and you smell gas, the diagram on the far right of the sticker also shows you where the gas shutoff valve is located by your gas meter, and tells you how much to turn the shutoff valve.

Steps for Getting Water from Your Water Heater

1. **Turn off the electricity or gas (#2 on the diagram) to the water heater.**
   - Turn off the circuit breaker for electric water heaters or close the gas valve for natural gas and propane types. If the power or gas is still on when the tank is empty, your tank will almost certainly sustain significant damage.
2. **Preserve the cleanliness of the water in the tank by closing the supply valve to the tank (#1 on the diagram).**
   - When water service is restored, the water department will be pumping water that could be contaminated. This will be fine to use for flushing toilets and for cooking, but not for drinking.
3. **Find the valve at the bottom of the tank for draining (#3 on the diagram).**
   - This is where your clean drinking water will come from. Many water heater valves have a connector for hooking up a garden hose to the drain valve.
4. **Turn on the hot water from any tap in the house. In order for water to be drained from the tank, you must allow air to get into it.**
   - This is easy to do by opening any hot water tap in the building such as the kitchen or bathroom sink.
5. **Remove any sediment that has collected at the bottom of the water heater.**
   - Water heaters are notorious for trapping sediments. The heavier-than-water sediment sinks and collects at the bottom of the tank because hot water is drawn from the top of the tank, rather than the bottom.

PACIFIC GAS & ELECTRIC 1 (800) PGE-5000

PILOT LIGHTING

PILOT LIGHTING

EMERGENCY SERVICE UPDATE

EMERGENCY SHUTDOWN INSTRUCTIONS

SAFETY INSPECTION CHECKLIST

- **A** Check for Leakage & corrosion.
- **B** Water heater must be earthquake braced.
- **C** Make sure there is a safety relief valve.
- **D** Gas connector line must be flexible type.
- **E** Water heater should be in safety pan as required.
- **F** Yearly tank flush is recommended.

A trained service technician should perform all maintenance and repairs.

TO AVOID DAMAGE WHEN LEAKAGE OCCURS:

1. **TURN OFF WATER SUPPLY** - Twist handle clockwise until it stops.
2. **TURN OFF GAS** - Twist top dial from "ON" to "OFF" position
   For electric water heaters, turn off Circuit Breaker.
3. **DRAIN WATER HEATER IF NECESSARY TO AVOID WATER DAMAGE.**
   Attach garden hose to drain valve & Open Relief Valve Handle
4. **CALL (925) 803-8003 FOR SAME DAY SERVICE.**

EARTHQUAKE GAS SHUTOFF

1 Gas meter and shut-off valve

IF YOU SMELL GAS:

1. **LOCATE GAS METER OUTSIDE OF HOME**
2. **TURN GAS VALVE ¼ TURN FROM ON TO OFF**

TANK FLUSH RECORD						
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CALL NOW ➡ FOR SERVICE

(925) 803-8003

24 HOURS 7 DAYS A WEEK

WATER HEATER SPECIALISTS

FIRE DEPARTMENT & MEDICAL (925) 933-1313

September 2020 Update:
Answers to Questions on the

2019 EPO Emergency Preparedness Fair
TWCM Presentation:
FEMA Tips for Managing Water

Raised at subsequent
Rossmoor EPO Meetings

Questions

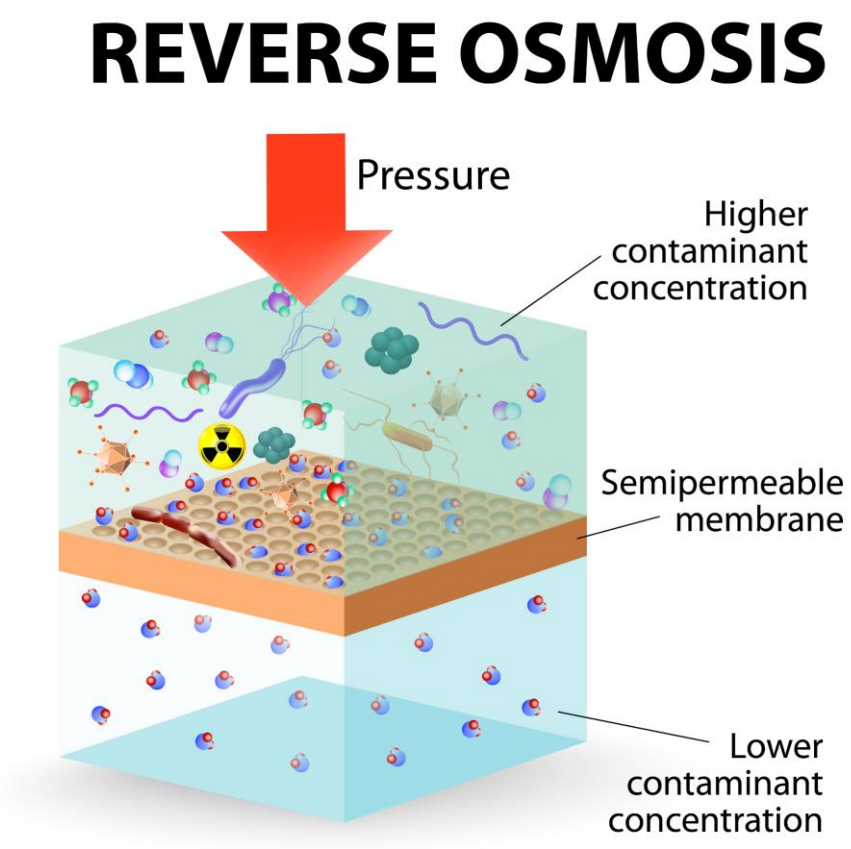
- How does reverse osmosis work? Can you use a reverse osmosis filter if the power is out or if there is no water pressure?
- Can we just use a counter-top water filter – like Brita or Pur?
- Can you use water filters designed for camping trips – like a LifeStraw, or Pump water filters?

Osmosis compared to Reverse Osmosis

If you have two containers of water, one with pure water, and one with salt or sugar dissolved in the water, and they are connected by a semi-permeable membrane (a thin film with holes only large enough to pass water molecules through, but not large ones like salt or sugar for example) then:

- Some pure water will pass through the membrane to the salty or sugary side of the membrane to try to dilute the solution of salt to make the concentrations more equal on both sides – THAT PROCESS IS CALLED OSMOSIS, and it occurs naturally
- To make the water pass from the salty or sugary solution into the pure water side – IS CALLED REVERSE OSMOSIS, and that process takes a lot of pressure to make it work

How does Reverse Osmosis (RO) Work?



- RO is a process in which dissolved inorganic solids (such as salts) are removed from a solution (such as water). **This is accomplished by household water pressure (40 to 60 psi) pushing the tap water through a semipermeable (RO) membrane.**
- Most systems actually have a series of filters:
  1. A sediment filter to remove dirt and dust
  2. A carbon filter to remove some chemicals, like chlorine to improve color and taste
  3. A RO membrane to remove most other contaminants, like lead and asbestos
  4. A polishing filter, also to remove bad tastes and color

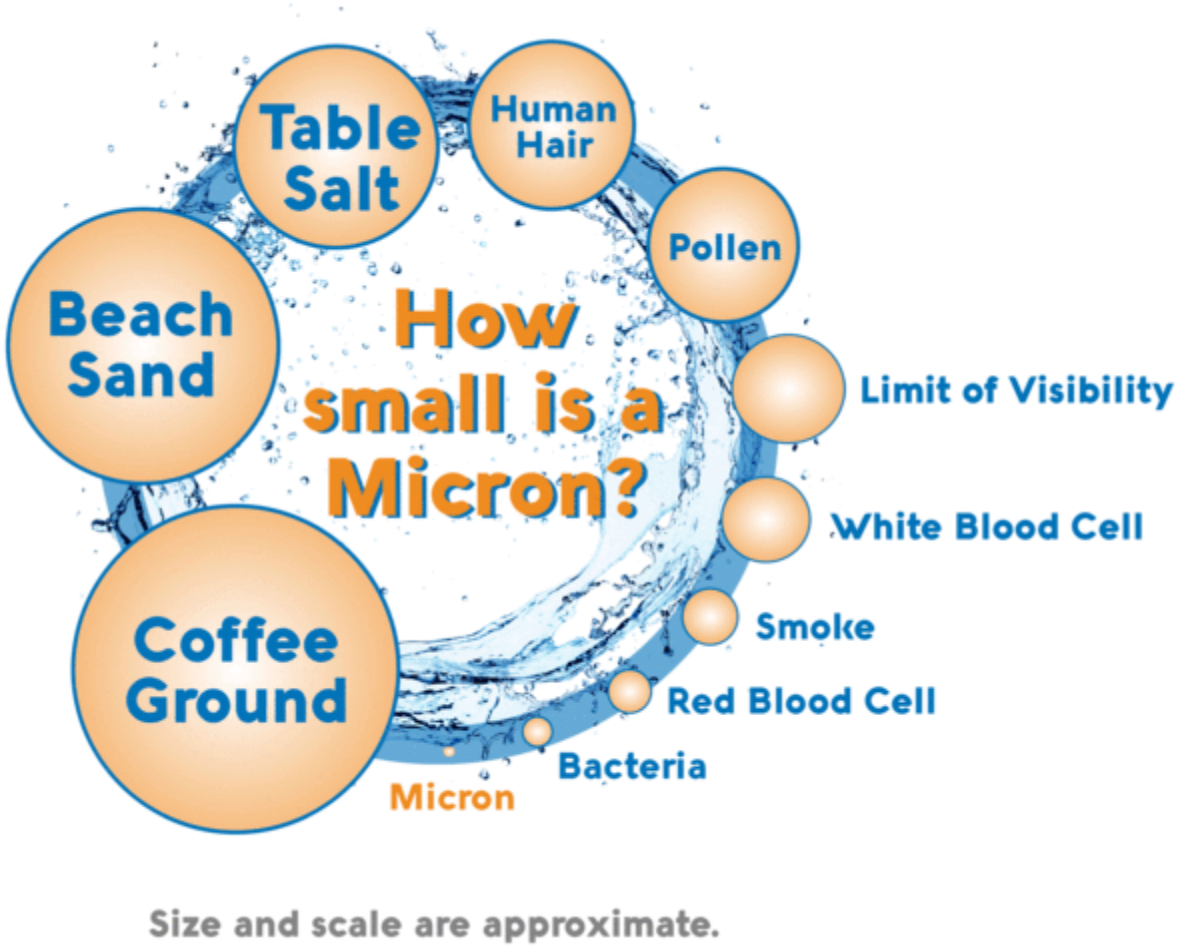
What is not removed by Reverse Osmosis?

- Some chemicals in pesticides and herbicides are smaller than water molecules, and they can pass through an RO membrane
- Most bacteria are large enough to be stopped by the membrane, but some virus particles may be small enough to get through (depending on the specific membrane pore size)

Will Reverse Osmosis work after a Major Disaster?

- Home systems that go under your sink, and provide a filtered water spout, use your normal household water pressure of 40 to 60 psi.
- Commercial water purification or desalination plants, that use RO, need around 400 psi to process large volumes of water.
- **After a major disaster, when the electricity and the water pressure are off, the home and commercial RO systems won't work.**

Size of Typical Water Contaminants In Microns*



*Note: Figure is from the FreshWaterSystems.com website.

Size of Typical Water Contaminants In Microns*

PARTICLE	SIZE (in microns)
one inch	25400
Bacteria	0.3 - 60
Mold	3 - 12
Mold Spores	10 - 30
Viruses	0.005 - 0.3

PARTICLE	SIZE (in microns)
Anthrax	1 - 5
Asbestos	0.7 - 90
Atmospheric Dust	0.001 - 40
Auto and Car Emission	1 - 150
Beach Sand	100 - 10000
Bromine	0.1 - 0.7
Burning Wood	0.2 - 3
Calcium Zinc Dust	0.7 - 20
Carbon Black Dust	0.2 - 10
Carbon Dioxide	0.00065
Cement Dust	3 - 100
Clay	0.1 - 50
Coal Dust	1 - 100

PARTICLE	SIZE (in microns)
Coal Flue Gas	0.08 - 0.2
Coffee	5 - 400
Dust Mites	100 - 300
Fertilizer	10 - 1000
Insecticide Dusts	0.5 - 10
Lead	0.1 - 0.7
Lead Dust	2
Mist	70 - 350
Oil Smoke	0.03 - 1
Oxygen	0.0005
Paint Pigments	0.1 - 5
Pesticides & Herbicides	0.001
Pollens	10 - 1000
Radioactive Fallout	0.1 - 10
Red Blood Cells	5 - 10
Rosin Smoke	0.01 - 1
Sea Salt	0.035 - 0.5
Spanish Moss Pollen	150 - 750
Tobacco Smoke	0.01 - 4

*Note: The Table is from the PortableWaterFilters.org website

Water purification using Counter-top Water Pitcher filters (such as Brita or Pur)

- Most all reputable suppliers of counter-top pitcher water filters comply with National Sanitation Foundation (NSF) standards.
- This means that they are effective in removing a specific list of harmful chemical and mineral contaminants.
- Typical filter life is around 40 gallons of water
- **However, typically none of these water filters are certified to remove biological contamination (bacteria and viruses).**
- If you get a “boil water advisory” for your area, you should boil your water for one minute (and let it cool) even if you run it through a top-rated filter system to improve the taste.

Water Filters Designed for Camping Trips

- Pump and ceramic filter with carbon core (Example: MSR MiniWorks EX Microfilter; around $90 at Amazon or REI).
  - Small pore filter: 0.2 microns – cartridge life around 525 gallons
  - Uses hand pump to provide pressure (85 stokes per liter)
  - Effective against: protozoa, bacteria, chemicals/toxins, and particulates
  - **Not effective against viruses**

- Membrane microfilter (Example: LifeStraw; around $35 to $60 at Amazon or REI).
  - Small pore size: 0.2 microns - cartridge life around 26 gallons
  - Effective against: bacteria, parasites, microplastics, dirt, sand and cloudiness
  - Activated carbon filter protects against chlorine, organic chemical matter, and removes odors
  - **Not effective against viruses**

References and Resources

- FEMA guidance for managing water (updated 5/12/20): https://www.ready.gov/water
- CDC guidance for healthy drinking water, including home water treatment, bottled water, and guidance for camping, hiking and travel: https://www.cdc.gov/healthywater/drinking/index.html
- Here's a link to a Wikipedia article that gives and in-depth explanation of Reverse Osmosis (RO): https://en.wikipedia.org/wiki/Reverse_osmosis
- For more information about microns and micron-rated water filters, you can check out a video from Fresh Water Systems (FreshWaterSystems.com) that explains filter ratings for pools and wells: https://youtu.be/5PS-L8HoOcI
- The table of water contaminant sizes in microns is from the Portable Water Filters website: https://www.portablewaterfilters.org/water-filter-guide/particle-contaminant-size-chart-microns/