Emergency Preparedness Workshop

Keeping Cool Without Electricity

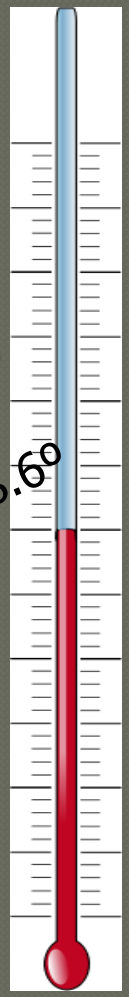
June 25th, 2009
Gilbert Arizona Higley Stake
Presented By: Jon Sherman

The Desert

- We live in the Desert!
- It's Dry and It's Hot! (No Surprise!)

The Desert

- With summer temperatures up to the 120's° F, the human body can quickly overheat if you don't take precautions.
- 98.6° F is the average temperature at which our bodies operate efficiently.
- When our bodies deviate from this temp. more than 5-7 degrees, our bodies will fail to operate properly and start to shut-down.



Staying Warm

- When temperatures are cold, we can insulate our bodies by wearing warm clothing and building a shelter.
- Additional clothing will keep the cold air out and prevent our body heat from escaping through the layers. This creates a pocket of warm air around our bodies.
- Ex. To keep warm underwater, divers wear insulating wet suits. The wet suit traps a thin layer of water between the insulating rubber of the suit and your body. Your body heat warms the water, which then keeps you warm.

Staying Warm

- Some types of shelters allow our own "Escaped" body heat to radiate back to us and keep us warm.
- When temperatures are hot. Removing clothing only goes so far.

Heat

- Just like Dark is the absence of Light… Cold is simply the absence of Heat.
- When it is cold, it is fairly easy to add heat, often by starting a fire.
- When it's hot, it is much harder to remove heat.

Air Conditioning

- Its easy to keep cool when the power is on and the A/C is running.

No Power in the Summer

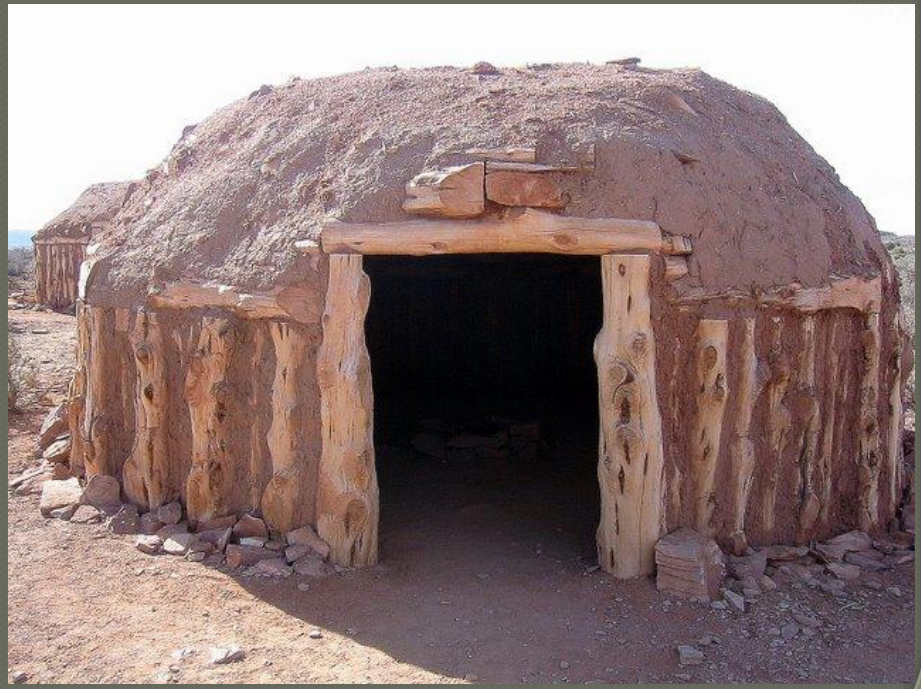
- But what if the power goes out during the heat of the summer?

No Power in the Summer

- We'll be fine!!! Right?
- The Native Americans and The early Pioneers Survived ok, right?

Local Native Americans

- Local tribes were mostly Snowbirds.
- They lived in the area in the Summer and moved to cooler climates in the Winter.



Hualapai Indian Hut

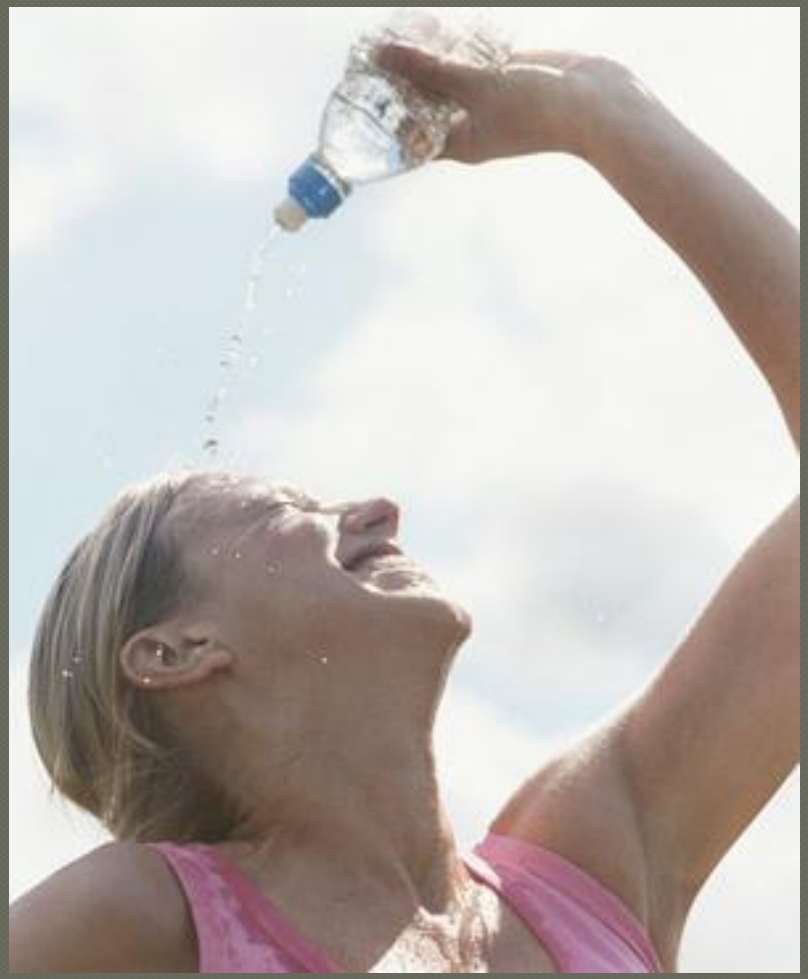
Early Pioneers

- Learned many techniques to keep cool.
- We'll discuss these later…
- Failure to keep cool can be dangerous.

Heat Related Illnesses

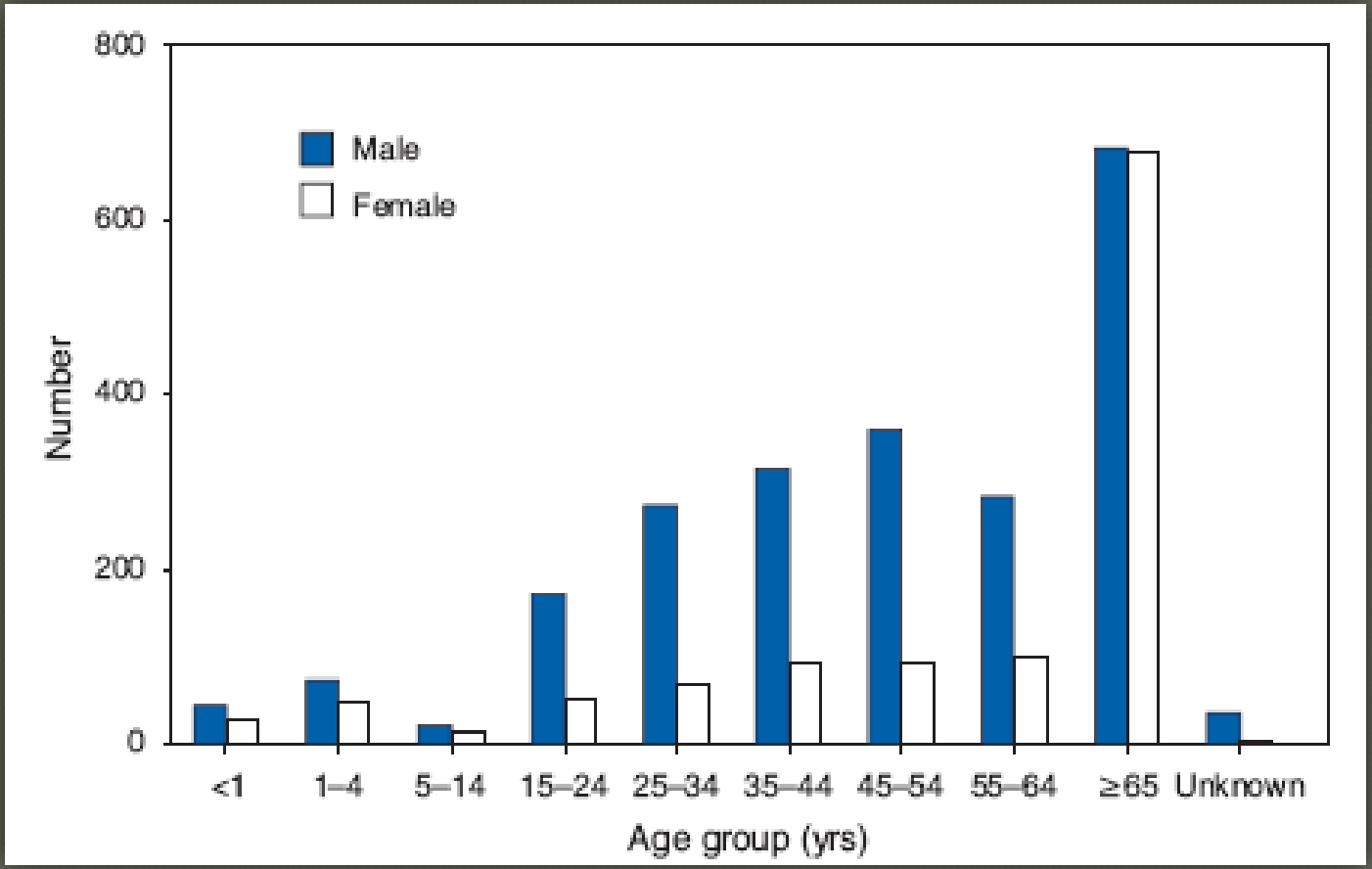
- Keeping cool when temperatures reach record highs isn't just about comfort. Dangerously high temperatures can result in heat-related illnesses ranging from:

- Dehydration
- Heat Exhaustion
- Heat Stroke
- Death



Heat Related Deaths

Number of U.S. Heat Related Deaths from 1999-2003
Total = 3,442



Source: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5529a2.htm#fig

Dehydration

- Dehydration occurs when you lose more fluid than you take in, and your body doesn't have enough water and other fluids to carry out its normal functions. If you don't replenish lost fluids, you may suffer serious consequences.

- Common causes of dehydration include intense diarrhea, vomiting, fever or excessive sweating. Inadequate intake of water during hot weather or exercise also may cause dehydration. Anyone may become dehydrated, but young children, older adults and people with chronic illnesses are most at risk.

- You can usually reverse mild to moderate dehydration by increasing your intake of fluids, but severe dehydration needs immediate medical treatment. The safest approach is prevention of dehydration. Monitor your fluid loss during hot weather, illness or exercise, and drink enough liquids to replace what you lose.

Dehydration

- Signs of Dehydration

- Mild
  - Thirst
  - Dry lips
  - Slightly dry mouth membranes
- Moderate
  - Very dry mouth membranes
  - Sunken eyes
  - Sunken fontanel (soft spot) on infant's head.
  - Skin doesn't bounce back quickly when lightly pinched and released.
- Severe
  - All signs of moderate dehydration
  - Rapid, weak pulse (more than 100 at rest).
  - Cold hands and feet
  - Rapid breathing
  - Blue lips
  - Confusion, lethargy, difficult to arouse

Dehydration

- Treatment:
- Stop your activity and rest, Prop up feet, Remove clothing
- Get out of direct sunlight and lie down in a cool spot, Shade or A/C.
- Drink water, juice, or sports drink to replace fluids & minerals. Drink 2qt of liquids over the next 2-4 hours. You should drink 10 glasses of liquid a day to replace lost fluids. You can make an inexpensive rehydration drink at home. But do not give this homemade drink to children younger than 12. Measure all ingredients precisely. Small variations can make the drink less effective or even harmful. Mix the following:
  - 1 quart (950 ml) water
  - ½ teaspoon (2.5 g) baking soda
  - ½ teaspoon (2.5 g) table salt, or ¼ teaspoon (1.25 g) salt substitute (such as "Lite Salt," which is potassium-based)
  - 3 to 4 tablespoons (45 to 60 g) sugar
  - Rest for 24 hours, and continue to drink a lot of fluids. Although you will probably start feeling better within just a few hours, it may take as long as a day and a half to completely replace the fluid that you lost.

Heat Exhaustion

- Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. Those most prone to heat exhaustion are elderly people, people with high blood pressure, and people working or exercising in a hot environment.

Heat Exhaustion

- Symptoms:
  - heavy sweating
  - Paleness
  - muscle cramps
  - Tiredness
  - Weakness
  - Dizziness
  - Headache
  - nausea or vomiting
  - Fainting
  - The skin may be cool and moist. The victim's pulse rate will be fast and weak, and breathing will be fast and shallow. If heat exhaustion is untreated, it may progress to heat stroke, which is a medical emergency. Seek medical attention and call 911 immediately if:
  - Symptoms are severe, or
  - The victim has heart problems or high blood pressure.
  - Otherwise, help the victim to cool off, and seek medical attention if symptoms worsen or last longer than 1 hour.

Heat Exhaustion

- Treatment
  - Cool, non-alcoholic beverages, as directed by your physician
  - Rest
  - Cool shower, bath, or sponge bath
  - An air-conditioned environment
  - Lightweight clothing

Heat Stroke

- Heatstroke is the most severe of the heat-related problems, often resulting from exercise or heavy work in hot environments combined with inadequate fluid intake.
- Young children, older adults, people who are obese and people born with an impaired ability to sweat are at high risk of heatstroke. Other risk factors include dehydration, alcohol use, cardiovascular disease and certain medications.
- What makes heatstroke severe and potentially life-threatening is that the body's normal mechanisms for dealing with heat stress, such as sweating and temperature control, are lost.

Heat Stroke

- Symptoms:
  - Elevated body temperature, generally greater than 104 F (40 C).
  - Skin may be hot and dry, although if heatstroke is caused by exertion, the skin may be moist.
  - Rapid heartbeat
  - Rapid and shallow breathing
  - Elevated or lowered blood pressure
  - Cessation of sweating
  - Irritability, confusion or unconsciousness
  - Feeling dizzy or lightheaded
  - Headache
  - Nausea
  - Fainting, which may be the first sign in older adults

Heat Stroke

- Treatment:
  - Move the person out of the sun and into a shady or air-conditioned space.
  - Dial 911 or call for emergency medical assistance.
  - Cool the person by covering him or her with damp sheets or by spraying with cool water. Direct air onto the person with a fan or newspaper.
  - Have the person drink cool water, if he or she is able.

Watch Others

- Pay special attention to the elderly, infants, and anyone with a chronic illness, as they may dehydrate easily and be more susceptible to heat-related illnesses.
- Don't forget that pets also need protection from dehydration and heat-related illnesses too.

3 Steps to Keeping Your Home Cool

- Keep heat from building up inside the home.
- Let warm air out of the house during cooler evening hours and bring cool air in.
- Find ways to reduce the generation of internal heat.

Landscaping

- Planting shade trees strategically on the south and west sides of you home can save as much as $300 a year to cool your home, reduces the temperature inside your home by 3 to 6 degrees F. Allows Winter sun to warm North side of house.
- Deciduous trees, those that lose their leaves in winter, will let sunlight through in winter when it's desired and create shade in summer.

Landscaping

- Try not to landscape the west or south side of a home using lots of hard, reflective materials such as rock, concrete or asphalt; these will only radiate heat onto the house long after the sun goes down! Plants around the exterior of the home will block heat reflection.

Windows and Patios

- Use sun shades on your windows
- Use heat-reflecting film or tinting.
- In the morning, before it heats up, close windows and blinds or shades to help keep indoor temperatures cooler.
- Light colors reflect better than dark wood or darker painted finishes on blinds and shades.
- Choose wide slats when buying blinds which block-out more light
- Consider blackout material for window shades on windows that get the most exposure to the sun.

Windows and Patios

- In a pinch, cover windows with aluminum foil to create a heat barrier.

Windows & Patios

- Window awnings can help significantly cool south and west facing windows. Retractable patio awnings are also a great way to keep outdoor living areas cooler!
- Creating a shady area outside where there is air flow maybe the coolest place. Patio Covers can also shade patio doors that are a challenge to insulate.

Insulation

- Appropriate insulation will help keep your house warm in the winter and cool in the summer.
- At least 12” of attic insulation is best..
- Consider a foil radiant barrier in your attic
- Add solar attic fans to expel hot air
- Seal the cracks. weatherizing your home greatly reduces the amount of cool air that escapes

Air Circulation

- 12 volt Fans (Solar Power) Use fans if you have them.
- In the evening, open windows and use fans to create a cross-breeze, circulating cooler evening/night air through the rooms.
- As soon as the sun hits the building the next morning, close all windows, blinds, and curtains, and keep doors and windows closed throughout the day until it is cooler outside than it is inside.
- Then you can open everything up again and cool off to be prepared for the next day.
- Leaving , closets, rooms and kitchen cabinets open all night helps too. If you leave them closed, they store the heat and your house won't cool off as much.

Cooking

- If you do have intermittent electricity, avoid using your stove or other heat generating lights or appliances, this will increase the internal temperature in your home.
- Cook during the cooler hours of the day.
- Cook outdoors to prevent heating your home
- Eat smaller, more frequent meals

More Home Heat Reducing Tips

- Go downstairs. Warm air rises because it is less dense than cold air. Position a fan in an upstairs window to draw off heat collected in upper rooms--set it up so that it sucks air from indoors and pushes it outdoors.

- If the garage is below a living space, leave your car outside to cool down before you park it in the garage.

Ways to Keep You Cool

Move North

Adaptation

- With time, your body can adapt to warmer temperatures.
- Don't forget that the human race lived for many, many years without air conditioning. Within the limits of your particular health situation, your body can adapt to the summer increase in temperature. Just become accustomed to the fact that you may have to alter your activities and schedule to 'beat the heat'.

Time of Day

- Work in the early mornings and evenings, rest during the heat of the day
- Decrease your level of exertion when it is hot
- 40 Million Spaniards can't be wrong. Siesta during the heat of the day, stay up later into the evening

Air Conditioning

- If there are public buildings in the area that do have power and A/C, plan on spending some time there each day to cool down.

Shade

- Stay Out of Direct Sunlight - stay indoors or outside in a nice, shaded area during the hottest part of the day.
- If a breeze is blowing, outside in the shade can be cooler than inside.

Air Flow

- A breeze will help evaporate the water/sweat on your skin increasing the cooling effect.
- 12 volt fans can help.

No alcohol or Caffeine

- Avoid caffeine and alcohol as these will promote dehydration.
- Caffeine and Alcohol act as diuretics, which make you urinate more often than usual. This promotes further dehydration through water loss.

Clothing

- Wear Light-Colored loose fitting clothing. Light colored clothing reflect heat and sunlight and help maintain normal body temperature.
- Darker colors will absorb the sun's rays and be warmer.
- Cotton clothing will keep you cooler than many synthetics.
- Wear a wide brimmed hat

Clothing

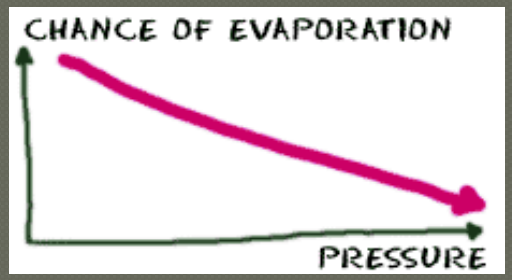
- Desert cultures have learned cover up skin to keep cool.
- Traditional cultures wear clothing covering from head to toe. By protecting your skin from the sun, you'll shade your skin and reduce your loss of water through perspiration.

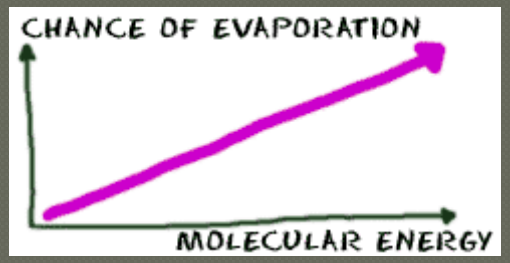
Evaporation

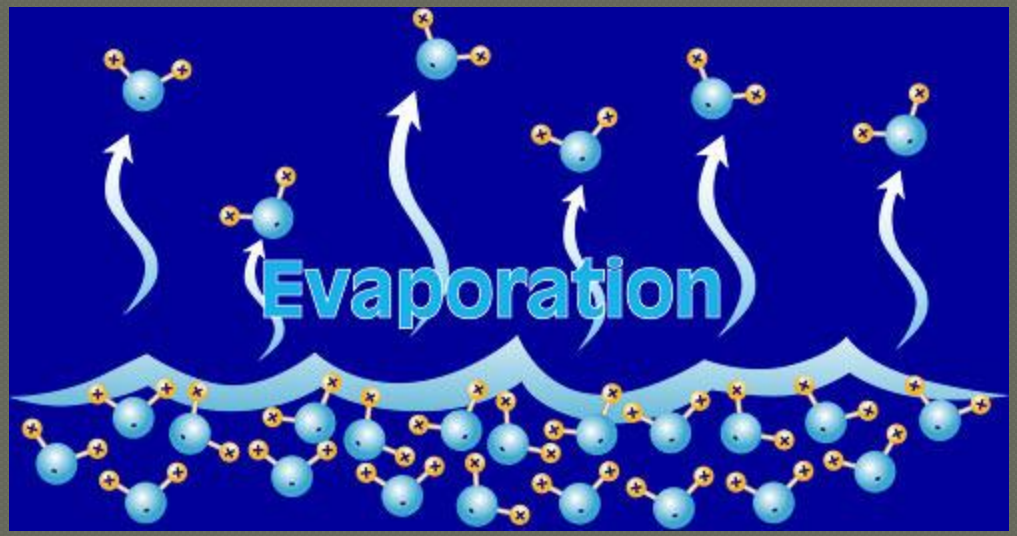
- If you take the temperature of a glass of water, you will get the average temperature of the water molecules.
- Some molecules have high kinetic energy (moving fast, high temperature) other molecules have low kinetic energy (moving slow, low temperature).
- The average of all of the temperatures of the molecules is what will read on the thermometer.

Evaporation

- Evaporation occurs only at the surface.
- Some molecules have enough kinetic energy to break away from the surface tension of the liquid.
- As the hotter/faster molecules escape, the slower/colder molecules are left behind, the average temperature of the remaining liquid becomes cooler.







Evaporation

- As our body temperature rises, the body tries to protect itself from overheating. By perspiring, the faster molecules in the sweat evaporate leaving the remaining sweat at a lower temperature, thus cooling your skin.

Just Add Water

Just Add Water

- Fill a spray bottle with water
- Personal Pump Misters

Just Add Water

- Take frequent baths, showers, dip in the pool or wipe down with wet rag.
- A bandana, hat, shirt soaked in water cools quickly.

Just Add Water

- Soak and ring out bed sheets before you go to sleep, they will keep you cool throughout the night.
- A bed sheet hung at doorways or windows where there is a breeze will help cool a room
- (Linen sheets are coolest, flannel hottest)

Just Add Water

- Drink lots of Water, don't ration it.
- Israeli Soldiers in the 6 day war in 1967
  - Beat the Egyptians in desert warfare because as they marched, they consumed 1 liter of water every hour, and were battle ready when they arrived, the Egyptians were dehydrated.
  - On days when the temperature is hotter than the average person's skin temperature, the only way for the body to cool itself is by the evaporation of sweat, A brisk walk could easily require ¾ of a quart or more of evaporative cooling each hour. Over an 8-hour period, that's a lot of sweat.

http://www.newscientist.com/article/mg20227061.500-the-man-who-revealed-the-secrets-of-sweat.html?full=true

More Heat Reducing Tips

- Eat spicy food. It's not a coincidence that many people in hotter regions of the world eat spicy food. Spicy food increases perspiration which cools the body as it evaporates.

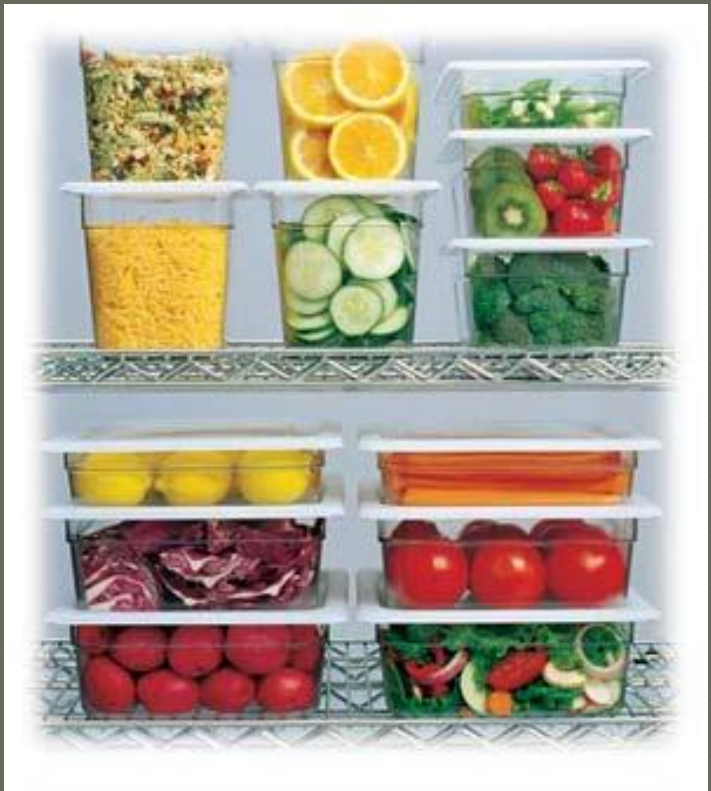
- Rubbing Alcohol – Applying rubbing alcohol to your skin and allowing it to evaporate will make you feel up to 30 degrees cooler.

12 Volt DC (Portable) Swamp Cooler

- 12 Volt DC
- .8 Amps – 1.7 Amps
- 11.3 Watts – 21.4 Watts
- $297.00

www.swampy.net

Keeping Food and Drinks Cool



Refrigerated Medecines

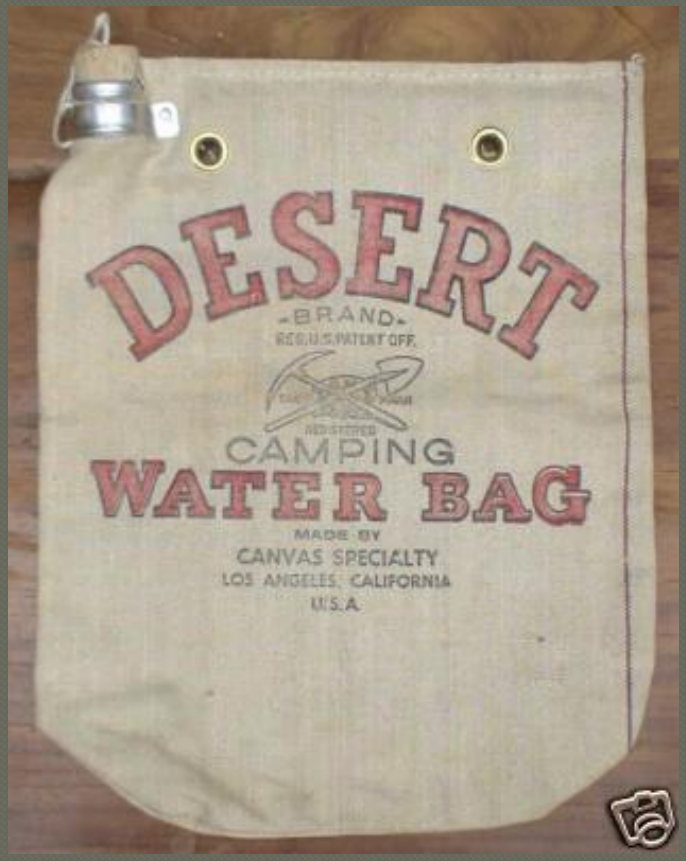
- Some Medicines need to be refrigerated.
- If you take medicine that you rely on for your survival, that must be refrigerated, Make it a priority to satisfy this need.
- Ex. Insulin needs to be refrigerated Diabetes)

Keeping Food and Drinks Cool

- Leather Bota Water Bag
- Blanket Canteen

Canvas Water Bags

- Water seeps through the material, evaporates and cools the water inside.



Earthen Drinking Water Pots

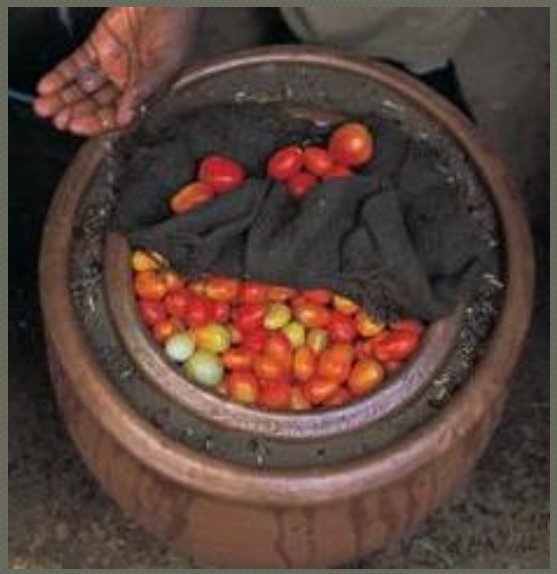
- Water seeps through the pores in the clay, evaporates and cools the water inside.

Zeer Pot (Pot-In-Pot) Fridge

- 2 unglazed terracotta pots, 1 larger than the other.
- No or blocked drainage holes in either pot.
- A layer of sand is placed in the bottom of the large pot and the smaller pot placed inside.
- Sand is poured in the gap between the two pots (which ideally should be about an inch wide) to just below the rim.
- It's also best that the smaller pot is level with the larger pot. A little lower is fine, but it definitely shouldn't be higher.
  Water is then poured on the sand until it begins pooling on the surface.
- The pot is then placed in a shaded area with good ventilation.
  As the water evaporates, it draws heat out through the walls of the smaller pot keeping the contents much cooler than the surrounding air.

Zeer Pot (Pot-In-Pot) Fridge

- Wet fabric such as a Hand towel is placed over the smaller pot to assist further with cooling.
- The Zeer pot works best in areas with low humidity levels.
- There's no moving parts and no components to break down!
- Used in Africa, people can keep vegetables for 3 weeks.



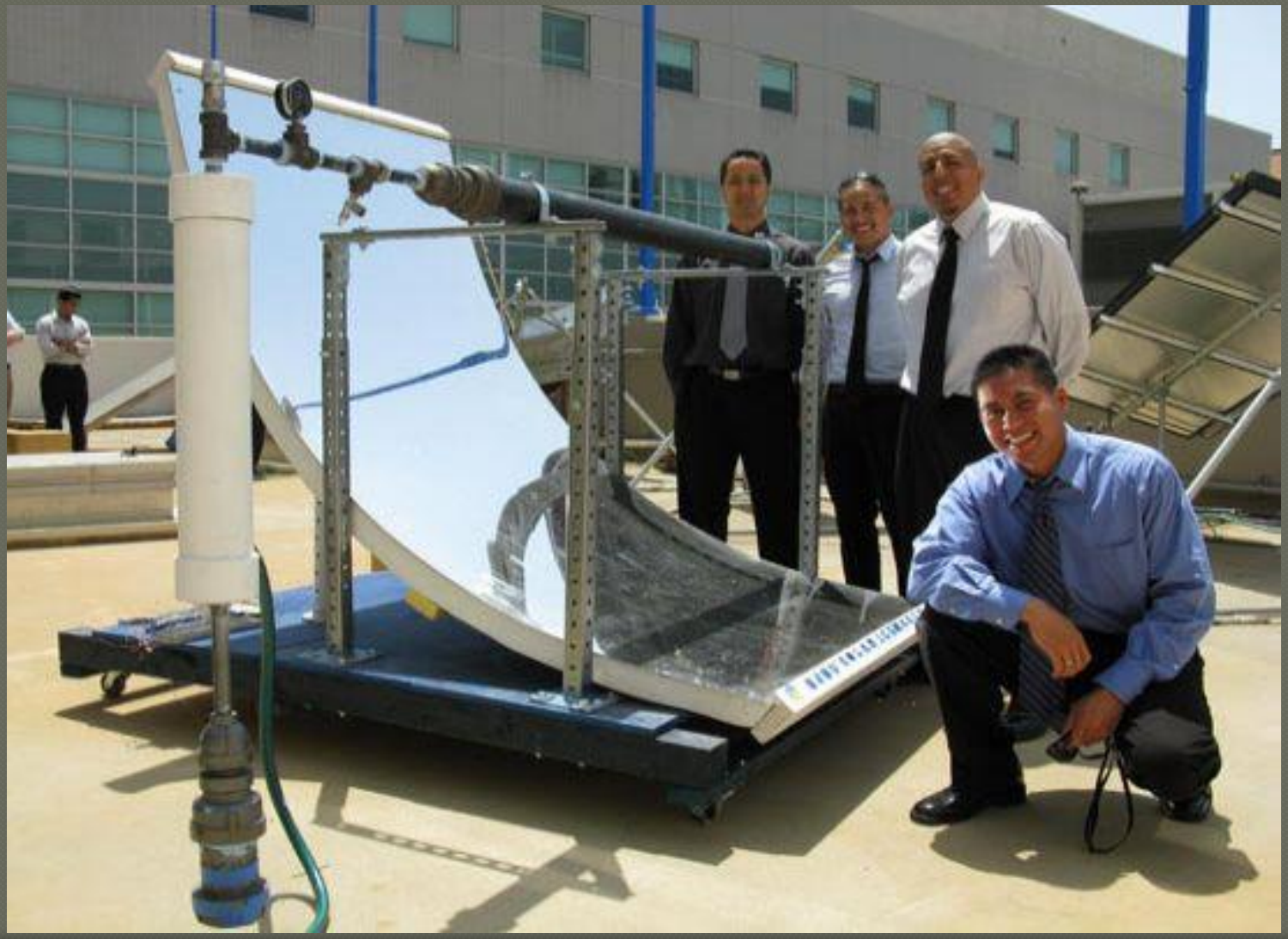
12 Volt Coolers

- Can reduce temperatures by 30-40 Degrees Fahrenheit

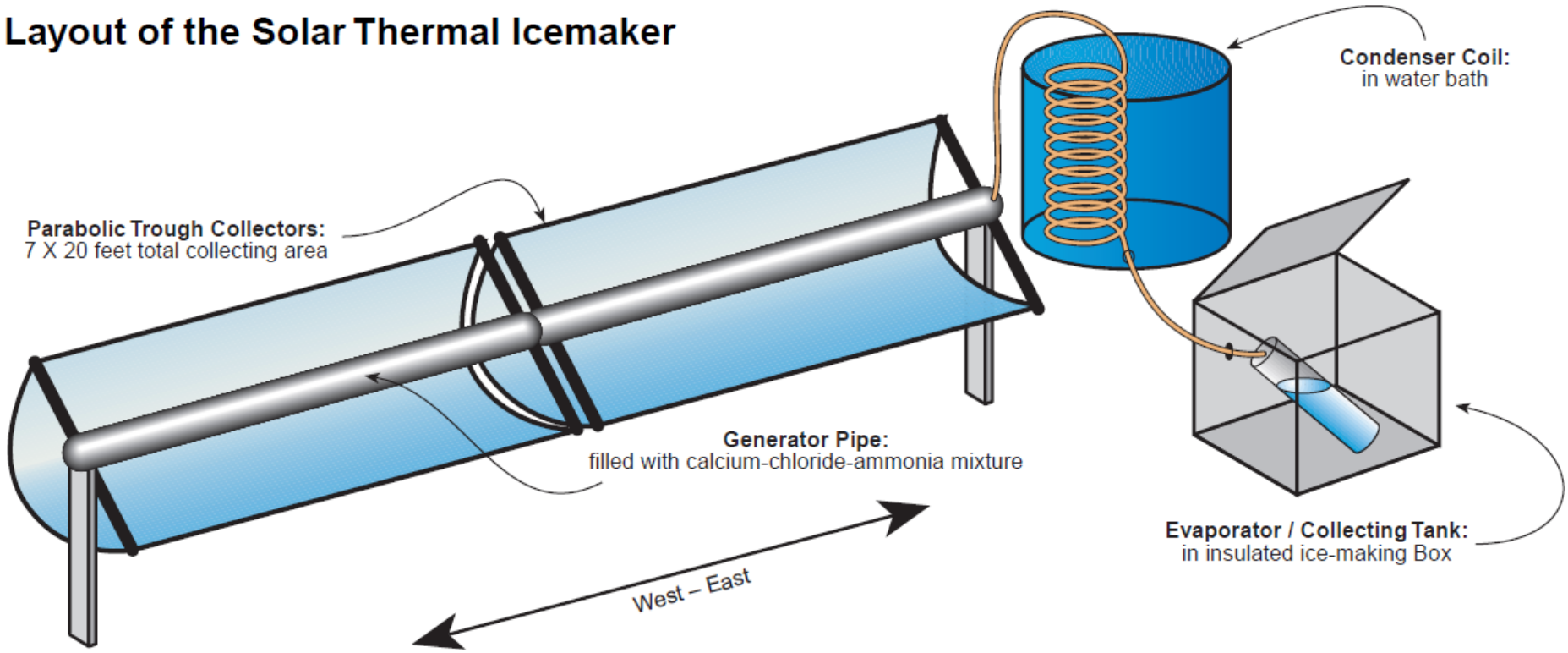

Ice Making

Solar Ice Maker

Solar Ice Maker



Solar Ice Maker



Crosley's IcyBall

- The Icyball is an intermittent heat absorption type of refrigerator. A water/ammonia mixture is used as the refrigerant .Water and ammonia combine easily. So, they combine in the hot ball at room temperature.

- When the hot ball is heated, for about 90 minutes, the ammonia evaporates first because it has a lower boiling point than water. The other cylinder is in water to help condense the ammonia in the cold ball. When the balls are fully charged, the cold ball is placed in the insulated box, as the ammonia evaporates to recombine with the water in the hot ball it removes heat, cooling the inside of the refrigerator for 24+ hours. A hole in the cold ball was for a special ice cube tray. (1920's)

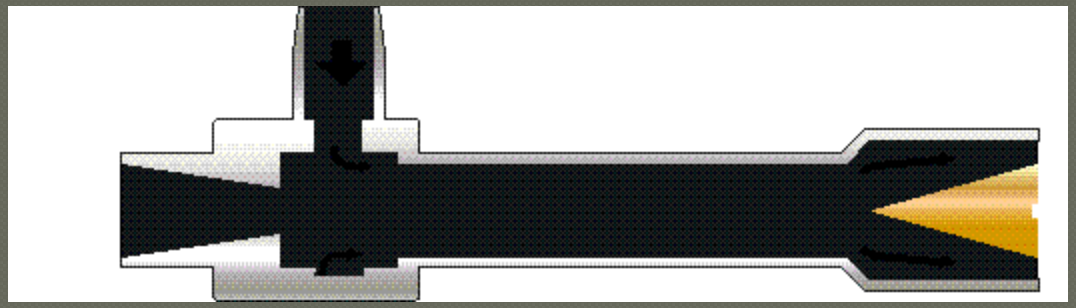
Crosley's IcyBall

Crosley's IcyBall

Votex Tube

- Vortex tubes are a type of heat pump. They have one inlet and two outlets. Compressed air (or gas) is put into inlet under pressure, where it is spun at high speed due to the design of the chamber. The high rate of spin which is often over a million rpm, causes the air to split into two streams, with one stream giving kinetic energy to the other. The result is two outlets, one with hot air and the other with cold.

  Vortex tubes have no moving parts, are almost maintenance free and tend to be very reliable. However they have lower efficiency compared to most other heat pumps.

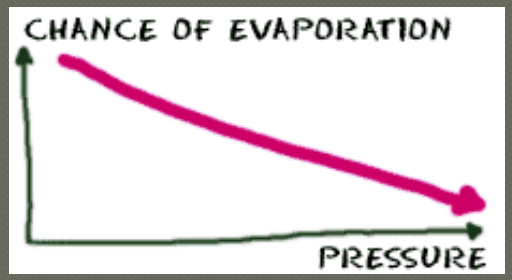


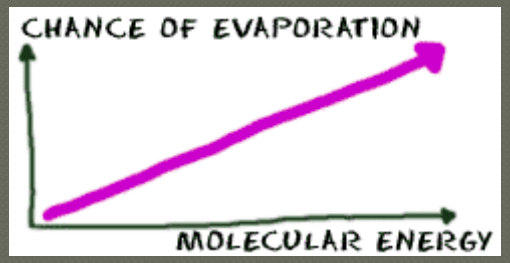
Vortex Tubes

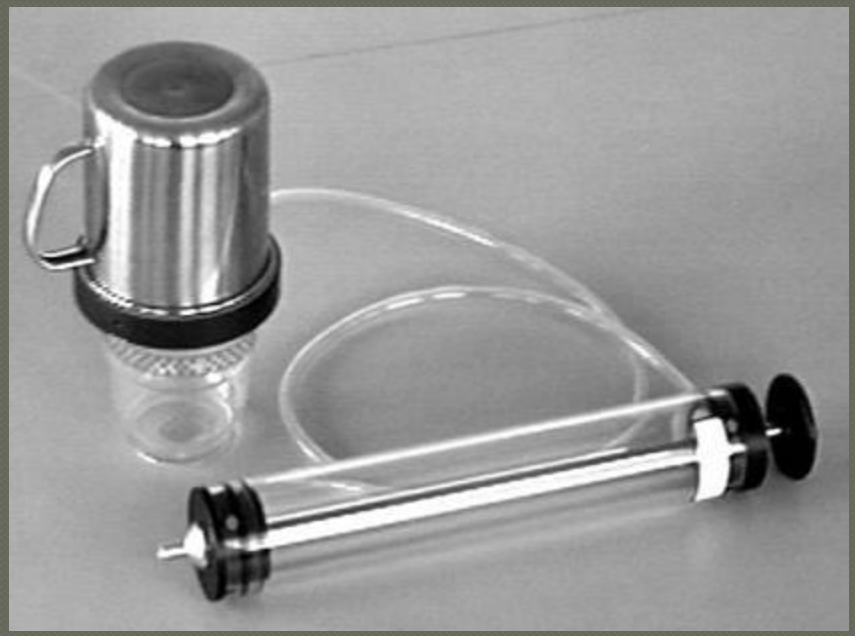
- One Test Results:
- Compressed Air Input: 65° F, 55 PSI
- Hot Air Output: 116° F
- Cold Air Output: -6° F

Ice by Vacuum

- Air and water in a sealed container.
- By reducing the pressure in the container (vacuum), the water will boil at room temperature.
- As water boils, the molecules with more kinetic energy (hotter) escape, leaving the remaining water colder until it freezes.







Ice By Vacuum

- 10 Minutes of riding a bike (operates pump)
- Temperatures of 0° – 6° F for 24 Hours

Ice By Vacuum

- Water and Air in container in refrigerator
- Evaporation causes hotter molecules to escape, ice results

Ice By Vacuum

- Water Vapor trapped by zeolite

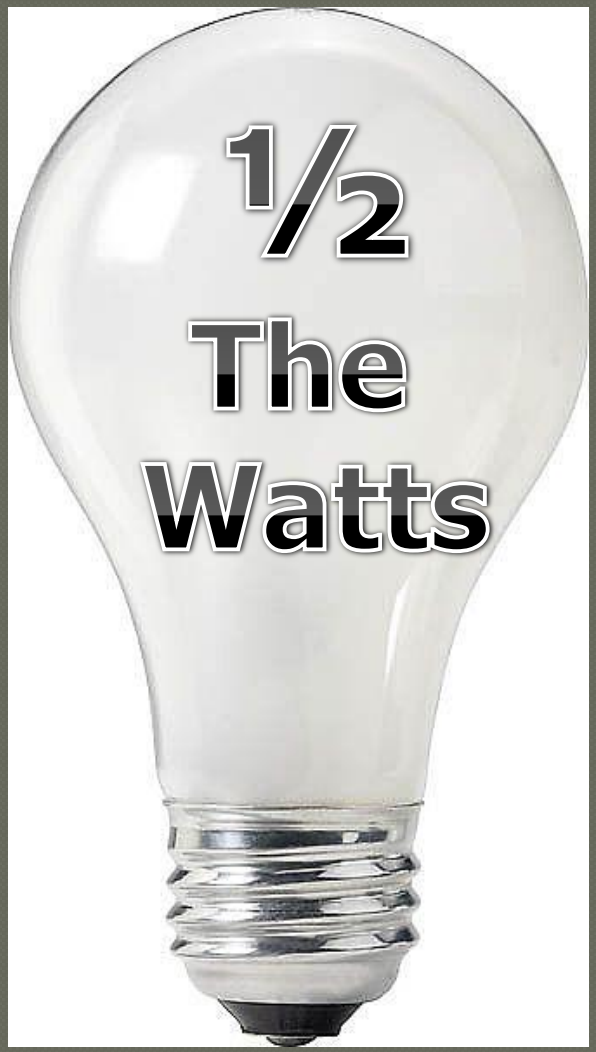
See youtube Video: http://www.youtube.com/watch?v=wpEG0ATylzo

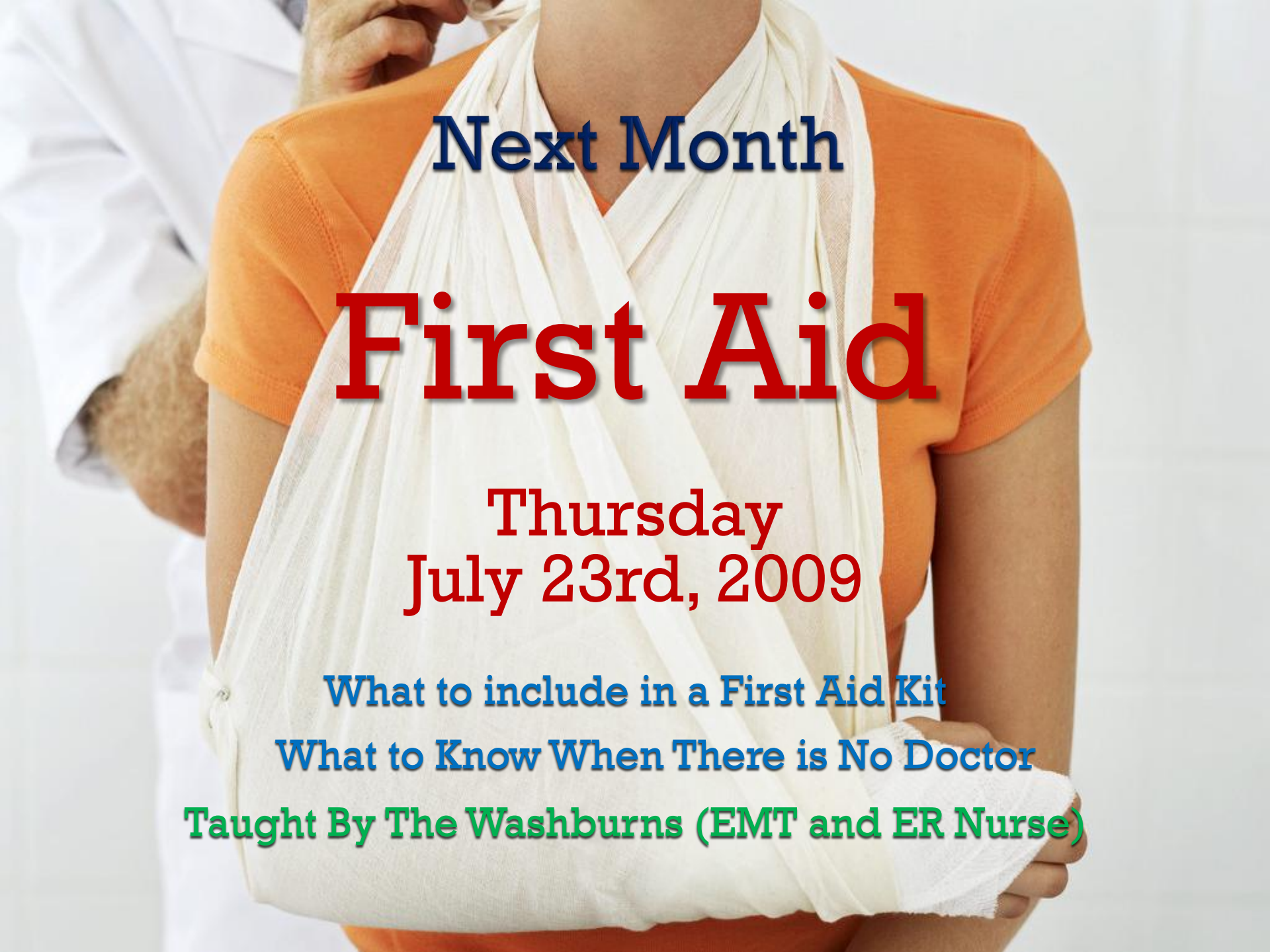
Efficient Portable Fridge/Freezers

- Runs on 12 Volt DC (or 110V AC Adapter
- 14 Quarts (12 Cans) – 84 Quarts (118 Cans)
- $399-$1,100
- 0.5 – 3.9 Amps (6-45 Watts)

- www.engel-usa.com

Efficient Portable Fridge/Freezers





Next Month

First Aid

Thursday
July 23rd, 2009

What to include in a First Aid Kit

What to Know When There is No Doctor

Taught By The Washburns (EMT and ER Nurse)

Contact Information

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