I haven't had time to proofread this, so I apologize for any spelling, punctuation, or grammar mistakes, as well as for any sections that are unclear or difficult to understand.

THE THREAT OF EMP

When a nuclear bomb goes off, there is an electromagnetic pulse (EMP). Think of it as a wave of magnetic energy radiating outward from the source of the explosion. Much like a generator creates electricity by passing a magnet near coils of wire (thereby aligning the electrons in the wire, creating a charge), this pulse generates an electric charge in anything metal within line-of-sight of the blast.

If the explosion is a ground burst (the nuke is set off at ground level), line-of-sight isn't very far, and EMP isn't much of a concern, mainly because anything close enough to be affected by the EMP will likely be destroyed by the blast.

If the explosion is an air burst (the nuke is detonated a few miles above the ground, as most nuclear missiles and aircraft-delivered nuclear bombs are designed to be), line-of-sight is somewhat further, and EMP affects electronics outside the blast radius.

If the explosion is detonated in the stratosphere, several hundred miles above the surface of the earth, the EMP can affect an entire country or even multiple countries. Since a nuke detonated at this altitude will not cause any blast damage or fallout on earth, the sole purpose of a detonation at this altitude is to generate a massively destructive EMP.

If a nuclear bomb of moderate yield (at least a few hundred kilotons--about ten times the size of the bombs dropped on Japan but about 1/4-1/2 the size of most intercontinental ballistic missiles) were detonated approximately 400 miles above the Kansas, it would likely wipe out most solid-state electronics (anything with microchips and/or circuit boards) and almost everything plugged into the power grid (even non-solid state electronics plugged into wall outlets) in the United States, the southern half of Canada, and the northern half of Mexico.

WHAT IS AFFECTED BY EMP

The pulse causes damage in two ways:

1. Power lines are long strips of metal. When the pulse passes them, it builds an enormous charge of electricity in the lines. Therefore, anything plugged into an electrical outlet gets a huge, massively damaging surge of electricity (far greater than any consumer surge protector can protect against).
2. Solid-state electronics (circuit boards and microchips—the stuff in your laptop, your cell phone, the fuel injection system on your car, your digital watch, etc.) are EXTREMELY sensitive to minor surges of electricity.

   If you've ever bought a new hard drive or some RAM for your computer, you've probably noticed that it came in a special bag designed to shield it from static electricity, and you probably noticed that there was a sticker on the bag warning you to ground yourself and open the bag in a "static free" environment. That's because something as simple as the static electricity created by wearing a sweater or walking on carpet in socks can damage those delicate circuits.

   Solid-state electronics, even if not plugged into the power grid, will be irreparably damaged by the charges built up in the circuits.

There is some debate among preparedness enthusiasts and experts in related fields (nuclear weapons experts, electrical engineers, etc.) as to the extent to which modern automobiles will be affected. Some experts believe that any automobile containing solid-state electronics and/or an electronic ignition (essentially, any automobile manufactured after 1979) will be rendered in operable. However, some tests have indicated that many modern automobiles (likely because they receive some shielding from their metal frames) will not be severely damaged if they are not running at the time of the pulse. Also, it's been suggested that some vehicles that stop running because of the pulse may be rendered operable again by disconnecting and reconnecting the battery (this assumes that the onboard computer simply needs to be rebooted and hasn't been fried).

An EMP that renders most vehicles inoperable is considered the worst case scenario. Under this scenario, no electronics more complicated than handheld flashlights will work. This is the scenario detailed in William R. Forstchen's book *One Second After*. Some preparedness enthusiasts choose to keep "bug out vehicles"—pre-1979 cars or trucks that likely wouldn't be affected by EMP—in case of a worst case scenario. This is a complicated debate, and I won't presume to offer a theory of my own, but if you want to read both points of view, you can check out the links in the 2007 supplement to my online essay about the effects of a nuclear attack.

It's important to remember that you can't protect sensitive electronics from EMP by turning them off, unplugging them, or removing the batteries. There are only two ways to protect sensitive electronics from EMP. The first is a complicated, expensive process known as "hardening." Hardening is how the military is able to design B-2 bombers that can drop a nuclear bomb and not be destroyed by the EMP generated by the blast. The second way of protecting sensitive electronics is by enclosing the items in a Faraday cage.

WHAT IS A FARADAY CAGE

The Faraday cage is named after Michael Faraday, one of the fathers of modern electronics. He discovered that an electric charge or magnetic field will pass around a closed metal container but will not pass through the container or affect anything stored inside. This happens because the electrons in the container align themselves to neutralize the field/charge inside the container. You can view an illustration of this principal HERE.

A simple experiment you can do to test this principal is to take a cell phone or cordless phone and wrap it in aluminum foil like a burrito, so that both ends are left open. Then call the phone. You'll probably find that it rings. Then, twist the ends shut so that the phone is completely incased in aluminum foil, and try calling it again. Most likely, the phone won't ring because you've just created a Faraday cage around your phone.

The first thing to understand about Faraday cages is that not all Faraday cages are created equal. A cage (such as the aluminum foil example just given) may be sufficient to block radio waves but may not be sufficient to block an EMP. In order to protect against EMP, you need one of two things:

1. THICK shielding.

OR

2. Several layers of shielding, with the outside layer being both grounded and, ideally, the thickest of all the layers.

   Each layer will let through less and less of the EMP, until it's finally filtered out completely. Grounding something is exactly what it sounds like—connecting it to the ground. If the shielding isn't thick enough to transmit the entire charge around the shielded items, without letting any pass through to the shielded items, grounding is necessary to bleed off the excess charge.

WHAT YOU'LL NEED TO BUILD A FARADAY CAGE

1. A solid metal container. An ideal choice for building a small Faraday cage is a metal ammo can. An ideal choice for a large Faraday cage is a galvanized steel garbage can with a lid.

2. A large roll of unpainted aluminum window screen.
3. Two 200' boxes of aluminum foil.
4. Two 200' boxes of plastic wrap (i.e., Saran Wrap).
5. A box of heavy-duty garbage bags.
6. A box of small Zip-Loc freezer bags.
7. A box of large Zip-Loc freezer bags.
8. 150' (three 50' rolls) of professional- or industrial-grade duct tape.
9. 50' of electrical tape.
10. A heavy-gauge (thick) 3-prong (grounded) power cord. You can either buy one or use the power cord from an old computer or cut one off an old surge protector.
11. A pack of desiccant (silica gel).
12. OPTIONAL: Some old cardboard boxes or a plastic container that will fit inside your metal container.

BEFORE YOU START

The large Faraday cage is harder to store but easier to build and is probably a slightly better design.

It's a LOT harder to build a Faraday cage that can be opened and closed at will, so I'm going to provide you with instructions on building a sealed Faraday cage. This means you'll have to put everything in it the first time and then leave it alone until you need it.

Keep in mind that you don't want the items you're trying to protect touching the metal sides of the Faraday cage. You also don't want the metal inner-layers touching the metal outer-layers (I'll expand on this later). The optional cardboard, shelf paper, and plastic container mentioned above can be used as insulators (an insulator is anything that doesn't conduct electricity) to separate the inner-layers from the outer-layers.

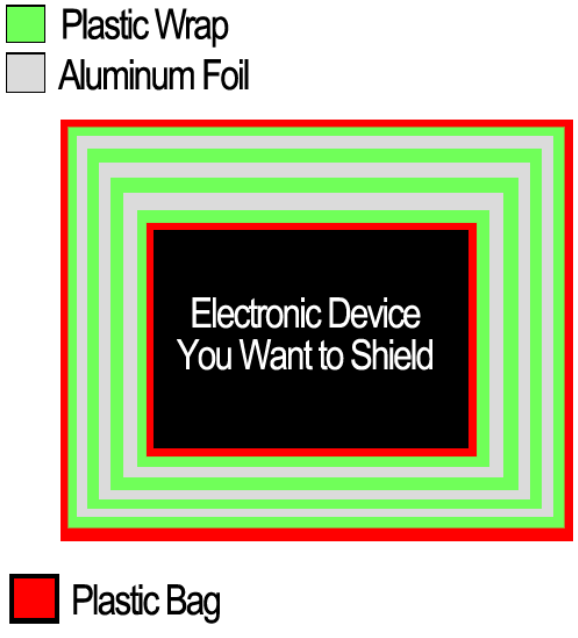
You're going to need some basic tools on hand to complete this cage, but none of the construction techniques are terribly difficult. Think of it as an eccentric crafts project.

ASSEMBLING THE CAGE

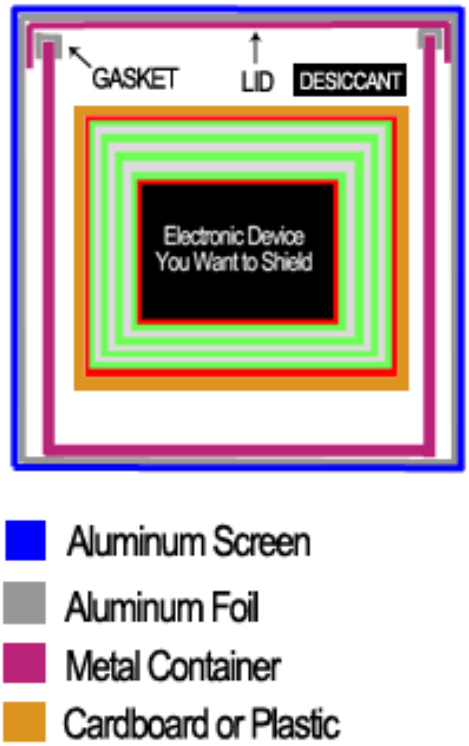
This may sound like a lot of work, but it's really not. And it's not an exact science; you're just trying to create a solid barrier without any gaps, around the items.

1. Collect the items you want to protect.
2. Make sure all disposable batteries are removed and stored in zip-loc bags. You don't want batteries to leak and corrode sensitive electronics.
3. You want to consolidate space, so remove items from cardboard boxes and seal each item in a Zip-Loc bag or storage bag**. Try to get all of the air out of the bags, and try to seal the bags as tightly as possible. You want the items sealed from air and moisture. Ideally, you would use something like this as the innermost bag in which to seal items in a Faraday cage (you'd first place the item in this bag and then begin the alternating layers of plastic wrap and aluminum foil): http://www.cheaperthandirt.com/BAG196-1.html
4. Once the items are sealed in bags, wrap them in 3-5 layers of plastic wrap. Then wrap them in 3-5 layers of aluminum foil.
5. Repeat step four 2-4 times so that you have 3-5 alternating layers of plastic wrap and aluminum foil. Both the inside and the outside layers should be plastic wrap. NOTE: These layers of aluminum foil are the "inner-layers" I mentioned earlier.
6. Seal each item in another Zip-Loc or garbage bag.

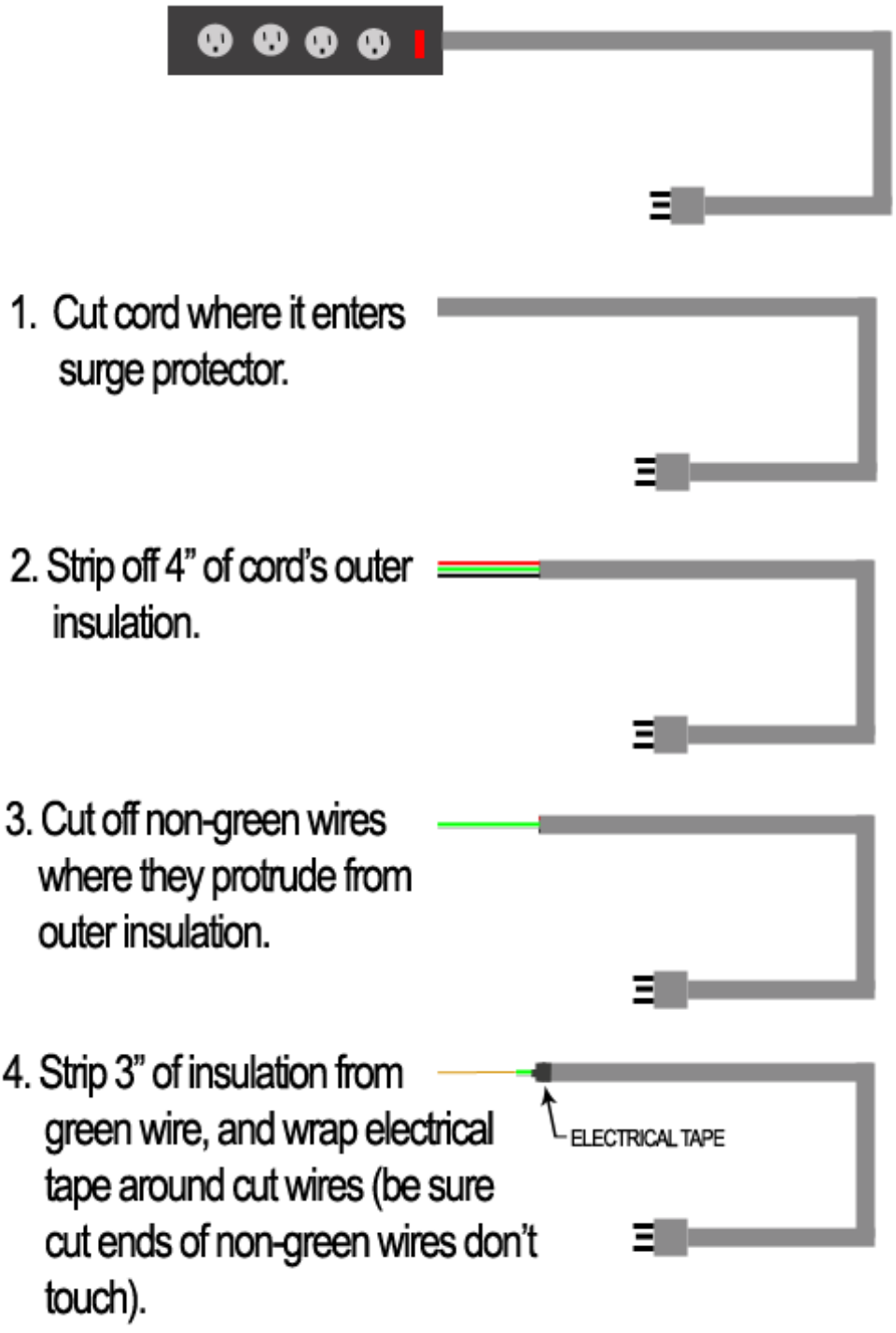
This illustration should help you understand how each item will be wrapped after you complete steps 3-6:



7. If you're using a steel garbage can, remove the handles from the side (just spread them open with a pair of pliers, and pull them off). If you're using an ammo can, sand or grind the paint off of the lips of the container and lid, and if there is a rubber gasket inside the lid, remove it and scrape away the remnants.
8. Use strips of aluminum foil to fill in any gaps between seams in the metal. (Sometimes, particularly in the galvanized trash cans, you'll see seams where two pieces of metal are stamped together. These seams sometimes leave little gaps. Filling these gaps with aluminum foil will ensure that there are no gaps in the conductivity of your outer container.
9. Place the bagged items in the metal container. Ideally, you should either place the bagged items in a cardboard box (or multiple cardboard boxes) or a plastic container before placing them in the metal container. This added layer of insulation will ensure that a charge doesn't pass from the outer container, through the plastic bags and plastic wrap, and into the inner (foil) layers. If you don't have a suitable cardboard box or plastic container, or if you don't have enough room in your metal container, you can place the items directly into the container (the bags and plastic wrap will still offer some insulation).
10. Open and activate the desiccant (silica gel) pack. Place it in the metal container with the bagged items.
11. Use one long, unbroken strip of aluminum foil to create a gasket (fold the foil to make it about 3-5 layers thick) around the lip of the metal container. This will ensure a tighter, better-conducting fit for the lid.
12. Secure the lid on the metal container. Make sure you get a tight seal. If you're using a garbage can, you can use 2-4 small strips of duct tape to make sure the lid is secured in place, but don't use too much. You still want most of the container's outer surface to be exposed.
13. Wrap the sealed container (the whole thing—you don't want any gaps) in at least three layers of aluminum foil. You can use a little tape to secure the aluminum foil in place, but as before, we want most of the metal surface exposed.
14. This step is a bit tricky. Now that the metal container is wrapped in aluminum foil, you want to wrap the entire thing in the aluminum screen you bought. I find that running a layer of screen vertically over the top and bottom and then running a couple of layers horizontally around the body is the best approach. Make sure the screen overlaps so that there aren't any gaps. Again, you can use duct tape to hold it in place, but make sure at least some of the screen is visible for step 18. Your container should now be configured like this:



15. Take the 3-prong cord. You want to find the green wire from the end opposite the plug. Use this photo as a reference. If you cut the cord off of something else (i.e., a surge protector), you'll have to strip off the outer layer of insulation (about 4 inches) to see the inner wires. Again, you want the inner-wire with the green insulation.
16. Cut off the other two wires (the non-green wires) where they protrude from the cord. Wrap the opening from which they came with several layers of electrical tape so that nothing can come into contact with them. Now you should have JUST the green wire protruding from the cord.
17. Strip the insulation from the last 3 inches of the green wire, exposing the copper wire underneath. This illustration, which shows how to remove a cord from a surge protector and use it, may help you to understand steps 15-17:



18. Find an exposed section of aluminum screen near the bottom of the cage (wrapping the screen will result in some protruding corners, so finding a protruding section of screen shouldn't be hard). Poke two small holes in the screen, about one inch apart. Feed the exposed copper wire in through one hole and back out through the next. Then, twist it around itself to hold it in place (this sounds more complicated than it is—you're just looping the wire through the screen). You've now installed your ground wire. It should look something like this.

19. Once the ground wire is in place, wrap the whole cage in duct tape—a lot of duct tape. Use as much as you think is necessary to hold the aluminum screen tightly in place and prevent it from being damaged. You also want to make sure that the cord won't be pulled free from the container, so tape the cord to the container. You just need to leave 2-3 feet protruding so that it can be plugged into a wall-outlet. You should have a container that looks like a giant brick of duct tape with a power cord protruding from it.
20. Plug the cord into a 3-pronged (grounded) wall outlet. Don't use a 3-prong adapter to plug it into a 2-prong outlet; it MUST be a 3-prong outlet. Don't worry about electricity—you cut off the positive and negative wires. The only wire connected to your cage is the ground wire, and it doesn't carry a charge. Because you cut off the positive and negative wires, your cage is not plugged into the power grid; therefore, an EMP or power surge won't damage it. You are simply plugging it into the wall outlet to take advantage of the electrical grounding built into your home's wiring.

The items in your cage are now shielded from EMP. But what items are in your cage? I've included my suggestions below.

RECOMMEND ITEMS

The Essentials:

1. A hand-crank shortwave radio receiver (example: http://www.amazon.com/Kaito-KA009R-4-Way-Powered-Emergency/dp/B000UK388Q/ref=sr_1_9?ie=UTF8&s=electronics&qid=1265225299&sr=8-9)
2. A hand-crank 2-way radio (example: http://dogbytecomputer.com/midland-xt511-two-way-base-camp-radio.html)
3. A couple of portable, battery-powered 2-way GMRS radios with rechargeable batteries (example: http://www.amazon.com/Midland-GXT740VP3-42-Channel-34-Mile-Rechargeable-Batteries/dp/B001WMCEFE/ref=sr_1_3?ie=UTF8&s=electronics&qid=1265225361&sr=1-3). I suggest you get a couple of headsets to go with these (example: http://www.amazon.com/Midland-Microphones-G-225C2-G-227C2-Headsets/dp/B00008JOMD/ref=sr_1_3?ie=UTF8&s=electronics&qid=1265747050&sr=8-3).
4. A battery-powered CB radio with an external antenna (radio example: http://www.amazon.com/Midland-1001Z-2-Way-CB-Radio/dp/B00024DIDK/ref=sr_1_2?ie=UTF8&s=electronics&qid=1265225423&sr=1-2 antenna example: http://www.amazon.com/Cobra-Base-Load-Medium-Magnet-Antenna/dp/B00005N5X2/ref=sr_1_5?ie=UTF8&s=electronics&qid=1265225423&sr=1-5)
5. A hand-crank AM/FM radio (the two hand-crank radios listed above both receive AM/FM frequencies, so if you buy one of those, you won't need a separate AM/FM radio).
6. A 12v-110v Power Inverter (at least 1,000 watts).
7. A solar trickle charger for 12v batteries.
8. A solar charger for rechargeable AAA, AA, D, C, and 9V batteries.
9. Plenty of rechargeable AAA, AA, D, C, and 9V batteries (check eBay and Amazon.com).
10. Two hand-crank flashlights (check Amazon.com; read the reviews before you buy).

Recommended:

1. A laptop computer (can be an older, slower laptop, as long as it runs at least Windows XP and has a CD/DVD-ROM drive) with two good batteries and a power cord. This may sound like a luxury, but if you think about how much information is available on CD-ROMs (medical reference books, engineering reference books, military manuals, encyclopedias, etc.) and how many computer programs might be useful for survival/rebuilding (engineering/design programs, spreadsheets, databases, etc.), you'll see that having a functioning computer after an EMP attack could be a HUGE asset.
2. A UPS battery backup system.
3. A replacement on-board computer for your car (assuming it's a modern vehicle). These typically cost about $300 and have to be specifically ordered for your vehicle, using the VIN number.
4. A small, low-power (900 watts or less) portable electric heater.
5. A small electric fan.
6. A solar-charged workbench light.
7. Whatever else you can think of that might come in handy.

It's a big, expensive item, but my ideal list would also include a computer printer or, better yet, a printer/scanner and as many ink cartridges as you can afford (many ink cartridges contain microchips, so the cartridges would have to be shielded, along with the printer).

Remember, it was the invention of the movable-type printing press that led to the renaissance, modern science, literature, recorded history, education, etc. Being able to publish could be an immeasurable asset in a post-apocalyptic society. Having a working digital camera (with rechargeable batteries) could also be a major asset.

You'd also want to have a large quantity of non-electric office supplies (i.e., typing paper, notebooks, pens, staples, brads, etc.) on hand. Remember, it took something like 65 years to build the first functional ballpoint pen, once the first inventors came up with the concept. Do you know how to build a ballpoint pen? For that matter, how adept are you at making paper? Without staples or brads, how would you bind multiple pages together?

Remember, there is more to survival than simply not starving. You want to be able to recruit allies, inventory resources, share news, record history, etc. All will be imperative to not only your survival but also society's survival.

Also remember that storing supplies is only 1/3 of being prepared. You also need to know how to use those supplies and improvise or build/grow new supplies, and you need to be prepared to defend those supplies from people who didn't take the time to prepare and who WILL try to take your supplies if they think they can.

It's not realistic to think that you're just going to hunker down in your home, with all of your supplies, and "ride out" a national disaster. You're going to have to band together with others and work to overcome and rebuild from the disaster. I strongly suggest reading both *One Second After* and *Lucifer's Hammer*. After that, you might want to read *Alas, Babylon* (a much older, tamer but still thought-provoking book). These will help you to develop and refine your "preparedness mindset."

You also might want to try to find a copy of the 1983 TV movie *The Day After* (not to be confused with the 2004 action film *The Day After Tomorrow*, about a modern ice age, or the book *One Second After*, which I recommended, about an EMP attack).

You should also find and read some preparedness books like these:

http://www.amazon.com/Emergency-Food-Storage-Survival-Handbook/dp/0761563679/ref=sr_1_1?ie=UTF8&s=books&qid=1265226435&sr=8-1

http://www.amazon.com/Crisis-Preparedness-Handbook-Comprehensive-Physical/dp/0936348070/ref=sr_1_7?ie=UTF8&s=books&qid=1265226449&sr=8-7

http://www.amazon.com/When-All-Hell-Breaks-Loose/dp/142360105X/ref=pd_sim_b_4

Once you've done all of that (and only after you've done all that—you'll only be confused and/or scared by all of the misinformed idiots if you try this too soon), you might want to start following the discussions on www.survivalistboards.com.

Remember, being prepared is like being in shape—it's not something you accomplish by working at it until you reach your goal and then quitting. It takes dedication and the right mental attitude to maintain a strong level of preparedness. For example, you must always be aware of the conditions of your supplies (i.e., when food and medications expire) and your changing needs (i.e., having kids, kids growing older, etc).

One way to extend the shelf-life of "non-perishable" foods (all foods except for pure, unsweetened honey and whole, un-ground wheat eventually go bad) is by storing them in a freezer. Even though "non-perishable foods" foods don't need refrigeration, the freezer will keep them in a state of suspended animation so that their shelf-lives won't start counting down until you either remove them from the freezer or the freezer stops working. For example, if the shelf-life of rice is 5-10 years, you can either replace your store of rice every 5-10 years, or you can store your rice (in a sealed bag or container) in a freezer so that the 5- to 10-year shelf-life won't kick in until the rice is removed from the freezer (or the freezer stops working).