Troubled Times

Shelter

Click on the icons above to go to your area of interest.

Troubled Times

TOPIC: Temporary

Prior to the cataclysms the emphasis should be on protection from firestorms and earthquakes during the pole shift, such as a Metal Roof over a trench. Temporary quarters provide ample living space while waiting for the pole shift hour, but should be vacated prior to the shift for safer shelters. Dome Tents such as US Calvary seem to have some Stability in high winds, and can be Hand Made. The Shepherds Tent is ample. Car top tents or Mobile Homes are portable. A Blue Tarp can shelter from rain. Survival Sacks are more water proof and insulated than ordinary sleeping bags. Teepees such as the Plains Indians erected, or a Thatched Sapling shelter likewise can be erected quickly and constructed with a variety of materials and Techniques, but are designed for a Nomadic lifestyle though can be Semi-Permanent. Dual use Plywood Boxes could become construction material after the shift. In cold climates, the Igloo can be a life saver. Usenet archives on primitive skills provide information on Circular huts, Storm Shelters, Debris Huts, Debris Tips, Debris Drawbacks, Psychological Factors, Debris Insulation, Moss Insulation, Warm and Dry, Rock Overhang, and Pit Shelters. For those with the resources, an Airtight dome is spacious.

Troubled Times

Rock Hard Homes & Domes Inc.

The project brings together many innovative building concepts and combines them to best meet a given need or situation. The basic principals involved in selection and concept development are:

1. Durability, long life, low maintenance
2. Energy efficiency, low cost of heating and air conditioning, high insulation R values, thermal mass, passive and active solar
3. Inexpensive, high quality materials, recycled if possible, reinforced concrete preferred
4. Well lit, spacious, pleasant functional design, floor plan and natural environment surroundings
5. A high quality housing concept, functional life span of over 1,000 years, quick and inexpensive to build, affordable, designed for maximum comfort, efficiency and lasting value

Detail on the several methods of construction are below.

Monolithic Domes

Air form is inflated over concrete foundation. Foam (EPU) is sprayed 3" on the inside after frames for doors and windows are placed and braced. #4 steel rebar is hung from the insulation 15" OC. vertically and horizontally. 3" of 8,000 psi concrete is sprayed in several passes. The result - a dome, which is the strongest shape covering the largest area per exterior surface. Thermal mass of the concrete combined with the insulation on the outside gives an effective thermal efficiency rating of R-68. An average fluctuation of temperature even in the middle of winter is less than 1/2 degree. Winds, hurricanes, tornadoes with 300 mph winds pass right over with no effect (do cover the windows however). Earth quakes, fire, ice, floods, insects, termites, dry rot have little affect. The main structure can be erected in less than a week.

EPS Foam Panels

Post and beam (4' OC.), reinforced concrete with 2" skin, both walls and roof, with 10" wall and 12" roof insulation resulting in R values and thermal mass of R-48. Quick and inexpensive to build. Many of the same qualities of a dome as listed above. Look and design of a conventional house. Concrete of 8,000 psi is pumped on the roof and sprayed on the walls. The beams are steel reinforced concrete 6"x 8" configured in a post and beam structure.

ESP Foam Blocks

This structure uses an EPS permanent concrete form in the shape of 12" x 16"x 48" blocks with posts and beams of concert and steel rebar core to form 6" and 8" reinforced concrete walls with an insulated R rating of 20 to 28 as well as thermal mass. The EPS foam blocks are stacked up on top of each other onto wet concrete footings with rebar placed 4' OC vertically as well as horizontally 32" OC. Concrete of 3,000 psi is pumped into the top of the forms and actually cures to 5,000 psi because the moisture and heat are retained by the insulated blocks. Stucco, brick or siding is placed over the exterior of the block. A conventional roof is applied, or Waffle Crete Panels (forms obtained from a Kansas manufacturer) used for the roof. An 8" to 12" soil and sod covering over this concrete roof is esthetic and environmentally compatible. This construction is very quick and once the foundation footings are poured the walls can be poured in any type of weather even in the middle of winter. (This is also true with the dome described above.) This type of building process is more expensive than the above because of the patents and basic cost of expanded polystyrene.

Sulfur Panels and Blocks

Another concept involves forms and blocks cast on site or at a factory. These are made of sulfur, an abundant by-product of the oil industry which is inexpensive as a material and is an easy product to produce. The sulfur walls are strong, fire proof, quake resistant, and rot and bug proof. I have a design that incorporates a built-in insulation and thermal break in the block itself. The inside and outside can be finished with a durable, colored, stucco finish made from melted sulfur. As an alternative, a second layer of conventional brick or brick made from sulfur block would be the house's outside finish. A 2" EPS layer of insulation would separate the inner mass wall resulting in insulation and thermal mass combinations approaching dome performance above. This is a more labor intensive process than the dome process or the RM Panel system. However, the process is quicker and less expensive than concrete blocks and over all, fewer steps are in the process. This is a promising technique for certain applications, and is an area of our research for lower cost construction.

Pre-Cast Concrete

There are three methods which use a pre-cast insulated concrete wall detailed below.

- One method gives a wall 8' by 12' to 28' long. The wall is 8" thick and has 2'x4' voids 6" thick for insulation purposes. These are forms purchased in Kansas and are known as Waffle Crete Panels. These can be used for floors, walls, roofs, on homes or commercial construction. The 16' long panels weigh about 3,000 pounds, so a crane is required to lift them into place. They can be cast with a pre- finished surface and with an insulating thermal break cast in at the very beginning. The forms will produce one wall panel a day. They are strong and 5/8's lighter than a full 8" concrete wall. They are excellent for roofs for earth sheltered construction.

- Another type of pre-cast wall is only 1 " thick. The door and window openings are cast into the wall. All the walls, floor, roof, etc. fit together in slots and groves which are secured by cement, glue and fasteners. The result is a monolithic structure which is basically disaster proof and very reasonable for mass low cost housing. This is rather a small house module, however, but can be added onto for expansion.

- A third wall system uses steel studs for the main frame (2"x6"), doors and windows are framed, 2"x4" steel studs are laid 24" OC, EPS (foam) between them, and concrete poured 4" thick which will provide a stucco finish on the outside. These are custom made for special house designs. Heavy cranes are required for panel movement and installation.

Tires and Earth

A system used for some of the Celistine Property developments involves an earth sheltered concept using rubber tires packed hard (tamped) with earth (dirt) for thermal mass. The 8" concrete pre-cast roofs mentioned above serve as the ceiling and support the earth and natural vegetation. Because most of the materials are natural or recycled, the overall cost is low. However a fair amount of labor is required packing the used tires with dirt and tamping them. The walls are stuccoed. A solarium faces the south for sun, light and growing flowers and vegetables. Add Skywell water systems for water requirements.

For more information e-mail Rock Hard.

The Hub

Troubled Times

TOPIC: Geodesic Dome

Developed by F. Buckminster Fuller, the Geodesic Dome has Great Strength due to the triangles. The EDEN Project in the UK is using geodesic domes. Where many Geometric shapes could potentially be used, the Triangle works best. A Troubled Times TEAM has been formed to find ways to put up inexpensive and portable geodesic domes. There are a number of Dome Manufacturers, such as Good Karma Enterprises which has been building such domes for over 25 years. American Ingenuity boasts an earthquake proof dome.

Troubled Times

TOPIC: Dome

Domes have a reputation for being almost Indestructible, even Tornado Resistant, according to *Round-UP* magazine. Information and Workshops on Monolithic Domes, which are Fireproof, is available, and Monolithic Constructors offers a news letter and kits. Newhouse Shelters also offer plans, and Dome Lifestyles offers networking. However, Concrete can collapse unless reinforced. The dome shape has Advantages that outweigh its Disadvantages, and among its Many Virtues are that it is ideal for Hydroponic gardens. The dome shape has been used over the ages for such structures as the Ethiopian Tukul, the Asian Yurt, the Pacific Yurt, or the Indian Lodge. Dedicated Troubled Times members offer a Home Dome design, an AquaDome design, alternate Escape Hatches, and a Floatable Dome. A Troubled Times TEAM has been experimenting with options. A Double Dome, which would have a Rounded Bottom as well as top, might float to level on land during after shocks, but would have to consider Wave Action during a tidal wave. As with any structure, damage from Wind and Water is also a concern. Domes made from Plastic or RASTRA are also available, and Shotcrete is affordable.

Troubled Times

TOPIC: Housing

There is a range of non-traditional housing that can be erected going into or after the cataclysms. During an era of melting poles, consider a Houseboat, perhaps on a Cement Base. Many construction methods use inexpensive materials and can rely on manual labor. Methods include Rammed Earth construction, Straw Bale construction with Midwest example and Instructions, Adobe Bricks with Pueblo example, and Coating Burlap or coating Wire Mesh. Combining these methods also works. Earthen or Bermed housing has many options, is Fireproof, or use fireproof material such as FireFree. Methods recommended by **Earthship** include using old tires and aluminum cans, and an Earthship history shows the steps taken during construction. Cob Cottage offers workshops on building with earthen materials, and Ianto Evans tells you how to build your own for $500. A partially buried Grain Silo or Steel Pipe could be bermed and wind resistant, as would a Quonset Hut. A Trench Hut would double as a pole shift survival spot. A Full Cylinder drainage pipe could be a sturdy quake resistant home, and a 1/2 Cylinder design, common as farm outbuildings, could be quickly constructed. The EcoLodge offers a self sufficient design. Pyramid Homes are sturdy and efficient. Old military Bunkers could be put to good use, and in the DC area, a Fiberglass Radius is popular.

Troubled Times

TOPIC: Shipping Containers

Shipping Containers such as Connex could be Bolted Together and used for shelter during the pole shift and as living quarters afterwards. Spray Foam for padding and insulation should be the fire retardant variety. Liquifaction during quakes is a concern, but placed on a concrete slab, containers could act like a Noah's Arc on land during liquefaction. Problems with an above-ground container include exposure to Wind but if Secured would hold. Problems with a Fully Buried container include Collapsing Walls, Warped Floors, Ventilation, Corrosion, and a Blocked Entry. A partially buried container, as described in this example Scenario, has many Advantages. A used container can be Cheap and a Fixer-Upper and can be used both Before and After the pole shift.

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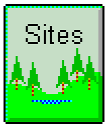
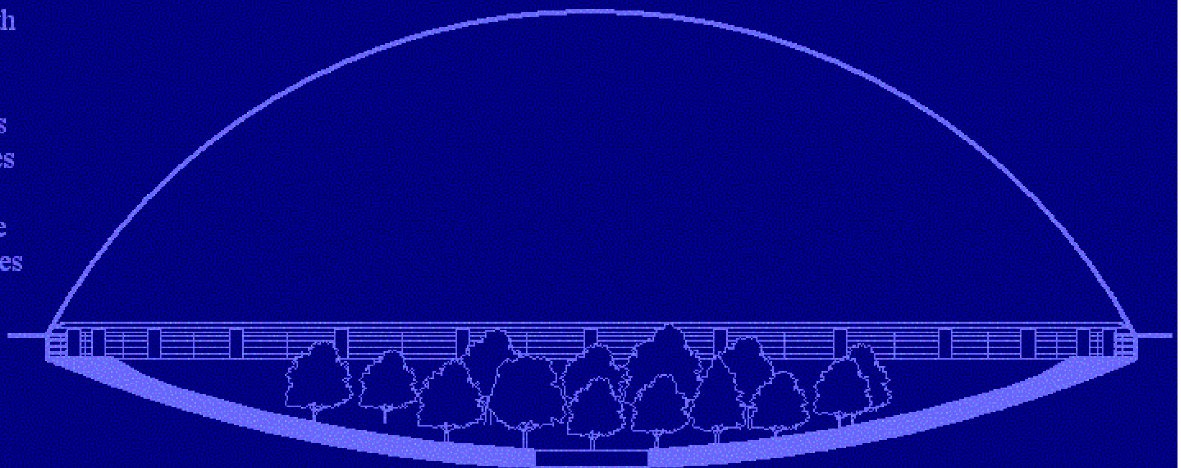
TOPIC: 

Sites

Site selection is a process that considers current and future climate, location, soil, natural resources, wildlife, protection from wind, availability of water, and local hazards. Many rural areas such as the state of Nebraska and Michigan make ideal sites. The Homestead Org has rural real estate. New York state offers safe sites. Consider crime and population Statistics when making a selection too. Old Cold War structures for sale come equipped and cheap.

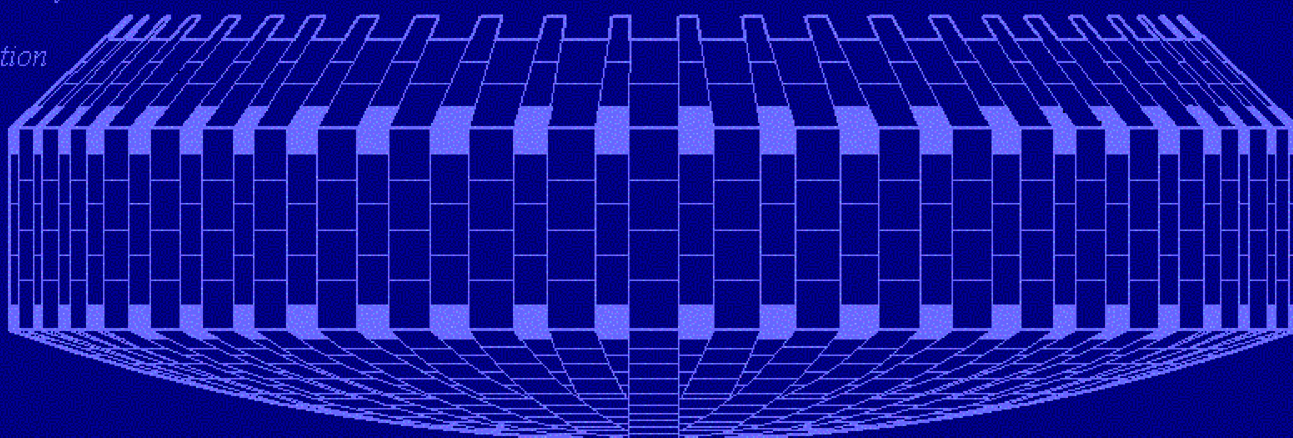
Space Age Biospheres

A New Approach to the Future of Living



The Interlocking Panel System

The Durable Alloy Building System That Can Make You Safer Than Ever Before!



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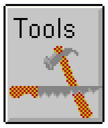
TOPIC: 

Tools

All Types of Tools may be required in the Aftertime, from gardening to radio repair, and old fashioned Non-Electric tools, Hand Tools powered by muscle, may be back in fashion. Tools can even be fashioned with a Wilderness Forge. The List is endless, but can be prioritized. Garage Sales or Estate Sales can be ideal places to locate such tools, which often sell at give-away prices. Heavy Lifting tools are portable, unlike a forklift truck. Welding can be done with a Battery Series. Fiberglass Handles can present problems. Harbor Freight comes highly recommended. The Internet offers online shopping at Woodworkers Depot.

Troubled Times

TOPIC:  Air Circulation

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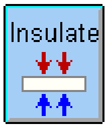
The natural convection that occur when hot air rises was used by the Ancient Romans to air condition their homes. Hot Air can drive a fan. Activated Carbon air filters made from Carbon Fiber can be made at home inexpensively from a Parts List, Using a Fan and a Bucket, making a Filter Bed for the Filter Layers of Charcoal, adding a Vent Tube and Cord, and activating the charcoal with a Charger that emits an Ion Spray. A more expensive alternative is a Solid State device. An Ozone producing device can be constructed to purify air.

Troubled Times

TOPIC: 

Insulation

The Basic Principle of insultion is an air barrier. Many Natural Materials can insulate, but they can present Problems by moldering or burning. Mineral Wools are fire resistant. Fire Retardant foams such as Icynene are available that have Passed the Test of fire. Foam insulation is Superior to other forms of insulation in many ways. The benefits of insulation can seen in the Growworld Module Project, which uses passive solar energy and can maintain indoor gardens even in cold temps.

Troubled Times

TOPIC: Material

Securing Parts in the Aftertime will be challenging, so Handy Items should be stocked. Supply Containers or Garbage Cans can be reused later. Recycling is a recent fad, so Land Fills could be a rich source of raw materials such as Sheet Metal and glass, versus Mining for ore. Smelting metals from raw materials or metal scraps is a Medieval Art that has its modern day practitioners. Galvanized metal is rust resistant. AlumiWeld works miracles with aluminum. Arc Welding can be learned, as can all Metal Working skills. Ferro-Cement is strong and durable, and concrete composites like RASTRA quick and easy. A Portland Cement Substitute is possible. Panel Systems are complete, and foam R-Control panels are durable, but these come only in Rectangle Shapes. Instructions on how to set rocks is available. Rope can be made from many materials such as Hemp, and cloth from natural fibers such as Natureworks PLA. Bamboo, when Lashed together, is strong enough to make Tall Structures such as Scaffolding. Canola Oil can substitute for a motor oil. Peat Moss, used in gardening, can serve as temporary packing material. Material such as Diaper Gel is fireproof. Natural Glue can be made from Milk, Blood, Fish Skin, Hides, Sinew, Resins, but these are not necessarily Water Proof. When shopping is no longer possible, the art of Scrounging should be applied.

Troubled Times

TOPIC: Quake Proof

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15 Richter Scale earthquakes are defined as an unusually long shaking period, accompanied by Earth Waves. Given that, Troubled Times members debate what structure would Resist the 15 and offer Seismic Safety. Base Isolation technology is one such technique. The presence of Ground Water is an important factor, and Liqufaction pressure can be computed. Construction Techniques for new or retrofit quake proofing shows visually the kinds of forces that act on structures in a quake. Reinforced Concrete or a Concrete Cellar are resistant. A heavily reinforced wood or steel Box Construction would be effective in preventing damage in a quake. US Geological Survey also advises on earthquake resistance design, such as the Amplitude of motion to expect. The most resistant dwelling windows are Lexan Windows. A Pole Shift ning offers adice on how to Secure Your Home.

Troubled Times

TOPIC: Wind Proof

The pole shift may present a Worst Case scenario. Wind damage is a function of the degree to which the wind can get around edges, as Roger's Travails demonstrate. A shelter should be constructed such that at a moments notice you can remove all overhangs, and Any Edges that wind can grab hold of. Such a construction technique will handle up to 150 mph sustained. Securing a house to its Foundation can brace against wind force pusing the house over. Blunting wind flow with Baffles can help. The A Frame is vulnerable. Windows that will withstand hurricane force winds are also available, but hurricane force winds includes danger from Projectiles. Steel Reinforced structures are recommended for projectile protection, and Monolithic domes have a good track record. The Slope of a structure affects the force of wind upon it. The point where a structure becomes Airborne can be computed, with Blowing Sand or debris affecting the outcome. Windows open on one side can cause a structure to Rip Apart.

Troubled Times

TOPIC: 

Water Storage

Due to the force of water, tanks fed from a Bottom Fill are most efficient. Old fashioned Hand Pumps, compared to Rotary Pump, or even Bike Pumps may be back in style, as there may be difficulty in pumping water up from a Deep Well. An Archimedes Screw can help. Cisterns can capture rainwater from the roof, and Wooden Barrels hold water well, with or without Pitch when Water Swelled, and can be Constructed. Consider that water in storage tanks may need to be Checked. There are pros and cons to dam building Beavers.

Troubled Times

TOPIC: Heat

Traditional sources of heat such as oil or gas will be scarce after a cataclysm, compounded by a lack of shelter. Kerosene Heaters are portable. Starting a Fire in the rain takes skill, and finding Natural Kindling such as Fungus or Cattail can make the difference. Hot Rocks help retain the heat. Charcoal is easy to produce, but Woods Differ in their qualities. The Hicks Water Stove produces both heat and hot water. Those with domestic animals can use Animal Heat during cold spells, and heat can even be gleaned from Manure. Burried Garbage or a Compost pile can also be a source. Geothermal heat can be tapped, but may indicate Unstable Geo. Hot Water can be heated from any source with a Tube Coil system, with a Caution. Heating Large Quantities is also feasible. A Peltier Junction supplies heat from 12V electricity, but has Limited Use. Those wanting to Experiment can get their own! While housing is being rebuilt, Gel Fuel from a portable fireplace that can be safely kept in tight quarters may fill the gap. Use a Re-Heater Bag or Electric Vest to carry while traveling. Heat can be retained by Reflection and Deflection. Cooking is more efficient with Thermal Feedback.

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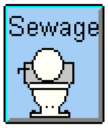
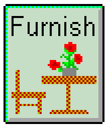
TOPIC: 

Sewage

With municipal treatment facilities destroyed, survivors will have to address sewage treatment locally. Insights can be gained from History and how sewage treatment in Europe caused Disease. Outhouse solutions range from the old standby, the outhouse, which can be a Fancy Outhouse, a Plain Outhouse, or a Garden Outhouse, to a Composting Toilet, such as Cottage Toilets or the Phoenix composting toilet. Sawdust Toilets are a cheap and easy composting toilet, odor free. Both are an indoor version of the outhouse, or the Porta-Potty. Sewage effluent should be used for its nutrient value, growing aquatic plants that can be fed to fish, for instance. For indoor gardening, cleansing methods include Ultraviolet lamps and Bare/Rift frequencies. Living Technologies offer treatment facilities that recycle water into gardens and use natural bacteria. Lime reduces the odor of outhouses.

Troubled Times

TOPIC:  Furniture

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Furniture that can be carried about, such as Inflatable or Plastic furniture, and easily assembled, such as the IKEA line, will ease the burden of setting up housekeeping again after a devastation such as a pole shift. A humidity proof Mattress is available. The Hammock is dry and portable. Bamboo furniture can be secured with bamboo pins.

Troubled Times

TOPIC: Products

Such household staples as Soap can be made from simple homemade ingredients using a few Basic Steps. Rendered fat, Ashes, or soap plant extracts such as from the Yuca Plant are the ingredients. To make civilized soap per Elaine White, collect Lye and the proper Equipment, and then follow a 10 Step Procedure and these Recipes. There are web sites on soap making available. Basics such as Vinegar and Baking Soda have many uses, but baking soda is Difficult to produce whereas vinegar is simply fermented from Acid Foods and Easy to make. Borax is a natural salt. Natural Cleaning Solutions are available, along with Techniques and Substitutes for many modern products.

Troubled Times

TOPIC: 

Clothing

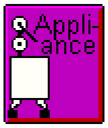
A return to Spinning and Weaving or knitting cloth will occur. Spinning Wheels are available, to make thread from wool, cotton, or to make flax into Linen. Sewing Machines operated by a foot Treadle are available, and electric machines can be modified. Felting is easy to do. Climate changes will result in Temperature Extremes and Conditions not anticipated. Space Blankets insulate well. Various Materials differ, and clothing in Layers or Mummy Bags help retain heat. Cotton does not insulate as well as Polypropylene, but the Natural Fiber debate continues. Fire Retardant clothing is available. We need to be Resourceful and think creatively. Dog Hair can be spun into yarn. Tanning hides provides durable leather and furs for warmth. Usenet archives provide information on Rawhide, Scraping, Dry Scraping, Wet Scraping, How Much, Brain Tanning, Braining Steps, Soap Tanning, Smoking, Softening, Inuit Women, Bird Skins, Resources. Needle & Thread will be valuable items, but Natural Needles are available. During the pole shift there might be Firestorms so fireman suits for rescue missions may be handy. Durable clothing will be much appreciated, and Army Surplus and Second Hand clothing or Closeout Sales are inexpensive. Boots made by Sorel or La Crosse are excellent for cold weather, and Mud Walking boots are available too.

Troubled Times

TOPIC: Surplus

The US Government spends millions in taxpayer’s dollars to acquire equipment that has been tested to be durable and dependable in a wide range of conditions, and then liquidates it to the general public for pennies on the dollar. Many Good Buys are available and where some of the items are used much military surplus is right off the shelf - brand new! Catalogs are available from dealers who secure the goods at Auctions. Regular Swap Meets are also held.

Troubled Times

TOPIC: 

Appliances

A lesson recently learned from Third World countries is that Cook Stoves can be up to four times more efficient by simple changes in design. Brick Ovens retain heat. Refrigerators such as SunFrost are more Energy Efficient. A Gas Refrig has pros and cons. A non-electric Clothes Washer or Sewing Machine are available. Lehmans and Jade Mountain specialize in non-electric goods for those who live simply, like the Amish. Hot or Not offers chemical free water treatment.

Troubled Times

TOPIC: Pottery

Pottery is basically clay from the earth, fired in a kiln such as the Romano-British kiln or Sawdust Firing technique. Making pottery is a Simple Process, requiring Clay Soil and a Temper, then Working the clay to the right consistency. Firing is a one or Two-Step Process.

Troubled Times

TOPIC: Transport

Going on Horseback may still be an option. Carts such as a garden or Hunting Cart can be used, and solid Tires are most durable. Dinghies can be attached to the sides. A Wind Car using the wind and car parts is an option where the land is flat land. Electric vehicles, such as an Electric Tractor with a Series Motor, home made from Converted Cars or purchased, can be Recharged, but there are Problems. Bikes in a world without roads or paths may not be practical, but on the flat a Quadracycle might be just the thing! Snowshoes and skis facilitate travel overland in winter. Electric Boats or Poke Boats or Portable Boats in an encroaching water world are a practical choice. On flat land, Motor Homes or trailers offer the potential of a home on wheels, Parked well ahead of the shift. Cars or Trucks could likewise serve a dual purpose of pre-shift travel and then a shelter. Cooking oil is a Diesl Substitute.

Troubled Times

Metal Roof

After seeing how nursery's and landscape business prepare for winter here in my part of the country, this idea intrigued me also many months ago. Just the snow roof placed on the ground might suffice in emergencies.

Offered by Debra.

Troubled Times

Temp Dome Tents

ArkaTents, makers of dome tents
3856 Highway 88 East
Mena, AR 71953
501-394-7893
Contact

Canadome, makers of tent domes
7651 Avenue de la Seine
Montreal, Quebec, Canada

Geo-Built Tent Rentals, makers of geodesic tents
Charles E. Leet
1420 Kiser Lake Road
St. Paris, OH 43072
513-663-5017

Intergalactic Tool Co., makers of portable tent domes
1601 Haight Street
San Francisco, CA 94117

Kyner Shelters, makers of protable dome shelters
6404 Sunburst Lane
Box 381
Cashmere, WA 98815
Paul Kyner
800-747-5963
509-782-1296 Fax

North Face, The, makers of geodesic tents
Hal Klopp & Bruce Hamilton
999 Harrison Court
Berkeley, CA 94710
415-527-9700

Shelter Systems-OL, makers of large dome tents and greenhouses
244 West O'Connor
Menlo Park, CA 94025
Bob Gillis
415-323-6202
415-323-1220 Fax

Troubled Times

US Calvary

The US based company **US Cavalry** 1-800-777-7732 sells very good looking tents in prescribed dome shape. They are called **Mobiflex** shelters - used by military and tested for high winds. They can be connected together . Price for 115 sq. ft, 8'6" tall and weight 94 lb.. - 2700$ smaller model 118 sq. ft, 4'10" tall and weight 59 lb.. - 1800$

Offered by Chris.

The Hub

Troubled Times

Dome Stability

I have dome tent that I used all through the 80's before I got a pop-up camper. I saw it hold up to an approximate 50-60 mile per hour gust of wind off a lake (bent in a little) when every other regular structure went down. Its structure is longitudinal like the longitudinal lines on the planet earth with a tie connection at the top. The structure is fiberglass poles which serve as the exoskeleton with the inner part of the tent suspended from the poles. There are tension ropes inside the fiberglass poles. A rain fly on the outside of the pole provides water-proofness. If you used PVC poles connected to a solid base, it might be an additional idea.

Offered by **Eric**.

Troubled Times

Hand Made

Here is a description of a portable dome you can make yourself. This is a description of one that is about 17' in diameter x 14' tall, made with 25 10' pieces of 2" PVC pipe. The dome might be made larger by cutting each pipe in half and slipping the ends inside a slightly larger pipe, with a few sheet metal screws to keep the pipes from sliding.

1. Each end of each pipe is attached with a 5/16" bolt to a steel tab made from 6" of stiff galvanized strapping material with holes in it.
2. The hubs are made by putting another 11 bolts through the free ends of the tabs.
3. The lower 5 hubs are bolted through the treads of 5 used "foundation" tires filled with gravel.
4. This structure will be covered with Bayer "Dureflex" urethane plastic film, which is fairly clear, costs about 35 cents/ft^2, comes in rolls up to 15' wide x 0.006" thick, and has a 10 year guarantee. (Greenhouse polyethylene films are chemically incompatible with PVC.)
5. The film will be attached to the pipes with some 2" electrical conduit cut lengthwise in thirds.
6. The film on the walls will extend about 2' outwards from the dome, laying flat on the ground, and that film will be covered with some gravel to make a fairly airtight seal.

Offered by Glenna.

The Hub

Troubled Times

Shepherds Tent

We are looking at what is called a Shepherds Tent. The tents the Wilderness Outfitters use. They are huge and the cost in substantially less that the Yert.

Offered by Mary.

Troubled Times

Temp

Mobile Homes

In the last couple of hours I have been searching the net for pages about home-made mobile homes and caravans and quite frankly I am amazed at the stuff I found. The mobile home option is one that would warrant serious looking into as a post pole shft solution. Either as a permanent home or as removable top on a pickup or similar vehicle. A welded square steel-tube construction with sheet-metal riveted to the outside, glass-wool as insulation and plywood as an inner material appears not only to be feasible but a very good choice indeed. In addition, if you already have a pickup a removable top can be made on shoe-string budget with a lot of the materials gotten free/cheaply from a scrap yard and as leftovers from a local sheet-metal shop, the only "real money" part of doing this would be a good mig/mag welder and those can usually be rented cheap if you don't already have a friend that owns one. Even if this isn't a primary option for post pole shft survival it is so quick/easy/cheap that it makes a backup solution that is just too good to not pursue.

As additional protection attachment points for metal plates (sheet) can be welded around the vehicle so that one can attach plates around the vehicle going down to the ground and shovel dirt over the edges, making for good protection against the "fire-walls" that might occur. Maybe some extra attachment points to allow the windows of the vehicle to be covered up. One could also make a trailer to tow behind a vehicle and it could be made to handle terrain as well.

Offered by Thomas.

That sounds like a great suggestion, San. I've been having similar thoughts of a four wheel drive plus trailer. I was thinking that digging a trench to partially bury the car and perhaps completely cover the trailer, might be a great compromise given the time remaining to prepare. The total mass, combined with the weight of the soil would keep it pretty stationary. Why not a mobile home or caravan, indeed. The only issue I see is soil liquefaction in the "Big Shake". I would hate to find myself sinking below the surface to die slowly, with my family, from asphyxiation. So, I was thinking of pre-digging the trench and pouring a concrete slab with some solid footings. Maybe incorporating some eyelets to secure the vehicle to. Not too deep below ground level, say 5 feet or so. Hopefully this would float a little better than the car on it's own.

I guess if you had the chance, one might lay a complete floor plan for a post-pole shft dwelling. A bigger, continuous slab of concrete may even improve your buoyancy if liquefaction does occur. In fact, thinking about it, if one had the means it may be a good idea to secure all your possessions, tools and resources to this concrete floor plan and bury the lot. All ready to dig back up again and begin building your much needed shelter when the dust settles. An earth bermed house. You can fit a lot of stuff on a house slab, maybe even pre-constructed roof trusses and wall frames or other construction materials. A caravan or mobile home would prove a great temporary shelter until you could construct your primary one, I agree. But would a concrete slab keep one from sinking below ground?

Offered by Gino.

The Hub

Troubled Times

Blue Tarps

I am not sure about other countries, but here in the US, we have those blue tarps that come in many sizes. Alaska is full on those things. In fact, I am building a chicken coup for those chickens I have that *better* lay eggs. I am covering the out side with those blue tarps. The stuff lasts for years. To stretch a tarp over a non-waterproof structure, put an eye bolt mounted directly in the center on top of the structure. From this, stretch ropes out to the ground at what ever length you like. You could use four ropes, six ropes, eight ropes, etc. Then these ropes can be fastened to the ground with tent pegs.

Offered by Clipper.

Troubled Times

Survival Sacks

Posted on owner-primitive-skills-group@uqac.uquebec.ca on behalf of John Wiedenheft

In the April 97 issue of *BackPacker* magazine, there is a small article on survival sacks. These are basically big rectangular bags, waterproof and windproof, which you crawl into for shelter from the elements. The author of the article tested two versions, one by MPI, made out of an aluminized mylar (space blanket type) material, and the other by Coghlan's, made out of 3 mil polyethylene. Both were 3 feet wide by 7 feet long. The author tested both on numerous occasions, simply by crawling into them and attempting to spend the night comfortably under various conditions. I went down to the local building supply house (thanks for the tip Andy!) and found some yellow colored plastic bags, made from 2 mil polyethylene. They had this same size and even larger. (I wish I could find a clear version - then the bag could double as a transpiration still.)

It seems to me that a much improved variant on the survival sack would be to stuff it with leaves prior to crawling into it, like a debris hut. This would add lots of insulation to the sack, in effect creating a large waterproof sleeping bag. Debris huts always have lots of sticks and other stuff that can puncture plastic bags in them. The author of the article did test the bags for toughness by poking toothpicks through them and making 1 inch cuts in them to see if they would tear. The polyethylene bag was much more resistant to tearing, although it was heavier (9.5 oz.) and also a bigger package to carry (6 in x 6 in x 1 in).

Yesterday I stopped in at a marine emergency supplies store. They specialize in life rafts, flares, water desalinators, strobe beacons, and yes, they even had a solar still kit! On the clearance table there was a "Survival Bag", similar to the two just described, except that the material they were made out of was very tough, like those mailing envelopes that you can't tear open. This Survival Bag also had a hood with a draw string and a zipper to get in through, instead of just being open on the end. I asked them if they could get more of these, but they said no, this one was purchased as part of a life raft/survival package, the life raft had been damaged and they were selling this survival bag from out of the kit.

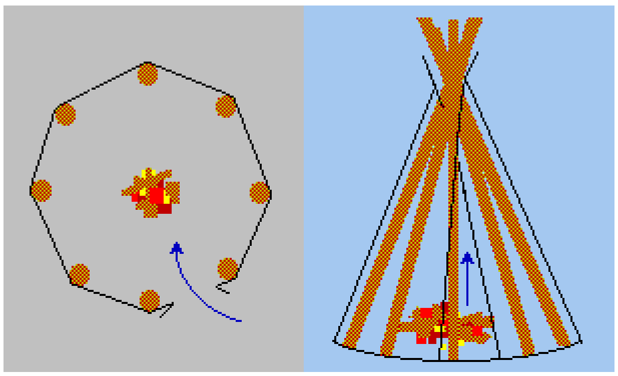
It is called the **ThermoSafe Survival Bag**, made by Nauteknik A/S. This company is located in Oslo Norway.

The Hub

Troubled Times

Temp Teepees

12 long pieces of wood of similar thickness and length make a teepee. The length of the wood determines the diameter of the teepee. It can be tied together at the top with rope, and or strong vines depending on availability. The outer casing is historically animal skins sewed together, but could easily be a tarp, the thicker the better. This naturally will give you a hole at the top for allowing smoke to exit the teepee.



Teepees can be purchased complete with stove for $1695 and 225 sq. ft. of living space (sleeps 6), and weighs just 115 lbs.

Offered by John.

The Hub

Thatched Sapling

Afterwards you won't need a structure like this. You wouldn't be able to build it while the winds were howling or the cold was freezing both you and the concrete anyway. When everything calms down the best type of structure would probably be similar to that built by Native Americans for centuries. Then we would probably just dig a big circular hole in a well drained place, with earth floors and trees bent to a dome shape for the roof. Thatched or whatever's available in pieces of old structures, etc. With a big hole in the center of the roof for the smoke to exit.

Another good Indian trick for temporary shelter is to find a cluster of saplings and bend them over and tie them to each other without cutting them down. They are already anchored down and after being bent can be thatched, etc. to provide reasonable cover. When you leave just remove the rope you used to tie them up (you'll want to keep that anyway) and everything is restored to its original natural state. The Earth Mother would smile on you for that and other poor wandering souls would be able to re-use the same camp in the future instead of finding a bunch of rotting logs.

Offered by **Ron**.

Troubled Times

Nomadic

Teepees and yurts are great as a temporary dwelling solution, while you're building your regular house. They should not be considered for permanent residence. There are many reasons, mostly having to do with comfort. Adding rooms or structures to your existing dwelling, for instance. It's not as efficient to add another teepee to an already standing one, than it is to add a room to a wooden house. Houses are generally better insulated against extremes of heat and cold. Plumbing and other structural elements can be hidden within the walls, they don't need to be in plain view and spoiling the scenery. Houses afford larger living space and better privacy. In the yurt, the entire Mongol family lived in one room, together with their live-stock. We've advanced a bit since then.

The point is, after the worse of the pole shift is over, we can start building permanent settlements, with permanent materials. There will be time enough for it. When life settles back to normal, which is the period I think you're talking about, we won't be living 'on the run', like the people that invented teepees and yurts. So we will not need to use their type of dwellings at that late stage, only, perhaps, in the interim, when we emerge from the enclosed shelters that will keep us alive during the changeover, and before we actually erect our permanent houses or domes.

Offered by Shaul.

The Hub

Troubled Times

Temp

Semi-Permanent

I've been thinking about Tipis and/or Yurts as housing options after the pole shift. It seems to me they would have advantages such as ready assembly, durability, adaptability, portability, and energy efficiency. Although the idea of a permanent home is appealing, I'm sure it will ultimately be more in the way of a log home or rough timber-framed home. Even in todays world, I would not have the capability or know-how or supplies to put a standard house together, and certainly not after the pole shift with a shortage of materials, no stores, near constant rain, and erratic weather. I can't imagine the prospect of putting such a home together, at least not for awhile. Yurts and Tipis are temporary but could probably last some time to get us through the periods of uncertainty. Perhaps domes too could be put together in this way (if in kit form), quickly after the pole shift for people with limited skills. All of these options have remarkable efficiency/strength/cost-effectiveness/adaptability. I think the key here is having everything needed, having it survive the pole shift and having it ready to go - no small task.

> Offered by Craig.

Not all of us will have materials to build permanent structures, at least not for some time. Lets suppose I have all my tools and materials safetly buried and after the pole shift I am unable to get them for whatever reason, I also have a leg which is broken and which heals wrong so I have no stamina, and also suppose I have people with me that know nothing about structures. The yurt or tent would do indefinately.

> Offered by Mary.

The Hub

Troubled Times

Plywood Boxes

Wooden and/or metal storage boxes after the pole shift can be used in various ways as housing materials.

Bricks

Plywood boxes that are rectangular say 1 feet high by 2 feet wide by 1 feet deep would stack like bricks to make the walls of a house. Sheet rock screws used through the ends would hold them together horizontally. A hole about 5"-6" (square or round) cut in the bottom of each end of the box. Reinforcing rod run through each of these holes up to the roof line. Mud poured in from the top would hold them together vertically. The lids could be used for shingles for the roof. Or the lids left on the box with holes in them for reinforcing rods. Caulking or mud to seal any air leaks (mostly the ends of the boxes).

Shelving

For those who have had or expect a shortage of shelf space. Use Plywood rectangular boxes 1 feet high by 2 feet wide by 1 feet deep. Stack like bricks with the open top toward the inside of the building, to make a shelf. Use sheet rock screws to hold them together. Use tar paper on the outside to seal it. Finish with siding or thermal insulation and then siding depending on how cold you expect the weather to get.

Note: In both cases it would be more optimum to use plywood with exterior glue, sprayed with a water sealer, and anti-terminate preservative.

Offered by Mike.

For those that have the resources to either acquire or build storage boxes in which to keep their supplies, this is a good idea. After all, what are they going to do with the boxes once they dig them up? If the boxes were built or purchased with this idea in mind, there would be a logical end result. Those of us that do not have the resources to plan ahead this far will be looking for shelter (if they survive) and might come across a group that had the resources to prepare in this way. These less fortunate will gladly except a shelter assembled in this manner.

Offered by Roger.

Troubled Times

Temp Circular

A Survival shelter that I can recommend is kind of difficult to explain. I'd have to draw it for you. But it's a round shelter, it's walls are stacked walls, with four poles going up in the center which surrounds the fire pit, Bracing the poles are beams tied around the top of the poles. Now. Put long poles all around on top of the stacked walls for the roof leaving enough room for a smoke hole. Then put slabs of bark or whatever on top of the logs, and gather up a huge amount of leaves and brush and pile it on. It should be twelve feet wide from the inside of the stacked wall to the other inside side. My friends and I made one and has kept us warm whenever we camp out in it in the winter, and cool in summer.

Dave McMullen
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Graphic by March Besse

The Hub

Storm Shelter

The old saying where I live is "If you don't like the weather wait ten minutes". A friend and I where hiking on a long day hike in the Cascade mountains one spring day when a fast moving storm overtook us. We where 8 miles in and had now way of returning in the storm. The storm hit fast it brought 70mph winds with hail. We would have probably died of exposure if we tried to hike back in the storm. There is no way in hell we could have constructed a debris hut. I have found that in a survival situation sometimes it is just not feasible to construct these shelters in time. The solution was to find a stand of low growing Silver Fir and Cedar Trees. Round up as much debris and line the base of the trees with the debris and climb in. This makes an excellent first need survival shelter. The storm passed as quickly as it came and we decided to hike out before dark. Both my friend and I where prepared for wet weather, but you add the wind and hail stones in and you have a dangerous combination.

On our way out it was already getting dark and we came across a unprepared family stripped down to their underwear shivering around a fire the father had made. Their clothes where all completely soaked. This fire did not seem to help them much because the wind was stripping away all the heat from the fire. We attempted to give some helpful information to the man about some simple survival techniques. He was not interested in listening, the classic I-know-what-I-am-doing syndrome. I always wonder to this day if the family made it out OK. My friend and I found shelter before we got soaked and hiked out toasty warm. We used very little energy to build our shelters and got in them quickly before the worst of the storm hit. Sometimes the simplest shelter can make a big difference. I think this type of shelter is often overlooked but they work well for me.

March Besse

Troubled Times

Debris Huts

They do take awhile to make, and I find that no matter how well I build it , it takes 2-3 nights before I am truly warm. After that it is only every few days that I have to add more debris, plus dry it out, etc. I'll also add bark to the outside when I have it thick enough. The big tradeoff is that I don't have to waste energy gathering more wood to keep me warm all night in a bark shelter. I have also heated football sized rocks and brought in as a space heater (keeping it away from the debris!) for really cold nights, or when I wasn't able to make it as well as needed for the temperature. Also used heated rocks in thatched huts.

I have built them after dark, but it's much slower. Another method is to make a big leaf pile (or pine needle) and just crawl inside that. With some bark and/or hemlock boughs on top, it'll stay pretty dry and get you through the night in a pinch. I learned a good method of gathering the debris while I was a kid from watching my pet skunk. He used to "borrow" any clothes left lying on the floor, and would gather these up and take downstairs to his nest behind the dryer. He would gather up as much clothes as he could in his front paws, and then pull them backwards to his nest. I adapted this for debris gathering. I get down on all 4's, gather up as big of a pile in my arms, and then scooting backwards and raking them towards me, I can usually keep the pile the same size (if not bigger) by the time I get back to the shelter and then toss it on. also a forked stick as a rake helps a lot and saves your fingers!

A way to increase the amount of trapped air is to alternate 6-8" of debris, 6-8" of small branches, more leaves, more branches, more leaves, etc. This also helps to make the debris go farther. Just makes sure that all the holes are filled, and after a few days and a couple of rains, you'll need to patch it up. The last layer of leaves that I put on is about 1'+ and when I patch it up, just use debris after that. If there is snow deep enough for a snow tunnel, then I'll make one, or just jump into a snowback, enlarge a hole big enough to sleep in, line the bottom with a foot of boughs, and cover the top with limbs/boughs/bark etc. It's a bear making a debris hut with 6" of snow on top of solid frost! When I was a kid we used to make a long fire and then rake it to one side, make a browse bed and sleep on the heated area with reflectors all around.

I have also made thatched huts, but they take a while, so stopped trying to get one done the first day out. If you find yourself lost where it's been logged, a log hogan/cabin may be doable quickly with bark/ debris/ mud/ grasses to fill in the cracks. A Lean-to with a fire and reflectors can also work.. Again, the more debris piled on, the better, both for holding in the heat and keeping dry. I'll make a browse bed and use debris for my blanket (or a thatched grass mett/sleeping bag). Also a small entrance opened out to a fire with a big reflector behind it and to the lean-to to trap in the heat. sleeping long ways to the fire is warmer. Always pay attention to the fire once you start adding debris! That's when I'll switch to rock heaters. I find my lean-to's usually end up as a debris hut anyway (or my debris hut starts out looking like a lean-to.

All in all, it comes down to location. If you have lots of firewood and little debris, it makes the choice for you.(and vice versa). I have been in more situations where I knew I could make a fireless shelter where my body heat does the work, versus getting a fire started for sure, and having to make that important first choice correctly, I'll usually go for a good thick squirrel nest over a fire.

Bruce Carroll
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The Hub

Troubled Times

Debris Tips

Ah, Debris huts. Well, I've slept in 'em many times with many different variations. Some simple, basic rules:

1. It usually takes a couple of nights to work out the kinks (i.e. find and fill all the nasty little draft holes, water pathways etc.)
2. There is usually always something that will work in a pinch if oak leaves or the equivalent aren't available, but there are exceptions as far as time of year and locations)
3. They can indeed keep you dry in a drenching rain storm and will keep you warm if you build it right.
4. It does take considerably more time to build a good one than 1/2 hour (although there are folks that claim it can be done in this time). Usually takes me about 3.

Other things that I have learned and tricks that help are:

Layering

If you are in an area where there is not a lot of good insulating material, a layers of sticks followed by smaller layers of what debris is available improves the insulating capacity of the materials you do have.

Best Insulation

Oak leaves or grass (preferably hollow stemmed) make the best insulation hands down! Followed by other types of hardwood leaves with pine needles taking a distant last place.

Other Material

Other materials will work in a pinch. I have slept in a debris insulated with sphagnum moss and small layers of leaves, sticks and pine needles. I was warm with a light shirt on, but then the temp. never dipped to far below 60F that night. I did take the precaution of covering the moss with slabs of birch bark to elevate the sponging (and thus drenching action). I stayed dry and warm through a drenching downpour that soaked other people in tents. Another material that probably would work as a supplemental material in a pinch would probably be dried cattail leaves. I personally have not tried this, though.

No Debris Available

There are times when there is simply nothing available to insulate with, or at least very little. A stint spent in the Wind River Range in Wyoming required Wickiup type shelters and fires. There just was nothing but sparse grass and very sparse and small evergreen needles. We found ample supplies of dead, punky wood that seemed to work adequately for a Wickiup, but I just couldn't imagine trying a debris hut. Maybe if it was stuffed with live pine branches. Although, it didn't look to inviting at the time.

Size

Size is critical. Think very cozy sleeping bag, not tent. If you have an aversion to cramped spaces this is definitely not the shelter for you. A good door is important in most instances. I keep my opening very small (just barely big enough to crawl in) and usually use a combination of a debris plug and a shirt or jacket if I have one.

My cold record is 21F with a light shirt and a sweat shirt on. However there were very irritating mini drafts that needed to be plugged. I have never used debris that was already wet. I would imagine that using the layering technique I described above you could create enough dead air space to keep you from freezing to death. I think I would try it if getting a friction fire going was out of the question, however if I had other options I can't imagine I wouldn't take them. I have friends that claim they slept in these things naked in temperatures in the teens and were hot. One friend had a woven grass "sleeping bag" inside one at 20 degrees and had to come out he was so hot. He says he slept on the ground then with only the grass bag and was warm. I wasn't there to see it, so I can't verify it.

Mark Zanoni

Debris Drawbacks

If you have enough time and dry material to make a good debris hut, you have enough time to build something better. I had one experience about 25 years ago in what I call a debris hut. ... We built an elaborate lean-to, 8 ft x 8 ft and 3 ft high. This we completely packed with dry leaves, mainly oak. Build time about three hours.Come bedtime we retired to the hut and wormed in, short sleeves and all. My partner came completely unglued after about 2 minutes, where I myself could have probably stayed in the hut another 15 or 20 seconds, but there no hut left to stay in. All the little spiders and ticks took their toll. We exploded from the hut and were left with nothing but a scattered pile of sticks and leaves. Total destruction time: about 5 seconds.

Next day we built a small "dome" using mostly remnants from the first hut. We put leaves on Top and on the SIDES only. We cleared the floor of all debris and put down a layer of dry grass (foxtail type) about 10 inches thick. We actually got a couple hours sleep. Short sleeves didn't go well with the comfort factor. Later in life I've built similar structures and camped in them down to 23 below zero. Of course I took the sleeping bag at that temp, but all things equal, the wigwam type shelter is far more comfortable (to me) and takes about the same time to build.

Max Warhawk
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Troubled Times

Psychological Factors

I stayed in a debris hut at TB's "back to back" for 2 weeks this past year when hurricane Bertha came through. I admit I had 1 small drip which was quickly and easily patched. Temperatures were not very cold, but the hut was very comfortable. Careful smudging helps to eliminate the presence of any previous residents. I used the layering technique. Total construction time was only a couple of hours 2-3. In other circumstances where I would not be out long, or the weather fair, I doubt I would build one (applying the conservation of energy principle. I would seek alternative shelter suited to the terrain. Don't get me wrong, if I could be out for more than a day or 2, and the conditions were right (no snow here in Texas to deal with) then this would be my shelter of choice.

When teaching survival skills for the general public, I teach the debris hut as primary. It does a couple of important things for a "lost" person.

1. It anchors them to a specific area making them easier to find (hug a tree).
2. It helps psychologically since they can now "feel more secure".
3. It is easier to rely on for that extra measure of time to be "found" than relying on that person having practiced fire and shelter skills.
4. It is easy to remember what to do under stress.

Eddit Starnater

The Hub

Troubled Times

Temp Debris Insulation

The only experience I've had with debri type shelter was during a year we decided to camp without benefit of a tent. We stacked dead leaves into a platform large enough to support our sleeping bags. Then we piled more dead leaves on top of the sleeping bag leaving only the opening to wriggle into. Even though the night time temp dropped below freezing we were very warm. I think even a canvas, or blanket bag would have kept us warm under the same circumstances. Oh I almost forgot the old fashion army "rubberized" poncho we pegged over the whole mess to waterproof and wind proof the whole thing.

Jim Burdine
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In general I have found that 3 feet of insulation on top off the shelter is sufficient for above freezing weather wearing a T-shirt and shorts. In freezing weather the thickness will easily go to 5-6 feet. Another thing I will swear by it to stuff to inside to overflowing with leaves. This is the only way to provide enough internal insulation. A good door is essential also. I have gone overnight at 8 degress celcius in a rainstrom with heavy winds in 1 foot of insulation in only a t-shirt and shorts. The wind ripped through the shelter but I did not get wet.

I can usually find dry insulating material underneath logs or thick piles of leaves. I always try to place dry material inside of the hut and wet material on top. Even if wet material is used inside, I have found that body temperature will usually dry it out a little. Of course in an evergreen forest one will have trouble finding enough debris to build a shelter. Green boughs can be used, but you must double all thicknesses. In a pinch you can always stuff your clothes with leaves. This will usually help a little with insulation. I think the main aspect of the debris hut is not comfort but mainly to allow you to survive the night.

Dave Mcmullen
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The Hub

Troubled Times

Temp Moss Insulation

Another quick way to build a shelter is to build a structure out of whatever is available (usually dead wood and "second rate" - the good stuff goes into the bed - spruce boughs), and then covering it with moss (the kind that grows in thick mats on rocks, "armored" with blueberry "bushes"). This moss is virtually waterproof, at least I've have slept dry in some fairly good downpours. Around here blueberry is a low (12-18") "bush" that grows just about everywhere in the pine forests. As is lingonberry and some others, whose Latin names I can't recall at the moment. All do a good job armoring this moss until you can roll off thick blankets from the boulders, lug them to our shelter and roll them out; "instant shelter". If you have the time and inclination you can first cover the shelter with a thick layer of spruce boughs, and use the moss as a water- and windproofing shell. I have slept well in such (unaugmented) shelters wearing a fairly thick wool shirt and hat at app. 40F/5C, no fire or hot rocks.

Par Leijonhufvud
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Sphagnum moss is especially effective as an insulator after it's dry, though. I have found this to be extremely useful, especially in regions like mine where ground debris of any quality is scarce or non-existent at certain times of the year.

Joe Schilling

The Hub

Troubled Times

Warm and Dry

The theory behind a debris hut is that you create insulation around your body. The only insulating material in the world is trapped air. Granted, a debris hut will work in a nice dry environment with lots of debris which create a lot of airspace. Even so, it will take one person many hours to make even a moderately functional model. That's too long! Also, when wet, I'm sorry, but there is no air in water, and in my experience, a debris hut will only work if you make it while it is dry out and it doesn't start raining bad enough to soak it through. Once it is wet, it contains hardly any air, therefore no air space, therefore no insulation. When it is wet and cold out, there is no way that I've ever been able to stay inside a soaking wet debris hut without freezing to death. Seems to me there are much better shelters available, and that staying dry is the absolute priority in survival.

Andre Bourbeau

My experience with the debris shelter is in 15 degree Fahrenheit temperature with about 6 inches of snow accumulation. I tested this shelter under the conditions stated with jeans and a T-shirt and it performed very well. However, I agree with you, it took way too long to construct, took a lot of effort and would be my choice only if I could not do better and/or if there was plenty of debris to build it, easily accessible. I had about 24 inches of debris on the exterior and had the interior stuffed with dry leaves that I packed it full with and packed down 3 times before I crawled in.

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I have used very wet leaves once while in a downpour, and was soaking wet while making one, but when it was done and I crawled inside and took off my wet clothes, I was warm. It was above freezing for that one. I had mostly cotton on (jeans, t-shirt, wool sweater and a nylon jacket). The coldest I've been in one overnight was -10F. I didn't have the door well made and it leaked cold air the whole night, but I was able to sleep for most of the night, and make it warmer by the 2nd night. I was wearing wool pants/shirt/jacket/hat/mittens. I just used debris (the fluffiest dry leaves I can find, or grass and ferns) for inside, and stuff it completely so I have to jam myself in. It may take 5+ minutes to wiggle my way back in with the toes pointed.

After one is properly made, it will remain dry! I make mine with a min. of 3' of debris on the outside (4'+ for -20f and colder). Wet, dry, it doesn't matter much, just make it thick. I have been inside during flashfloods (6" rain over night) and stayed dried. If not made well, you will get wet. Some bark on top will also help keep it dry. I have one I made a few years back, and it still remains dry inside, even though I haven't done any maintenance on it for a year.

Bruce Carroll
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The Hub

Troubled Times

Rock Overhang

An overhung concavity in the side of a rock or cliff with a small fire in front, facing across the wind rather than away from the wind.

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Troubled Times

Pit Shelters

As for pit shelters with coal beds, here is the generic form: Dig a grave, long enough for your body, plus a foot or so extra, and deep enough so you can lay down, but can bend your knees without touching the ceiling (I like lots of roll-over room). Then dig down another 6-8 inches for the hot coal bed. Digging takes about 2 hours with a stick. Start a fire in the pit and burn hot for 1-3 hours, depending on soil moisture (burn time not included in total construction time). A hot coal bed on the surface will produce steam when the dirt is put back on it, but in a pit shelter you can cover the coals with the now-dried dirt from the pit walls. The dirt puts out the coals, what you want is the hot mass of the ground. This covered, put a roof of sticks/logs across most of the top, except for a narrow doorway at one end. Cover the roof with debris to fill the cracks between the sticks, then cover with earth.

Properly constructed you can sleep in shorts and a tee-shirt, without ever closing the door, down to about 20 degrees F. A coat draped over the hole is sufficient for a door if necessary. For successive nights, fill with debris (an underground debris hut), or make the pit extra wide and bring in a row of football sized hot rocks along one side. There are unlimited variations on the pit shelter, hybrids with other shelters, some partially above ground, door at the end instead of straight up. Utilizing natural pits can significantly reduce the dig time. My favorite is to move into a pit created where a tree has fallen over, pulling a plug of earth out with it's roots. (This can only be done in damp weather, otherwise the fire may enter the roots of the tree and emerge days or weeks later.) Also herbs can be placed on the floor of a scout pit for a medicinal steaming.

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Troubled Times

Airtight

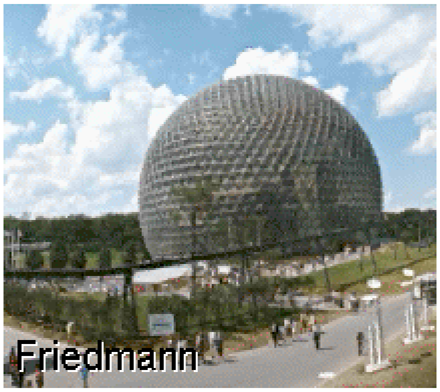
Set up an after pole shift building that would provide a huge amount of shelter, assuming there is ample electrical power. It is a dome shaped structure that is made of a light airtight material with metal loops around it. Several fans (this is where that large amount of electrical power comes in) blow in air to keep the dome aloft by air pressure. Entrances to this thing are like quasi airlocks. Ropes are connected to those metal loops, by the way, to maintain structural integrity. Does this sound far fetched? Well, it’s not, my tennis club back home actually uses such a device to cover 5 or 6 tennis courts at one time during the winter. The cost of the thing, I'm sure, is rather hefty, but it could be purchased by a community (or even later constructed from by salvaged materials). The beauty of this idea, is, of course the large space, but also the fact that it is so large as to house everything a growing community might need. The only problem with this is that the air is not going to be very clean, and I'm afraid that filters may get to too gunked up with the large amount of soot contaminated air entering the structure.

Offered by Ted.

The Hub

Troubled Times

Geodesic Dome



The Hub

Troubled Times

Great Strength

To consider domes monolithic or geodesic? Consider the same for bridges, the ones which are huge, massive structures of rebar reinforced concrete, square forms, few arches, basically post and beam like design. They are built extra big because their design and materials are inherently weak and ready to fall or crumble. Now consider the arched bridge over the New River gorge in West Virginia. It is an arched truss type bridge. It weighs perhaps half that of a bridge of equal span or area. Why? Because it was nearly built right, though it is still huge and overbuilt by geodesic standards, even while there are some geo-elements in it.

What you want is structure which is either flexible and light or strong and rigid. The best, though, will have elements of each. A geodesic dome is inherently stronger than the monolithic dome because it is lighter and its structural integrity is made by the standard laws of the universe. The monolithic dome follows few if any of these laws. The strength of any given material can affect this, as determined by the integrity of the connections of the materials used to build with, the strength of the materials themselves. Given the same material, the geodesic dome is far stronger. The monolithic dome has so much weight to it that it barely holds itself up, having also few integral connections (of that special strong shape we all know of as the triangle) to hold itself together.

Offered by Steven.

The monolithic dome also has great strength. Consider the test - a shell on a sea urchin, for starters. Monolithic domes are based on the arch - a universal structural form, if there ever was one. Both geodesic and modern monolithic structures are strong. The geodesic simply adapts a series of planes in a geometric configuration to make a "spherical" form. This made construction of domes simpler and easier until other options (like monolithic ferro-cementing) became equally viable options. The monolithic dome is a continuous hemisphere, without the "breaks" defined by the triangular shapes that characterize the geodesic dome. Thus, there is a continuous rounded surface, like a ball, that is constructed in one continuous whole (monolithic) and not in the connected triangles that give the geodesic it's unique "pointy" look.

Offered by Granville.

Troubled Times

Geo-desic EDEN Project

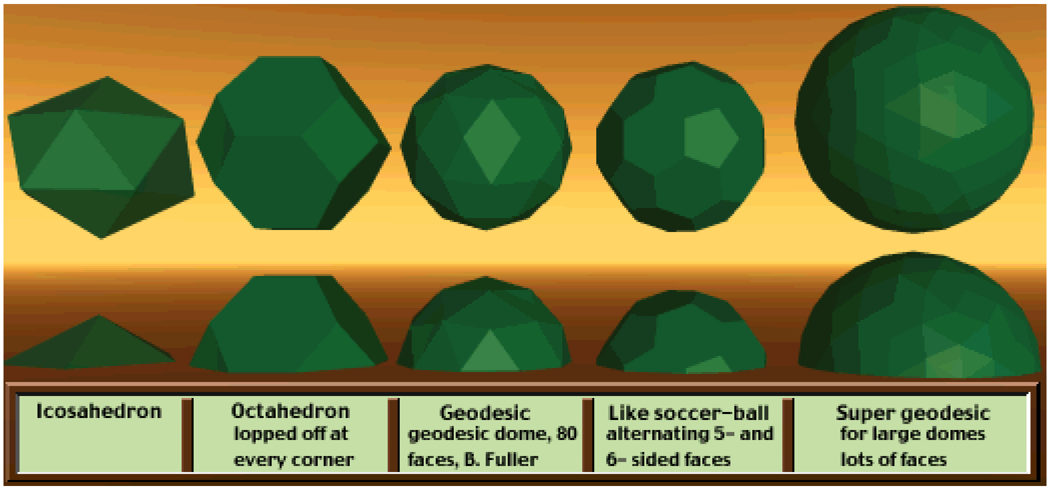
At Cornwall in England, scientists are trying to create the 8th wonder of the world, the EDEN Project. On the foundations of an old quarry, they are building a garden in which 3 different typs of climates will create the best atmosphere to all kinds of growings. The 3 geodesic domes of the projects are made from an interesting material called ETFE which is lighter than glass and seems to stands perfectly against all kinds of rays. the domes are 2 meters (!) thick. It will be open for visitors next summer, and the enormous size of the project reaches the size of 35 football fields! it will contain 80,000 different types of plants. The founders, 3 british scientists say that their mission is to show the crucial dependence between human kind and our beloved planet.

Offered by Linton.

The Hub

Troubled Times

Geometric



Graphic by Michel.

Troubled Times

Geo-
desic

Triangle

There's a million ways to subdivide a sphere but the geodesic is the only really strong way to do it. A triangulated sphere will collapse, as well as quadrilaterals. I've spent time with different models of these and only the geodesic works. This is to save others the trouble: geodesic frameworks have to be precise and other geometry's aren't worth the bother. The sticks you build the dome from have to be measured with precision, when you bolt or tie the structure together, its angles should self-align. Also worthy of note is that a geodesic is probably stronger from top stress then from side stress, meaning that it would survive a car being dropped on it better then a car driven into the side. Of course it ought to be pretty transparent to wind nevertheless, and relatively strong.

You probably get a tradeoff between dome shape and impact strength. A half-sphere dome (as if cut from a perfect sphere) may be stronger then one with a lesser arc - which would be more aerodynamic. So a lower profile dome may be more susceptible to damage from debris flying around during a tornado, but may be more transparent to the high speed winds. Depends a lot of materials I guess too. And finally, it's possible to create immense geodesics. One starts at the top, and adds pieces to the bottom, gradually pushing the structure up to completion.

Offered by Joe.

The Hub

Troubled Times

Dome Manufacturers

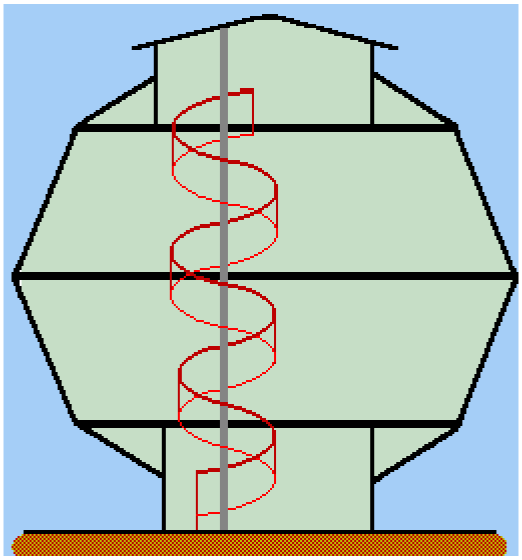
Information on geodesic domes and their construction is available on the web:

> **Faze Change Produx**, Econ-O-Dome Kit creates Insulated and Finished Inside dome. They state that for more than 20 years, they have been dedicated to designing dome packages.
>
> Archway Construction state that they build homes anywhere
> Kelvin Bailey - President
> Tyler, Texas
> (903) 566-9631
>
> Dome Habitat Foundation
> 255 East 400 South, Suite 150
> Salt Lake City Utah 84111
>
> Lotus Dome are a new form of architecture designed for environmentally progressive facilities.
>
> **Weldco Domes** can be extended to be larger. Located in Kentucky, with inventory in stock. Just picture welding 8 or 10 of these things in a circle around a central plate to get the dome. Man this thing would be indestructible.

The Hub

Troubled Times

Good Karma



Good Karma Enterprises has had 25 years of experience in building geodesic domes. The basic structure is Icosa Hedron, a hub and bolt system. Available are 3,4, and 5 Frequency domes and elliptical domes. The domes range from 10 ft to 100 ft in diameter. The domes range from 10 ft to 100 ft in diameter, and are either do-it-yourself kits or custom on-site construction.

Good Karma Enterprises

Mr. James Lynch
3531 SW 42th Street
Oklahoma City, OK 73119
(405) 685-4822

Let me be blunt, contractor's are building houses the way they did 2,000 years ago. Squares are not structurally sound. That's why they put that big triangle on top (roof), then the roof weighs so much you have to put all these walls under it for support. A huge waste of material and labor that you end up paying for. In conventional housing the roof area is wasted space. They won't stand up to hurricanes, tornadoes or even earthquakes with any fair comparison to the geodesic dome. The sphere is one of the strongest structures known to man, enclosing the most amount of area with the least amount of material. A mathematical maxim, nature builds round. The sphere is the most wind resistant structure. Air also circulates naturally in a round structure so it costs less to heat and cool. Energy efficient.

James Lynch, President
Good Karma Enterprises

Note: Prices quoted below are 1996 prices.

Fair Play Series

We try to customize our domes as much as possible. If you want to cut out and build your own dome, I will furnish a list of materials and details of how many struts with length and angles, along with a diagram for erection. I would advise this only for a professional carpenter to construct.

3 frequency, any size to 30 ft. diameter	$500
4 frequency, any size to 50 ft. diameter	$750
5 frequency, any size to 60 ft. diameter	$1,000

Whirlaway Series

Dome kit consists of struts cut to length with axial angle dehidrial angles and heavy duty hub.

* 4 freq. hemisphere, 2x6 strut, up to 40 ft. dia. 1256 sq. ft. - 2000 sq. ft. with loft (loft not included)	$4,200
* 5/8 4 freq. 2x6 strut, up to 40 ft. dia. 26 ft. ceiling	$4,800
* 4 freq. 2x8 strut, up to 40 ft. dia.	$5,400
* 5/8 4 freq. 2x8 strut, up to 40 ft. dia. 26 ft ceiling.	$6,000
* 5 freq. hemisphere, 2x6 strut, up to 40 ft dia.	$5,400
* 5/8 freq. 2x6 strut, up to 40 ft. dia.	$6,000
* 50 ft dia. 1890 sq. ft. with 1.2 loft 2840 sq. ft.	
* 5 freq. hemisphere, 2/6 strut, up to 50 ft. dia.	$6,800
* 5/8 freq. 2x6 strut, up to 50 ft dia., 30 ft. ceiling	$7,400
* 5 freq. hemisphere, 2x8 strut up to 50 ft. dia.	$8,000
* 5/8 freq. 2x8 strut, up to 50 ft. dia., 30 ft. ceiling	$8,400

Man-O-War Series

Our most complete Dome Kit is called the Man-O-War series, after the great race horse man-O-War. It incorporates the strongest method of building a dome. Using double struts and no hubs. It is also the easiest to erect. Panels are already insulated with 2 1/2 inches of foam (approximate R value=30). The exterior sheeting, 1/2 inch plywood, is in place, as is the interior sheetrock. All that is required for the come is: shingles, stucco or your choice of weather proofing.

* 4 freq. hemisphere, 2x6 strut, up to 40 ft. dia. 1256 sq. ft. - 2000 sq. ft. with loft (loft not included)	$12,000
* 5/8 4 freq. 2x6 strut, up to 40 ft. dia. 26 ft. ceiling	$14,000
* 4 freq. 2x8 strut, up to 40 ft. dia.	$14,000
* 5/8 4 freq. 2x8 strut, up to 40 ft. dia. 26 ft ceiling.	$16,000
* 5 freq. hemisphere, 2x6 strut, up to 40 ft dia.	$16,000
* 5/8 freq. 2x6 strut, up to 40 ft. dia.	$18,000
* 50 ft dia. 1890 sq. ft. with 1.2 loft 2840 sq. ft.	
* 5 freq. hemisphere, 2/6 strut, up to 50 ft. dia.	$22,000
* 5/8 freq. 2x6 strut, up to 50 ft dia., 30 ft. ceiling	$24,000
* 5 freq. hemisphere, 2x8 strut up to 50 ft. dia.	$28,000
* 5/8 freq. 2x8 strut, up to 50 ft. dia., 30 ft. ceiling	$30,000
* 60 ft. dia. 5 freq. start at 2826 sq. ft. first floor, 2826 sq. ft. second floor (5852 total square footage)	$28,000

The Hub

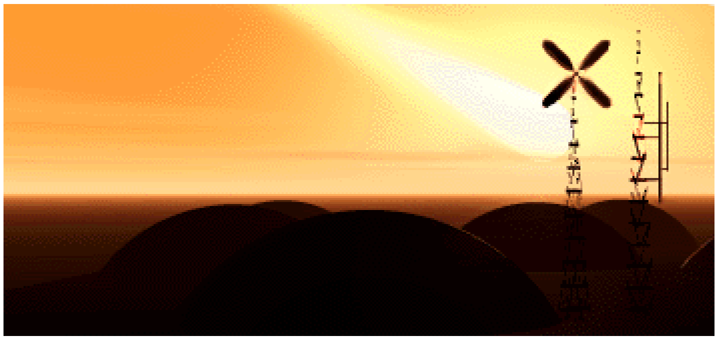
Troubled Times

American Ingenuity

Hurricane Bonnie has caused the television program *Inside Edition* to give attention to geodesic domes. *Inside Edition* reported on domes made by a company called **American Ingenuity**. Apparently their domes are guaranteed hurricane and earthquake proof. The television report said that the dome kits go for around $18,000.

Offered by Charles.

Domes



Graphic by Michel.

Troubled Times

Indestructible

Excerpts from an article called **The Monolithic Dome** in the winter, 1997 issue of *ROUND-UP* magazine, compiled by Dr. Arnold Wilson, a leading engineer in thin wall shell concrete construction

> The monolithic dome is probably the most disaster resistant building that can be built without going into a mountain or underground.
>
> It is predicted that a wind of 70 miles per hour blowing against a 30 foot tall flat building in open flat terrain will exert a pressure of 22 lb./sq. ft. If the wind speed is increased to 300 miles per hour, the pressure is increased to 1004 lb./sq. ft. Wind speed of 300 mph is considered maximum for a tornado. It is far greater than that of a hurricane. It is predicted that a wind of 70 miles per hour blowing against a 30 foot tall flat building in open flat terrain will exert a pressure of 22 lb./sq. ft. If the wind speed is increased to 300 miles per hour, the pressure is increased to 1004 lb./sq. ft. Wind speed of 300 mph is considered maximum for a tornado. It is far greater than that of a hurricane.
>
> Against that much pressure a Monolithic Dome 100 feet in diameter, 35 ft tall would still have a safety margin nearly 1.5 times its *minimum* design strength. In other words the stress created by the 300 mph wind would increase the compressive pressure in the concrete shell to 1098 psi. The normal design strength of the shell is 2394 psi, and the maximum design strength is 4000 psi. The fact is that the monolithic dome is not flat and therefore could never realize the maximum air pressure against it of 4000 psi. Neither is the concrete limited to only 4000 psi. The margin of safety is probably more like 3 or 4.
>
> The Monolithic Dome at Port Arthur, Texas has not been hit by more than three hurricanes. A hurricane doesn't exert enough pressure on the dome to even be noticed. The Monolithic Dome can very easily withstand the stresses of a Tornado. However debris carried by the tornado could cut the surface membrane. If the tornado carried a large timber or metal object it *might* be possible - if conditions were just right - to puncture the dome. But the puncture would be very local and never cause any serious damage to the dome. Possible damage to the windows or doors might occur if there was a rapid decompression caused by the tornado.
>
> For most Monolithic Domes, the likely disaster will be earthquake. The worst listed areas in the US are listed as seismic zone 4. Through analysis it is easy to prove that earthquake forces do not even approach the design strength the Monolith Dome is built to withstand under normal everyday usage. It would take an earthquake many times any that we know to even approach the design strength of just the concrete itself (let alone the dome.)

Troubled Times

Domes

Tornado Resistant

A newsletter published by the Monolithic Dome people in Italy, Texas recently reported that they had a tornado go right over one of their domes. They heard a light bump, and went outside to see what the bump was about. A telephone pole had been caught in the middle of the swirl of a tornado that went right over the dome. They looked at the swath behind them and the tornado in front, but the dome was unaffected.

These domes cost about $15,000-$25,000 thousand dollars to set up. The dome is first inflated and then three inches of polyurethane is sprayed on the inside. Rebar is attached to the foam, and appropriate rectangular holes for windows and doors are put in. The shotcrete of about 3-4 inches is sprayed on to that. The result is nearly indestructible, impervious to any known wind pressure (tornadoes get to about 300 lb. per sq. foot - but the dome is rated to 4000 lb./sq. foot), and rated above a #4 seismic level. Additionally, with 3 inches of concrete, it would be proof against most fallout situations. Additionally the expected hot ash from the sky during a pole shift would just sit on the polyurethane outside. It won't burn unless subjected to actual flame, and the R-value is better than 60.

The Hub

Troubled Times

Domes Workshops

I have just returned from Italy, Texas after taking **Monolithic**'s workshop (6 days) and actually building two domes (30 ft and 24 ft.) The energy cost to heat and cool a monolithic dome is about 25-33% of a conventional house. They will withstand 400+ MPH winds as well as any magnitude earthquake we have on record. Material costs for the shell only are about $15/sq ft.

Offered by Michael.

The Hub

Troubled Times

Domes

Fireproof

Monolithic domes are inherently fireproof. The outer outer shell is not fire proof, but it is only a thin piece of touch fabric (I have a piece from when I planned to build one). Inside that is the polyurethane sprayed insulation in a 4 inch thickness. This stuff will burn when an actual flame is up against it, but without a blow torch or forest fire on it will only smolder. Inside that is 3-6 inches of concrete, which of course is impervious to any normal fire, and that concrete exists with numerous cable rebar to maintain its stability. You can't burn down a monolith dome even if it exists inside a forest fire. The windows on it are covered with a steel/polyurethane shutter. None of the contents will be damaged.

Offered by **Eric**

The Hub

Troubled Times

Monolithic Constructors

A year or two ago I called these people requesting information on their "Do it yourself Dome Homes". They sent me the material, and then for the next 6-8 mos. I received their newsletter without charge, the newsletter is very informative. Their structures are easy for the novice to build in my opinion, they don't require a great deal of construction knowledge other than making sure you have what plumbing and electrical installed before spraying the shotcrete, ferro-cement or whatever. The shell is strong enough to repel bullets. Once you see the description and illustrations of the process in the newsletter you'll be impressed. They sell kits as well.

> **Monolithic Constructors, Inc**.
> PO Box 479
> Italy, TX 76651
>
> Phone (214)483- 7423
> FAX (214)483-6662

Ted

Suggestion Ted.

Troubled Times

Newhouse Shelters

I was wondering if anyone had any construction plans for a dome structure in which the forms can be built out of plywood and 2x4's and then regular concrete is poured on. Newshouse Shelter apparently has plans available from Yellowstone River Publishing @ 800-327-7656 but that number appears to be unavailable in Canada.

Offered by Steve.

Found a reference for newhouse shelters which looks at several shelter alternatives, also gives an address with that 800 number:

http://www.arachneweb.com/NewHouseShelter/

Yellowstone River Publishing
P.O. Box 206
Emigrant, MT 59027

Offered by George.

Troubled Times

Dome Lifestyles

I have come across recently something that really got my head spinning. I found something called EcoDomes, which were designed by an Iranian born architect named Nader Khalili who lived in California. His company called CalEarth uses seven elements: arches, vaults, domes, earth, air, water, and fire to create sustainable and super strong structures. I became so intrigued with what I saw that I created a social networking site devoted to dome living. This is called Dome Lifestyles, where there is information that both myself and others have gathered to help people live and survive in a self sustained environment. Check out the videos page to see the CalEarth homes. This site is fairly new, so there is still information to be gathered, but we are starting to gather a good list of resources (see resources page).

Offered by Josh.

Troubled Times

Domes Concrete

Rob (my partner) did a workshop with **Monolithic**. David South told a story about when he built a 300 ft. dome, and an expert from a (very famous) cement works told him it was unnecessary to use rebar with a new product they had, which was something that looked like large staples mixed into the cement. David thought it looked feasible, and took the expert's advice and built the dome. Three days after completion, they removed the blowers (fans) and the dome collapsed. Fortunately no one was hurt but it resulted in court cases, and a great deal of money. Of course there is a big difference between a 300 ft. dome and a 35 ft. dome which is the average size for a small home. But for survival purposes it needs to be very strong.

Offered by Jan.

When constructing your dome, integrating it with a floor and four foot circular exterior wall as well as some interior walls will add a lot of strength to the unit and cut down on the amount of cement in the dome needed to hold it up. You'll need rebar (it's not that expensive) to keep the finished concrete construction from cracking. Rebar does not support the dome, it simply keeps the concrete from developing cracks that could lead to a failure of the dome. You'll need interior walls anyway, so you might as well develop them as part of the initial construction.

A unit about 35 feet across (962 sq. ft.) would be economical enough and adequate enough in size to survive a pole shift if in the middle of a tectonic plate. Make the center height about 10 feet high and 4 feet high at the exterior wall. You'll have to use 4x4 posts with plywood and 2x6 joists to support the structure, until the concrete cures for at least 2-3 weeks. I would recommend three continuous pours, one for the floor, one for the exterior and interior walls and one for the dome. An option would be to use 8x8x16 inch block construction on the exterior walls, and 4x8x16 inch for the interior walls. Use #3 (3/8") rebar every third row and vertically every 3-4 feet (#4 1/2"), pour the vertical rebarred wall holes solid. For the top row of blocks, use "knock-out" blocks and pour that row solid with #3 rebar. Paint the exterior of the walls and dome with a product available to keep the water from seeping through.

Make an entry like the Eskimos do with their igloos, but add a "T" to the outside entry.

Offered by Michael.

The Hub

Troubled Times

Domes Advantages

Quotes from the book *Bucky Works*, by J. Baldwin, p 112, chapter Why Domes?

> All domes share certain advantages, whether or not they are geodesic. Their compound-curved shape is inherently strong, giving a self-supporting clear span with no columns. Domes are resource and energy-efficient because, of all possible shapes, a sphere contains the most volume with the least surface. This holds true for dormal slices of a sphere as well. A dome has a circular footprint. Of all possible shapes, a circle encloses the most area within the least perimeter. Thus, for a given amount of material, a dome encloses more floor area and interior volume than any other shape.
>
> The minimal surface presents the least area through which to gain or lose heat. Field experience has shown that home-size domes use about 1/3 less heating fuel than an equally well-insulated conventional home of the same floor area, built of the same materials. .. When you double the exterior dimensions of a dome (or any other object), the skin area rises by a factor of four while the volume rises by a factor of eight. ... Larger domes are more energy efficient because less percent of the contained air is near or touching the skin where most heat loss or gain occurs. Doubling the size of a dome doubles its thermal efficiency. Bucky suggested that the huge mass of air contained in a big dome would make insulation superfluous, especially if the dome had a double skin. ..
>
> The favorable surface-to-volume ration is not the only reason for a dome's remarkable thermal performance; interior and exterior aerodynamics play a part too. ... Except for the calculation of wind loads, most architects do not consider aerodynamics at all. Bucky, however, found aerodynamics to be critical in the design of energy-efficient buildings. He discovered in the 4D experiments, a building's heat loss is in direct proportion to its aerodynamic drag. .. Unlike most buildings, domes are streamlined. Wind slides smoothly over and around them, generating minimal eddies and vortices to disturb the insulating boundary layer of air that clings to the exterior of any object. ..
>
> The domes heat loss is further reduced by the concave interior. .. A heating device located somewhere in the central updraft will distribute heat evenly throughout the dome. The concave interior also bestows a less-expected thermal advantage: self-cooling.

The Hub

Troubled Times

Disadvantages

Quotes from the book *Bucky Works*, by J. Baldwin, p 123, chapter Leaks

> A new technology may have an entirely new *type* of problem that takes engineers and trades worker by surprise. The tendency of geodesic domes to leak is an example of such a problem. .. the geodesic pattern distributes stress - the forces acting on the structure - evenly and almost instantly throughout the entire dome. That's what gives geodesic domes their remarkable strength per pound of material. ... When the sun heats one side of a dome, the warmed materials expand ... A dome consisting of separate panels may open gaps between the panels. In other locations, it may tighten the gaps, squeezing out seals or caulk. In a dome with a one-piece skin - welded metal or fiberglass, for instance - the dome distribute the strain by distorting.
>
> Today's commercial designs not only don't leak, they can't leak. Their permanent, precision parts are mass-produced in automated factories, giving a very high standard of fit and finish not vulnerable to careless assembly at the building site. Clever, long lasting silicone seals keep working without fatigue. Some designs don't even require seals.

Troubled Times

Domes

Many Virtues

Excerpts from an article on domes in *Solar Today Magazine*, by Jonathan Zimmerman

> Domes embody the virtues of simplicity, economy and energy conservation, and **enclose the maximum amount of space with the least surface area**. It is this surface area which consists of building materials, and comprises the exterior skin of buildings through which heat is lost or gained. This is the essence of dome efficiency. ...
>
> An entirely different construction technology offers the solution to this dilemma. This technology, known as airforming, is a method of building concrete structures by spraying construction materials on the interior of an inflated airform, or balloon. Rigid foam insulation is sprayed onto the inside surface of the balloon, steel reinforcing bars are fastened to the insulation and concrete is sprayed to cover the steel, all from the inside of the inflated form. When the concrete cures, the inflation fans are removed and an insulated, freestanding, steel-reinforced concrete shell remains. The exterior of the balloon can be coated with a variety of different colors and textures to meet individual requirements. Openings in the shell are created by not placing the steel and not spraying the concrete at the desired locations. ...
>
> The use of an inflated balloon as a primary construction element represents a major improvement in the art of concrete forming. The cost of an airform, constructed to inflate to a specific size and shape, ranges between $1.25 to $1.75 per square-foot of surface area. The cost of conventionally formed curved concrete surfaces is about $12 to $15 per square foot of surface area. Completed shell costs range from $25 to $35 per square-foot of base floor area, not including interior construction and finishes. **Comparative costs for the shell of conventional buildings of the same square footage are nearly double that**. It is readily apparent that we can now build small steel reinforced concrete structures at an economy of scale formerly possible with only very large public buildings. ...
>
> Conventional flat-walled structures must be designed with expensive moment-resisting connections and shear walls to counteract the stresses which accumulate at corners during wind and earthquake loading. **With the absence of corners and resultant stress concentrations, this shell concrete structures are far more earthquake and wind resistant than conventional structures**. The ability of these buildings to easily accommodate earth berm loading allows concrete shells to nestle into the landscape. Earth berming and landscaping can be sculpted against the shell structure, allowing an interaction between architecture and landscape architecture that is not possible with conventional buildings. ...
>
> The concrete shell is insulated by the layer of foam against which it is sprayed. Hot air rises and heats the top of the concrete shell. The heat is conducted back down through the shell to achieve a steady state condition. The shell then radiates energy to living spaces below. **Measurements reveal as little as a 5 degree F temperature difference between the air temperature at the floor and the air temperature at the ceiling**. The temperature difference between floor and ceiling in conventional structures with little thermal mass can be as much as 25 degrees F. During hot weather, an operable skylight at the top of the shell creates a natural convection flow for warm air to rise and exit the structure. By means of this no-moving-parts fan effect, the moving air also fosters evaporative cooling, without the need for air conditioning units in all but the most humid of climates.

Troubled Times

Domes

Hydroponics

Went to Monolithic Domes this week and talked to David South about a hydroponic building. 10th Planet or no 10th Planet, his building is perfect for this type of thing.

The key to making hydroponics economical is controlling energy costs and the dome structure does a wonderful job of that. In addition, he has a friend that has developed a wind structure that would sit on top of the dome and work like a jet engine. A normal windmill has the propeller and only catches wind with the propeller. This friend of his has designed what amounts to half a jet engine that would sit on top. The reason it hasn't been commercialized is a normal tower doesn't have enough strength to handle the force, but a dome does! In addition, another 30 feet of slope up is just perfect for a windmill. This makes for a natural energy source and reduces hydroponic costs considerably as energy is the main cost. For me it's $50 per month for just 1 Halide 1000 watt lamp. In addition, I've seen his caterpillar structure in a dream, only it wasn't in Texas, but in Michigan. It's not there, yet.

I checked into the company, **Eneco** in W. Simsbury, CT and have talked to the owner of the patent on the technology. While the concept and technology look like they'd work (it makes sense to me even though I'm not an engineer), it hasn't been put into use yet. He has a pre-prototype, a single module on a 60 foot tall tubular tower with the New York State ERDA.

Offered by John.

The Hub

Troubled Times

Ethiopian Tukul

Excerpts from the *Shelter*, copyright 1973 by Shelter Publications, PO Box 279, Bolinas CA 94924, a synopsis of material available from a number of publications.

> The tukul or sarbet of the Ethiopian high plateau is a structure which utilizes simple building techniques and excellent use of natural resources:
>
> 1. A circle with a diameter of 9 to 20 ft. is drawn at the building site. Eucalyptus poles are placed in the ground at one yard or so intervals along the circumference. The poles should be long enough so that at least 7 or 8 feet of the pole is above the ground. Next the center pole is set. It should be tall enough to give the roof an angle of at least 50 degrees.
> 2. Now the walls are filled with upright poles set close together and stuck in the ground. Rope is used to tie supports to the side of the wall. Green wood is used for ease in bending. Now the roof supports are attached 1 foot from the top of the center pole and extend about two feet past the top of the wall. This helps shed rain away from the wall. The supports can be extended even farther and used as a type of verandah.
> 3. More supports are added to the roof. These again are of green wood and tied with rope. Now it is time to put on the roofing material. A straw type grass is used. It is thatched or tied. This work is done from the op down working carefully to insure a good roof. A pottery jar is added over the top of the center pole to help shield water from the center of the roof.
> 4. An adobe plaster of straw and mud is put on the wall. After the plastering is finished, a door is built and installed and two small holes are put in the wall to allow sunlight to come in.

The Hub

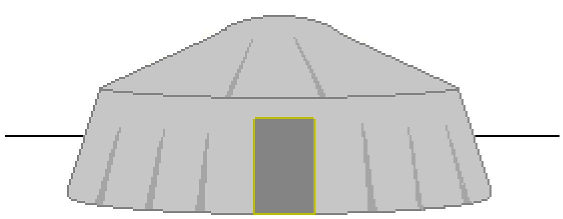
Troubled Times

Domes

Asian Yurt

Excerpts from the *Shelter*, copyright 1973 by Shelter Publications, PO Box 279, Bolinas CA 94924, a synopsis of material available from a number of publications.

> The yurt used in the Near East and Central Asia is easily transported yet so solid in look and construction. The basic element is the expanding wall lattice: strips of wood are fastened together at intervals such that they can be expanded to form a larger wall section. Several of these sections are expanded and tied together with a door frame to form a circular wall. A compressive band/rope is then drawn around the top of the wall to help support the roof. Poles are then run from the top of the wall to a higher central compression ring. Sometimes there are two pillars helping hold up the central ring - and sometimes there are no pillars, the roof being self supporting like a truncated cone. The wood structure is then covered with various amounts of felt and canvas depending on the climate and weather. [1]
>
> [1] The whole shelter is carried on one or two camels. It can be erected by several people in a half hour. After the outside covering is tied on and door shut, it is astoundingly solid and sedentary looking. The yurt is always pitched facing south, so the pool of sunlight shining through the smoke hole in the roof acts as a clock.
>
> Elisabeth Beazley, Country Life 2/3/73



The Hub

Troubled Times

Domes Indian Lodge

Excerpts from the *Shelter*, copyright 1973 by Shelter Publications, PO Box 279, Bolinas CA 94924, a synopsis of material available from a number of publications.

> The Mandans and Minnetarees of the Upper Missouri constructed a timber framed house ... the houses were circular in external form, the walls being about 5 feet high, and sloping inward and upward from the ground, upon with rested an inclined roof, both the exterior wall and the roof being plastered over with earth a foot and a half thick. These houses are about 40 feet in diameter, with the floor sunk a foot or more below the surface of the ground, 6 feet high on the inside at the line of the wall and from 12 to 15 feet high in the center. An opening was left in the center, about four feet in diameter for the exit of the smoke and for the admission of light. The interior was spacious and tolerably well lighted although the opening in the roof and a single doorway were the only apertures through which light could penetrate. There was one "Eskimo" doorway; that is by a passage some 5 feet wide, 10 to 12 feet long and about 6 feet high, constructed with split timbers, roofed with poles and covered with earth. The fire pit was about five feet in diameter , a foot deep and encircled with flat stones set up edgewise. Such a lodge would accommodate 5 or 6 families embracing 30 or 40 persons.

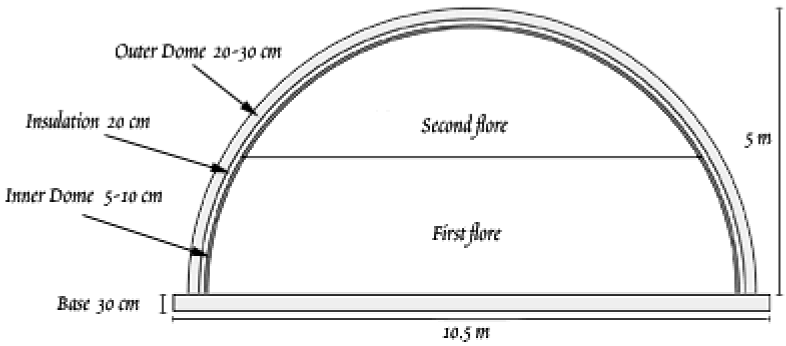
The Hub

Troubled Times

Domes

Home Dome

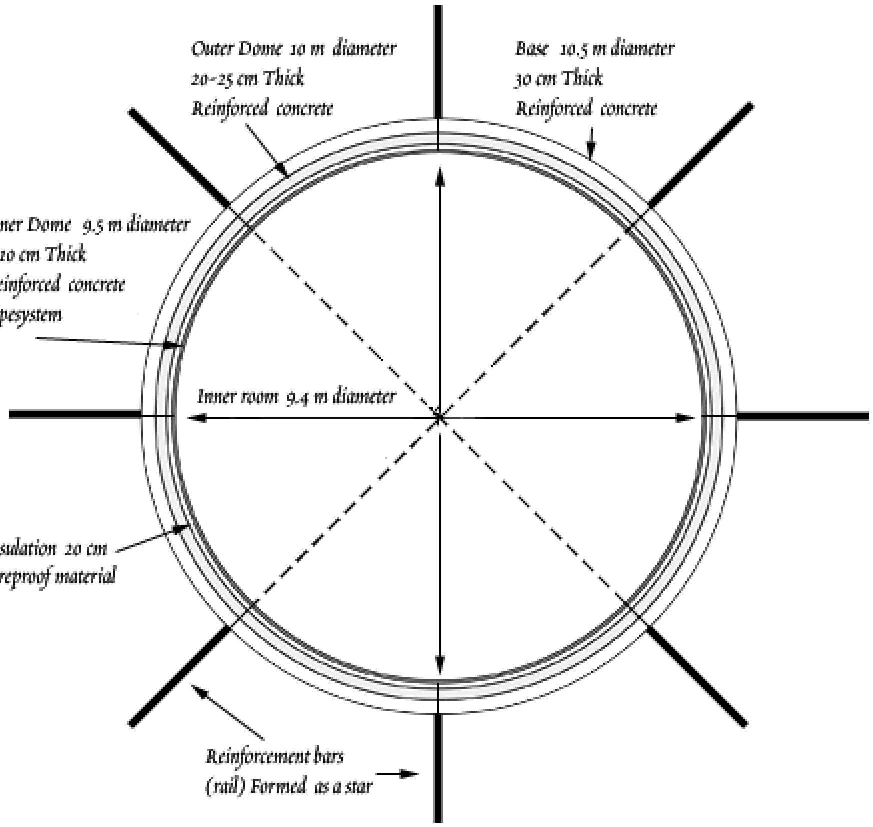
This document is far from a finished product. I will try to make a blueprint for this combined with material information in time.



When building a Dome one needs to be careful not to make the walls to thick. We don't want the Dome to break under its own weight. Concrete is strong and heavy. The Outer Dome has to be reinforced to withstand the pole shift. The Inner Dome has to be even more reinforced and also have a couple of pipe systems (1 cm inner pipe diameter) for cooling and warming. Ventilation can be solved.

This inner room, in this picture, is about 9.4 meters in diameter and 4.4 meters in height. The roof is of course sloping downwards on the sides. You can have two floors. Windows and doors are the weak points in this structure but can be made safe with reinforced iron doors bolted on the inside and outside. The Base, 30 cm thick and 10.5 meters in diameter, is also reinforced concrete and one could use reinforced iron bars (or old rail bars) formed as a star from the center of the Dome Base. The far end of the bars could then be bent down into the earth (30 cm). This should make it a stable base.

I'm *not sure* if this structure will actually survive the pole shift. I strongly suggest you take a look at what the Zetas have to say about Safe Structures.



Offered by Geson.

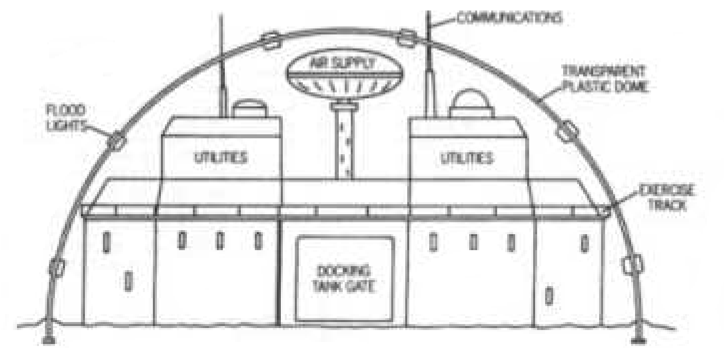
The Hub

Troubled Times

AquaDome

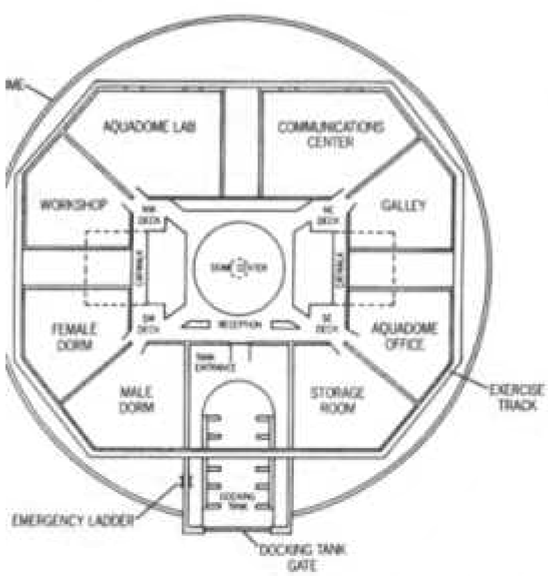
Please keep in mind that the aquadome home was drawn by me when I was in Jr. High School Drafting Class in 1977-1978. I choose this type of project because I was on the swim team and had / have always enjoyed the water. So as far as tech stuff, it is what I thought was / is practical. It will make a good starting point for design or layout. Perhaps if someone is / knows a marine biotechnician or an underwater engineer that could shed light on the matter.

Offered by Lou.



About Lou's water dome. The oxygen on Earth is almost entirely produced by Kelp beds in the oceans. Blue/green algae has a higher protein % than even earthworms at 82%, plus all manner of vitamins. What would stimulate the algae or kelp growth? Housing underwater as well as above, lots of surface space for the water to interchange carbon dioxide and oxygen, and folks breathing deeply!

Comments by friend Clipper.



The Hub

Troubled Times

Domes

Escape Hatch

Provide one or more escape doors or hatch plates just big enough to easily crawl through that opens to the inside. Should be bolted shut from inside with many bolts around the perimeter. This should be placed at or near the highest point in the structure. In a worst case if dirt, trees, and debris piles against all exits, this additional exit would allow one to be able to dig or cut ones way out. One could then clear the normal doors from the outside.

In the case of a large Dome, three outwardly opening doors around the base perimeter would probably be a good idea. Outwardly opening doors can be made to withstand more wind pressure than inwardly opening doors. If the dome gets tipped, this would provide that at least one door would not be buried in earth. This door could still be blocked, but would be able to be cleared by use of a high roof escape hatch.

Offered by Mike.

The Hub

Floatable

No matter what area you are in, you naturally assume the worst can happen. Even if you think your area is relativly safe, reinforce your survival shelter for *any* circumstances, even high water. I had the thought that a dome with an attached, reinforced floor - so that essentially the shelter was all one piece - would not only survive dislodgement in an earthquake, but might also float. I think I read somewhere that during WWII they made some ships/boats out of concrete. If concrete will float, why not a one piece dome shelter? For instance, is the dome is shifted by a quake, right off its foundation, or heavy rain caused flash flooding and mudslides, which might shift it. If the dome was one continuous unit, walls and floor, it could be built strong enough to withstand a "slide" or shift from its original location, and remain intact and usable for the survivors. I'm just not sure of the feasability from an engineering stand point.

Offered by Brent.

I think a dome would have a tendency to tumble in the waves. So - one would need to tie securely everything down including bodies. If the dome had a weighted bottom, thicker on the bottom or heavy objects secured to the floor, then I think it would ultimately end up right-side up. It would have to be made with water proof doors or escape hatches. If anything like flying trees or boulders crashed into the dome and water leaked in - allow a battery operated bilge pump to turn on due to sensing the presence of water. You would need a way to get air in and out without water getting in. The idea has some engineering challenges, but is not beyond the range of possibility.

Offered by Mike.

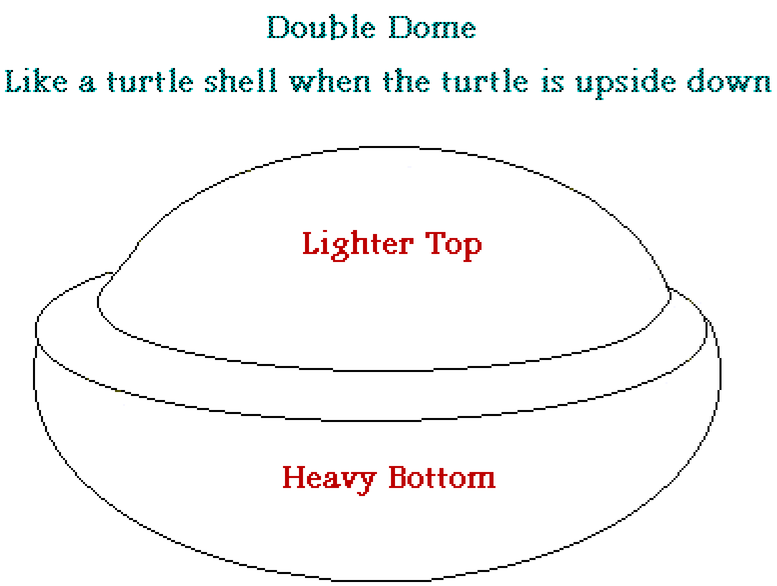
Even though a floatable structure may sound like it's covering the contingencies, please consider that such an object is mobile and subject to the unpredictable action of waves and currents which will be severe at the time of the shift. Who knows what you might find yourself thrown against. It may be better to try to find an area far enough away from water and high enough to keep you dry if there is an unforseen incursion.

Offered by Richard.

Troubled Times

Double Domes

This should work for sliding around, staying up-right, and floating if liquefaction occurs. May work on water too if built right.



Offered by Clip.

Troubled Times

Domes Rounded Bottom

In *Critical Path*, a profound, perhaps essential work, Buckminster Fuller explains much of the physics in plain English. If I recall correctly, the lower portion of his prototype living dome is submerged, but does not contain the full dome shape. It is shaped more like the bottom of an Apollo command module, perhaps a little more rounded, and is designed to evenly distribute the shock from earthquakes and to withstand hurricane force winds.

Offered by Mike.

The Hub

Troubled Times

Domes

Wave Action

Two things to remember on this. First, wave height is a function of water depth. Waves get higher the shallower the water is. Next, the minimum water plane area, the intersection of the water's surface plane and the floating object, will result in least vertical acceleration as the wave passes. Thus, a flying saucer form will be worse, a spar buoy would be best. Two domes, top and bottom, would *not* be in the middle.

Offered by Jack.

The Hub

Troubled Times

Wind and Water

I just saw a news clip of a flood somewhere in the US There were two dome houses in the middle of the flood with water up to their windows. This brings up a concern with me about water-proofing. Is there a way to water-proof the windows on a dome and make them sturdy enough to withstand the pressure of raging waters. The water from a flash flood may eventually recede but the inside of your dome house might be demolished before it does.

I also have a concern with wind resistance. I've visited several web sites on building dome houses and have looked through their picture galleries. Every house, although beautiful, has gables, eves, overhangs, bay windows or glass patio doors. My concern is; What will happen to these windows and such when they are struck by 200 mph winds? The dome itself may survive but the windows and eves will be ripped off and everything inside the dome will become a projectile. Can we come up with something to cover the windows? Something permanently attached to the house that slides down and protects us from the wind. What would it be made out of, steel, concrete, other? Once it is down, how do we seal it?

Offered by Doug.

Domes
The Hub

Troubled Times

Plastic

An architect in San Jose, California designed and built a dome house made by first laying down a circular concrete footing/ring, then installing a plastic fiber membrane (**Tyvex**) like a drumhead, then spreading a fibrous Portland cement mix uniformly on this like frosting on a cake, and finally inflating this from below. The resulting monolithic dome can be then spray insulated on the inside, further stiffening the shell.

Offered by Phil.

Take a look at the product Radomes if you want to see a hi-tech (expensive!) solution. Looks like these guys have built some domes before!

> *The first modern air structure was a radome developed at Cornell Aeronautical Laboratory in the early 1950's. It was specially designed to meet the need for a thin wall, nonmetallic enclosure to protect large radar systems from high winds and severe weather*

Offered by Jon.

Troubled Times

RASTRA

I watched a special on Discovery the other night about future houses. They showed a beautiful round house built from this product called RASTRA. This product could easily be molded and carved into a dome structure. I snipped a few things from different web sites.

Offered by Leila.

RASTRA's beneficial qualities include:
4 hour fire rating
High insulation value
No toxic outgassing
Energy saving
Sound attenuation
Pest resistant
Seismic 4 System
ICBO ER-4203

What is RASTRA? RASTRA is a concrete form system made of a lightweight material **Thastyron** which provides a permanent formwork for a grid of reinforced concrete to form load-bearing walls, shear walls, stem walls, lintels, retaining walls, and other components of a building. Thastyron offers the ultimate in properties for a wall, such as insulation, soundproofing, fire protection, all in one easy-to-install element. Thastyron also is resistant against frost and heat radiation. It does not entertain mold or attract nesting insects. And 85% of its volume is recycled material - postconsumer polystyrene waste - which very likely would have ended up in landfills never to disappear.

Concrete filled into the cavities of the elements provides excellent strength. The channels inside the elements have been designed to provide optimum strength while using the lowest possible amount of concrete. The square grid allows use of the elements either vertically or horizontally maintaining the grid and the runways for reinforcement. By using different strengths of concrete and various amounts of reinforcement, the load capacity can be adapted to any requirement.

A primary building product is RASTRA, an above and below grade wall system that breathes like a house made of natural materials yet has superior earthquake and wind resistance, pest resistance, noise reduction and acoustics, a 4 hour class A fire rating, and an insulation value that exceeds code in most States. RASTRA is an insulating concrete form (ICF) made of recycled expanded polystyrene (EPS) bonded with cement and non-toxic or low-toxic additives. Basement walls and Stem Walls can be built in less than half the time it takes to form, reinforce, brace, pour, strip, and insulate a conventional concrete block wall. A RASTRA exterior wall can be quickly finished with a single coat of stucco - no mesh or lathing is required.
Do-It-Yourself

We need the engineering properties of RASTRA compared to concrete. What is the tensile, bending, shear strength? What is the density? What is the comparable cost? By the way does any one know what Seismic 4 System ICBO ER-4203 means?

Offered by Mike.

Hi Mike,
Saw your name on the zetatalk. Strength data for Rastra are on Rastra web page www.rastra.com. Seismic 4 system refers to possible design for seismic loads in seismic 4 areas, like CA. The ER 4203 is the evaluation report number. For more info contact Rastra.
Karl Holik

The Hub

Troubled Times

Domes

Shotcrete

Shotcrete is much cheaper than poured concrete domes, and done for the same type of dome design could be very affordable.

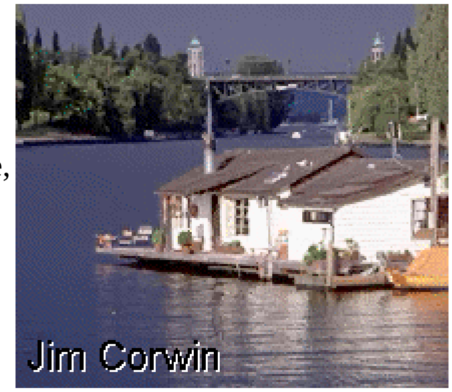
Offered by Bill.

The Hub

Troubled Times

Housing

Houseboat



Houseboats are in use in one form or another all over the world, particularly in cultures that rely upon fishing or where land is scarse. In an era when the melting poles will be forcing pole shift survivors back from the coasts, increasingly creating new inland bays, having a floating home that can be moved along with the new shoreline is practical. Considering sea weed as a algae food source might be possible, and certainly fishing the oceans, which will be coming to your door, would be a possibility.

Offered by Nancy.

The Hub

Troubled Times

Cement Base

I found a site that shows the construction of a Boat with fero cement. It's not a dome, but I found it interesting since the same techniques could obviously be used for building a dome.

Offered by Michael.

Troubled Times

Housing Rammed Earth

An article called **Terra Firma** in the June 2, 1996 *San Francisco Examiner* describes using earth combined with concrete to produce energy efficient and rammed earth homes. After the cataclysms, building materials such as wood or stone may be in short supply, and using earth to extend the available concrete may be just the thing. The article states, in part:

> For all of recorded history, dirt has been the primary source of building material. As many members of our species grew up in caves, it was natural that humans would fashion earth into walls, as they did in the Kasbah of Morocco, in the Great Wall of China, in the Alhambra in Spain and in the ancient Anasazi pueblos in what would become the American Southwest. Earthen walls - poured and compacted into wooded forms - can last a millennium. In some rural regions of France, 90 percent of buildings are made of earth.
>
> Now, thanks to the tireless efforts of a Stanford University engineering graduate, the construction industry finally seems to be catching on to "rammed-earth" construction, as it's called. ... Easton's firm, **Rammed Earth Works**, currently is working on earth homes. ... He has written a just-published book, "*The Rammed Earth House*," that is generating increased interest in the technology.
>
> Rammed-earth walls are built 18 to 24 inches wide - that's two to more than three times as thick as conventional framed walls - which keeps the building cool in the summer and warm in winter. ... Rammed-earth homes are built by erecting plywood forms, then layering clean, moist soil mixed with a small amount of cement into the form and ramming it until it's hard and only about 50 percent of its original volume. The material is packed with pneumatic or hand rammers and the forms can be removed almost immediately.
>
> When finished, the rammed-earth wall is essentially reconstituted sedimentary rock. Its strength rivals concrete. ... Whereas concrete typically has four to six sacks of cement pre cubic yard, rammed earth uses only one or two. The bulk is made up of clay. The resulting walls are fire-proof, rot proof, termite proof and nearly soundproof.

The Hub

Troubled Times

Straw-Bale Homes

Articles called **House of Straw; Adding Up Pluses of Straw Houses; Straw: Owners, Architects Love the Natural Imperfections;** and **Facing concerns about pests, moisture damage, earthquakes** in the August 7, 1996 *San Francisco Chronicle* describes using straw bales covered with stucco for housing that is quick, cheap, and has outstanding insulating qualities. For Straw Bale housing there are many web Sources. Excerpts of the articles follow.

> That first little pig, it seems has gotten a bum rap over the years. His infamous decision to build his house out of straw has demonstrated to many a child the perils of flimsy building materials. But now builders are beginning to realize the poor piglet wasn't too far off base. He was missing just one key piece of equipment, a straw bailer. A baler can compact wispy strands of straw into sturdy, dense 2-by-3-foot bricks that can be stacked, pinned and stuccoed into walls capable of withstanding hurricane-strength big bad wolves, not to mention fire and pests.
>
> Straw-bale homes are houses whose walls are composed of stacked bales of straw covered with stucco. These houses, with signature two-foot-thick walls, have interesting features, such as wide window seats, lots of nooks and even furniture built into the wall themselves. Not only are they ecologically correct because they use less wood but they are also well insulated and fire resistant.
>
> Bale homes can be made of any type of straw - rice, wheat, oat or rye. Straw is not hay but the non-nutritional part of grain that often remains in the fields after harvesting ... Although farmers in the Great Plains built straw-bale homes more than 100 years ago, most Americans are unfamiliar with them. ... Straw-bale construction [has] such benefits as exceptional thermal and acoustic insulation and fire resistance. Using an abundant waste product such as straw also seems smarter than chopping down trees (straw-bale walls typically use half the wood of conventional walls).
>
> Straw-bale homes are naturally imperfect - what some would call organic. The bales are stacked - laid out like bricks - on a conventional foundation. Metal stucco netting is placed on both sides of the stacks, then plaster is applied on the inside and stucco on the outside. Often the walls are pinned with rebar and reinforced by wood or steel to bear the roof's weight. Unlike bricks, bales do not line up in perfect rows, and the plaster and stucco surfaces don't always camouflage the irregularities. Although straw-bale homes can be made to look like conventional buildings with the use of drywall and other materials, most architects and homeowners prefer to let the bales' natural beauty show. ... Most architects like to capitalize on the thick walls, incorporating such elements as window seats and other built-in elements.
>
> The solid straw-bale walls don't have passageways for rodents to travel through as do the walls in wood-frame houses. Without space to run, rodents are less likely to make their homes in your house. ... Moisture damage is uncommon in straw-bale homes. Even in the wettest climates, straw-bale homes have fared as well as traditional homes. The stucco seals and waterproofs the exterior while allowing the straw bales to breathe. "Think of it like a sponge," explains Swearingen, a general contractor experienced in straw-bale construction. "If the sponge is left open to the air, it dries out. There are 100 year old buildings .. that are still doing just fine."
>
> Most architects and engineers .. believe that straw-bales are the ideal seismic-resistant building material. "Where are the bales going to go?" asks Alameda architect Darel DeBoer, a board member of the Architects/Designers/Planners for Social Responsibility, a nonprofit ecological design organization based in Berkeley. "The whole thing is woven together with these threaded rods, the top of the wall is bolted all

the way to the bottom. I have complete confidence in it. The worst that could happen is that the plaster would crack."

The thick walls have an energy efficiency rating of about R-55 - that's two to three times the typical R-value for modern, energy-efficient homes. Air doesn't flow through easily, .. During the hot summer days, it takes about 12 hours for the heat to get inside, and you ventilate the house at night. South facing windows provide a passive solar heat source in the winter, and the bales hold in any heat from more costly sources, such as gas furnaces, so homeowners can expect a significant savings on energy bills over a lifetime.

Tests by Canadian and US materials testing labs have shown that straw bale walls are much more fire resistant than average wood-frame walls. In the tests, flames took more than two hours to burn through plastered baled walls as opposed to 30 to 60 minutes for comparable wood-frame walls. "Basically, the bales are so dense that they won't support combustion very well," explains John Swearington, .. "Even if you put a blowtorch on them, they tend to char and the charring itself stops further burning."

Straw-bale building, somewhat like an old-fashioned barn raising, is a process that brings communities together. "Straw bale is very user-friendly for builders," says Swearington. "Fewer advanced carpentry skills are required."

The Hub

Troubled Times

Housing Midwest

For anyone in the Minnesota or Wisconsin area.

Strawbale House

Minneapolis-St. Paul. Visit a two-story single-family residence being built with strawbales at 3128 - 5th Ave. S. Designed by the Community Eco-Design Network (CEN) and approved under the Uniform Building Code, the house is of conventional post-and-beam construction, with engineered joists, 2-hr. fire-rated walls and a pre-cast stucco panel system on the exterior. An aesthetic and affordable house, 85% of it was constructed in a shop and it will use 70% less energy than a typical house its size. For more information contact Eric Hart, CEN, 612/306-2326.

Strawbale Construction

Ashland Wisconsin, workshop sponsored by the Midwest Renewable Energy Association (MREA). Participants will learn about the theory and history of strawbale construction and other alternative building techniques on Friday, and then on Saturday help construct a strawbale building on the Northland College campus. Mark Morgan of Morgan Design and Construction is the instructor. $50. For more information and to register contact MREA (Box 249, Amherst, WI, 54406) at 715/824-5166.

Offered by Doug.

The Hub

Troubled Times

Instructions

You can cover your straw bail home walls and ceilings and floor with cement inside and out. To see how, use a search engine keyword *shotcrete*.

Offered by Michel.

This type of construction appears in almost all ancient cultures around the world (where a stucco or concrete material is placed over the straw). It is fire proof, water proof and will last at least a hundred years. There are good sources for straw bale construction information on the internet.

Offered by Lou.

Should we buy the straw now? It's a by-product of wheat or oats. Harvesting requires that grass not be lodged by strong winds, but is standing up. Bailing requires *dry stalks* and machinery. These conditions may not be an option after the pole shift, where it is predicted that we will have *decades* of ash laden low clouds and constant rain with no sun. Rainwater in many cases will also produce poisoned mud. About those hundreds of wind scattered, soggy bales of straw purchased before the pole shift: If the topography has changed we might need to relocate a mile or so. That could be a real back breaker without a pickup! If survival is desired, the #1 task is shelter to get past the pole shift. If the same shelter could see us through the Aftertime, so much the better. Most economical of all is Ron's Sand Bag bunker in Survival Tips.

Offered by Bobby.

The straw bale technique provides great thermal protection at reasonable cost, and has some merit for building after the pole shift. If it's built before the pole shift, I would be concerned with the amount of mass to strength ratio. A wall so constructed of straw bales could easily shake apart with the jolts predicted for a pole shift as compared to a concrete steel reinforced structure. The construction technique talks about using only dry straw and keeping it that way. In the wet environment after the pole shift this will be difficult. After the pole shift fighting rot will be a major concern. If the walls absorb water, and the straw begins to rot, some of this smell will get into the interior. After the pole shift we will probably need a more closed environment, due to the need to keep out the volcanic ash and frequent rains.

Offered by Mike.

Troubled Times

Adobe Bricks

Articles called **Recipe for Adobe Bricks,** and **History of the adobe building** in the August 21, 1996 *San Francisco Chronicle* describes making adobe bricks from the most basic resources - sunshine, water, straw, and sand. The Earth Architects site also provides information. The article states, in part:

> Home brickmakers may need to experiment to find the right balance of ingredients. ... "The consistency of the brick mixture should be halfway between pancake batter and stiff cookie dough," advises Robert Pedritti, site director at San Jose's Peralta Adobe and Fallon House. Pedretti shares the following adobe brick recipe:
>
> ### Recipe for Six Adobe Bricks
>
> **Time required:** about one month (most of it waiting for bricks to dry).
> **Cost:** little or nothing
> **Materials:**
>
> - One five-gallon bucket
> - One mixing stick or old wooden spoon
> - 1/2 bucket of adobe clay
> - 1/4 bucket of sand
> - 1/8 bucket of straw cut into two-to-three-inch pieces
> - Enough water to make a doughlike consistency
> - Six empty half-gallon waxed milk containers OR six 4 * 11 * 22 inch wooden brick molds, which can be made from 2-by-4s nailed together
> - Waterproof tape
>
> **Directions:**
>
> - Thoroughly mix the adobe clay, sand and straw in the bucket; add only enough water to create a workable consistency
> - You can use either the wooden brick molds or the waxed 1/2 gallon milk cartons. To make the molds from the latter, cut one side from the carton (which becomes the open top of the brick mold). Cut and flatten the folded spout end and tape the carton firmly into a rectangular shape.
> - Pack the brick mixture into the cartons, filling each about tow-thirds full. IN 15 minutes to 24 hours, the brick will be firm enough to tip out. Each batch is different' you will have to judge when your mix will maintain a brick shape.
> - Place shaped bricks in a sunny location and turn repeatedly as they dry. (A completely dry brick is uniform in color, inside and out.)
>
> Adobe is derived from the Arab word, "at-tub," referring to the earth bricks Arabs made as early as 7000 BC. With the mingling of the Arab and Spanish cultures, "at-tub" evolved into "adob." And when the Spanish and American Indian cultures combined in California, the word became "adobe". ... The outer

walls were first smeared with a thick coat of adobe mud and then a coating of white lime plaster, made from baking seashells in a fire. Each year, a fresh coat of plaster was applied to cover cracks and fallen chunks. The wall thickness of California adobes varied from about two feet to five feet. The higher the walls, the thicker they were built. Because of this thickness, the inside temperature of an adobe remains fairly constant and comfortable year-round.

Troubled Times

Housing

Coating Burlap

I came across an obscure book, *The Owner Built Home*, By Ken Kern, published by Charles Scribmer's Sons, New York in 1975. Cheap housing was built in India using a method of coating burlap with cement. I was looking for a very inexpensive way to build outbuildings. I took 1/2" PVC pipe and made a Quonset structure with a base of 2'x4' out of 2" wide plywood that was 1/2" thick. The burlap, an old potato sack, was stretched tight and stapled to the wood frame and up over the PVC pipe to make a little Quonset building. The burlap was totally wet with water and a thin slurry of Portland cement was painted on and permeated the fibers of the burlap. Then a thin paste was made of the pure Portland cement and water and painted on. The result was a beautiful smooth coat that could be painted with a waterproof paint.

The author of the book says to build up the cement, adding sand after the first coat (I used sawdust and it did a great job) to about 2" thick and this will free span a 40' width. After my experiment I don't have any doubt. I am now getting ready to place cattle panels, which are 5'x16' of very heavy wire fence, into the shape of a Quonset and make a storage building using this method. The cost per sq. ft using this material and including the frame is around 60 cents. Building codes say that a concrete slab should support 30 lb. per sq. ft. The author poured a 1/2" thick slab, laid the burlap down and poured another 1/2" and, when dry, tested at 470 lb. per ft. Seems the burlap does the same job as re-bar only much better. By using sawdust that is free in most places, you could build a Quonset or a dome as thick as you like for a song.

> Offered by Wayne.

I plan building a dome kit using fiberglass cloth with an epoxy resin. You can get the fiberglass and resin at just about any auto, boat, pool, or hardware store. It doesn't require much space to store, setup is relatively easy, dries quickly, and is very strong and durable when done. With the resin, even burlap would do instead of fiberglass cloth in a pinch.

> Offered by Steve.

The Hub

Troubled Times

Wire Mesh

On the topic of shelter, I recently found a website with a Navajo Hogan on it. This is an octagonal log home about 15 to 40 feet in diameter. The roof is also made out of logs and come together in the centre in a dome shape, leaving space for smoke to escape from the central fireplace. Sometimes the hogan is completely covered with mud several inches thick, which completely dries and bakes hard in the sun. Of course this would not be useful in continuing rain, but I have been wondering if it could be covered with cement instead of mud. The log frame certainly looks sturdy enough to hold the weight, and it would provide great insulation. I would like to know the feasability of using wire mesh, or chicken wire for example to cover the log structure, and then cover this with cement, as I mentioned. It seems that it would have a lot of stability.

Offered by Cass.

Chicken wire would be good, but I've also seen on a web site somebody using chain-link fence for the outside material and then covering it with cement. Chicken wire is probably cheaper and easier to shape, but the chain-link fence looks stronger.

Offered by Michael.

From the little experience I have in working with concrete, I would tend to go with the chain-link fence as being better because it's much sturdier for the outside, but use chicken wire on the inside precisely because it's easier to mold into shape, and because of the finer holes, for better holding. When building a concrete roof in ordinary building construction today, a bottom and top layer of very fine, thick solid wire netting is placed on beams, and is then covered with the concrete. That's as solid as you can get to keep the top floor from caving in. In the construction we're talking about - you would already have the basic supporting structure, and the chicken wire to cover it would be just an additional structural factor holding the concrete in place, so it's advisable to have. The hogan structure as it's described on the link you provide should definitely be sturdy enough to support a layer of concrete up to 2 or even 3 inches thick, even on the roof. For that ultra extra strength, the structure is covered with an additional layer of the chain-link fencing after about an inch of concrete, and then the rest of the concrete is put on.

After the concrete sets, the whole structure should be heavily watered down from a hose, first of all to homogenize all the cement, and more importantly - to check for leaks. It's vital to have some easier 'filling' stuff, like Polyfilla, to close those minor cracks which are bound to exist after all the cement sets. Both chicken wire and chain-link fencing are easy to obtain and aren't so expensive as to be out of reach, so they seem like good solutions for reinforcing concrete. However, I don't know about the whole hogan idea itself. The structure looks pretty complicated, if you ask me, so it may be good for a permanent after-time dwelling, but I don't know about a temporary 'safe place' to weather the pole shift in. For that - a simpler and sturdier dome structure is probably preferrable, because the fitting of the logs in the hogan would take some doing and know-how, so it seems to me. It's a beautiful and solid structure, though, and thanks for providing that link - because I wouldn't mind living in a place like that in the permanent settlement. One thing to remember though, is that the hogan is good for the climate of North America, and wouldn't offer much protection in our climate here, where you need thick stone insulation from the heat. Of course the concrete on the outside would provide some of the insulation - but it's not really enough, you need stone walls. So I would say that it's important to take into account what climate will prevail in the area you choose, before settling on the hogan for a dwelling.

Offered by Sol.

Troubled Times

Housing Combining

I have read: *When using straw bales for walls, surround the bales with old tires, packing the tires firmly with dirt, and then using adobe dirt (or in the north areas, concrete) to completely cover the entire structure*. It is warm in the winter and cool in the summer, plumbing, electrical, etc. is put into piping inside the structure. Planning is the key. I have seen a TV special on this home and it was amazing and the cost was minimal.

Offered by Mary.

Your confusing two different construction technices. They are often used in the same construction, but not together. Stacking old tires packed with dirt and then plastered inside and out, called an Earthship, is one, and straw bale plastered inside and out another. Sometimes both are used to construct different sections of the same building, i.e. some walls done Earthship style, others straw bale. But they aren't done together (i.e. strawbale surrounded by tires or vice versa). Doing so would result in walls 5 to 6 feet thick. I live in that part of the country, (New Mexico), where both techcnices pioneereed and are well known. I also know someone who is currently building an Earthship. There is also a series of 3 books available covering all aspects of Earthship building. The last one, Earthship III, covers stawbale construction.

Offered by Travis.

The Hub

Troubled Times

Housing Bermed

My main concern has been surviving the intense heat of a firestorm. Granted, if you are in a cement dome, say, surrounded by an earth berm, you might feel pretty safe. But the intensity and the duration of the heat will determine how safe you really are. The dome might not burn, but the heat generated *around* it might cook whoever is inside, like an oven. I don't know of any studies out there regarding this subject, except recommendations to build deep underground. And what about air circulation inside?

Offered by Brent.

Using concrete and ample re-bar, build an octagon with 2 foot walls 4 feet high with a 2 foot thick dome top. Set your 2 foot concrete floor and walls in the side of a hill with a drain rock and drain pipe around the footing floor, double coat the concrete walls and concrete top with standard foundation water proofing material, readily available, and then cover the entire structure with dirt with a rented bobcat. The door can be shut, sealed and latched with an igloo type opening to include the addition of a protective concrete barrier across the front (requiring one to turn right or left to exit). Calculate the needed oxygen for a couple days and keep enough available green oxygen bottles to tide you over the initial potential fire problems. A home-made carbon filter using barbecue briquettes will work as an air purifier. You won't have much to do so a hand cranked squirrel cage fan can be used to circulate the air. A water tank can be constructed as an integral part of the structure with other ample storage closets built in for items required for survival.

Offered by Michael.

I was flipping through the TV channels this Sunday morning, and for some reason I stopped at our local **PBS** affiliate. They were carrying the children's show called **TeleTubbies**. What struck me was where the **TeleTubbies** lived - in a grass-covered Geodesic Dome-type structure. This may be the optimal structure to create for a post-shift environment - such domes can withstand hurricane-force winds, and they conserve heat well. And if properly constructed, they can be earthquake resistant. Also, being grass-covered, they don't draw attention to themselves - they kind of blend into the landscape, not an unimportant consideration. And according to Buckminster Fuller, inventor of such structures, Geodesic Domes cover the maximum amount of living space with the least amount of material, and they are the structures most consistent with the laws of nature.

Offered by Mike.

The Hub

Troubled Times

Housing Fireproof

For those choosing to live in or near the remote forests of the north, the number one danger after the shift itself and many years later is forest fires. The recommended building of choice is a waterproofed rammed earth home in the shape of an octagon. The walls should be at least 24 inches thick reinforced by steel re-bars. The roof has to be layered with thin rolled aluminum sheets applied under the shingles if needed to reflect the heat generated in the fire. This structure when erected on the proper reinforced foundation is hurricane proof, earthquake resistant, insect proof, Grizzly Bear proof, and of course fire proof. The rammed earth shell must be completed and cured before the shift and the roof with its rafter supports and plywood covering pre-cut for easy assembly, to be constructed sometime after the shift. This can then be your permanent residence.

Offered by Robert.

I've been relatively close to a few wildfires with extreme heat and smoke, low oxygen, disorientation. I imagine we can multiply that by at least several thousand, and that might be what the pole shift firestormes would be like. I think the sheet aluminum coverage is a good idea, but is there something we could use that is less expensive? I don't know how many people could afford the amount of sheet aluminum they would need to cover an entire roof or structure. And what about breathable air? Sure, you're inside during the firestorm, but how long is it expected to last? If your structure is sealed, what about your air filtration from the outside, or is this feasible with the fires raging?

Offered by Brent.

Aluminum *burns* and will ignite when a certain temperature is reached. Don't depend on aluminum for firestorm protection. Use things that don’t burn so easily, like steel, concrete, rock and earth.

Offered by Educate-Yourself.

The Hub

Troubled Times

FireFree

How would you like to just paint on fire protection over your steel, concrete, rock, or earth?

> *Welcome to the Firefree 88 Website! This site is all about an exciting new fire protection product which applies like paint. This product is going to revolutionize the way buildings and structures are protected from fire. ...Withstands concentrated flame temperatures in excess of 2,000 ºF for two hours and maintains its integrity without degradation.*

I guess there are many solutions, but many variables need to be taken into account. Cost, Insulator Efficiency, and Effectiveness to name a few. Somewhere there's a balance in there that'll make a good solution. GeoBond and DuraSystems are products you could include in your building plans to help keep the dome fire resistant. (However without knowing the cost of these products it's hard to tell if they are a feasible solution.)

Offered by Jon.

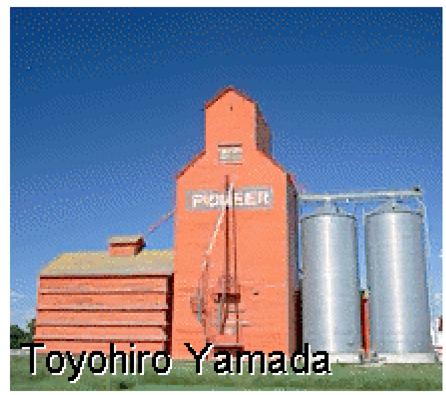
The Hub

Troubled Times

Grain Silo

Most of us have seen the grain silo's that farmers use. You know the tall oblong metal building with a pointed top. Most are made out of light weight steel, riveted together, a door on the side and a hatch door on the top. These silo's come in many different sizes, from about 14-16 ft. diameter to 20-60 feet tall. They come in numerous sizes. If you took one of these and countersunk it into the ground on a concrete foundation, leaving the side door exposed by excavation it should work like a root cellar or it could be reinforced to act as a bomb shelter. If used after the pole shift a wood stove with chimney extended to top hatch could be placed in the center and it should be warm and dry. Windows could be cut out for lighting, depending on height, a second floor could be added if materials were available.

Offered by Mary.



Sounds like a good idea. We have lots of grain silos around here and I had thought about the same thing, but that door 20 feet up got in the way. I never think about going down. Good idea.

Offered by John.

Our farm silos are squat and rounded and appear too thin to be used in this way. We plan to build a small Monolithic Dome (IO 24) partially buried then bermed to completely cover it. Storage dome and Hydroponic domes (eco domes) will be built in like manner. All fitted with escape Hatches and connecting tunnels (able to be sealed off) lined with reinforced concrete culverts.

Offered by Jan.

Notice what remains standing when a tornado goes through a rural area? Low cost, low profile silos made of corrugated steel, with no windows. A water tight, fireproof, hail proof, fire resistant cylinder with a cone roof! You might be forgetting the Aftertime (dark, dark, dark, dirty rain, dirty rain, dirty rain, mud, mud, mud, wind, wind, wind, mold, mold, mold). A canvas tent will not be enough! I think the key will be throw away low cost and durable!

Offered by Bobby.

Troubled Times

Housing

Steel Pipe

Nuclear blast shelters made out of steel piping have incredible strength. I think the round shape gives them this strength. I saw one strength rating on another site which was 40 tons! It would be a pain getting the piping to ones location but I think its just a matter trucking it over and having some lame story to tell overly nosy people. I think the pipe could be easily insulated and waterproofed with any type of common spray on insulation - 2 or 3" thick. So far I definitely think the pipe shelter is workable but much more research is still needed.

Offered by Steve

The Hub

Troubled Times

Housing

Quonset Hut

I have been looking into Quonset-type huts as a relatively inexpensive shelter both during and after the pole shift. There are quite a few websites dealing with storage buildings, but I was particularly looking for dome-type design. They would be cemented into a floor pad several inches deep. Size varies enormously, and there are many suggestions for uses aside from equipment storage. I'll include the website I've been looking at:

> www.conservatek.com/

Of these three, the conservatek is quite similar to geodesic dome,only made out of aluminum - bonus for firestorms!

Offered by Cass.

The Hub

Troubled Times

Housing Trench Home

Interesting passage from "War & Peace" by Leo Tolstoy. Written in the 1860's, some people consider this the greatest novel of all time. At one point, Tolstoy describes an earth hut used by Russian soldiers for winter encampment in 1807:

> *This earth hut was constructed according to a plan much in vogue at that time: a trench three-and-a-half feet wide, a little less than five deep, and about eight long was dug. At one end steps were constructed, and this formed the entry, the 'grand staircase'; the trench itself constituted the abode, in which those who were fortunate, as for instance, the squadron commander, had a board set on posts on the side opposite the entrance; this served as a table. On each side along the trench the earth was hollowed away to half its depth, making a bed and divan. The roof was so constructed that in the middle it was possible to stand erect under it, and one could sit up on the beds by leaning over toward the table . . . . When it was very cold, coals from the soldiers' fires were brought on a bent piece of sheet iron and set on the steps . . . . This made it so warm that the officers . . . could sit there in their shirt sleeves.*

From http://www.nepanewsletter.com/survival.html

The Hub

Troubled Times

Full Cylinder

See the following as a sample of what should be available. I think the half circle and other odd shapes have some possibilities. The corrugated curved sheets have the advantage of portability.

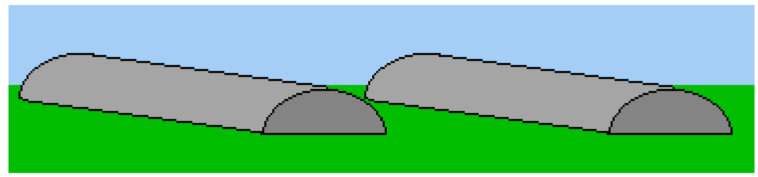
> Drainage System that's easy to install, resistant to damage and durable enough to last for years. They're available in both aluminum and galvanized steel to suit any requirements. **Diameters up to 3.6m (12 ft)** and lengths up to 12m (39 ft).
>
> Corrugated Steel Pipe was first developed and used for culverts in 1896. As experience was gained in the use of this thin-wall light weight, shop-fabricated pipe, the diameters gradually increased to 2.4m and larger. Fill heights became greater, even exceeding 30m. A further development, in 1931, was structural plate pipe with larger corrugations, for field assembly. **Diameters and arch spans beyond 8m (25 ft)** have been installed. Steel plate structures were complimented in 1962 by the addition of Corrugated Aluminum Plate Structures, introduced to the USA by Kaiser Aluminum with many thousands of successful structures now in service.

Offered by Mike.

Troubled Times

Housing

1/2 Cylinder



I've been giving this some thought here lately too. In the Midwest we have an awful lot of farm outbuildings made of steel arch sections that look a lot like the old army barracks structures. You know, half of a cylinder laid on its side. If you mounded dirt up around the end of these things in a rounded hemisphere to block the wind from the vertical flat ends the overall result is almost a dome. The same structural properties of a dome would still apply - wonderful wind resistance and general stability in terms of quake.

I suspect you could get by with even a dirt floor using 4x4 posts driven into the ground for anchorage points and so use absolutely no concrete. Since these things come in kit form storage of the sections for later use would be quite easy. I guess this is really just a modified form of the culvert shelter everyone is talking about, but culvert pipe doesn't come in a kit.

Offered by **Ron**.

The Hub

Troubled Times

EcoLodge

Featured in *Popular Science Magazine*, October 1997, an article called **ECO Homes**

The Geo-Lite Ecolodge is a self-sufficent system that requires no connection to utility services. Each unit generates its own electricity, recycles its own waste and stores and pumps its own water. An external water source is required. The electrical, water and waste handling capacity of each model is designed to match a range of occupancy factors. As many as 12 adults can be accommodated in a single unit. Geo-Lite Ecolodges can be assembled in a a matter of days. Most models can also be quickly disassembled and relocated if desited.

The dwelling rests on a thin wooden deck supported by a modular steel framework. The raised platform conceals all of the support equipment and may be varied in size to accommodate outdoor amenities such as picnic tables and recreation equipment. The dwelling is composed of one or more bedroom areas and a bathroom containing a lavatory, shower and flush toilet. The nomber and location of doors, windows and bath facilities is completely customizable.

Sustainable Design Features

Variety of Applications - The flexibility of the Geo-Lite system allows it to be tailored to a wide variety of climate variations, site conditions, comfort levels and numbers of occupants. While conceived with ecologically sensitive recreation in mind, the Geo-Lite system offers a much **wider range of comfort options** than traditional forms of remote-area shelter.

The units are unusually spacious, ranging in size from 330 to over 700 square feet (31 to 65 square meters) with ceiling heights up to 14 feet (4.25 meters).

If desired, features not normally associated with adventure travel such as carpeting, fireplaces, stereo and microwave ovens can be included.

Worldwide **Transportability** - The entire system can be transported in a standard overseas shipping container.

A very **Small Footprint** - No grading is necessary. The unit rests on small diameter non-continuous footings requiring little, if any, excavation.

Non-Consumptive Construction Methods - The entire unit is constructed with reusable materials and removable fasteners. It can be completely disassembled and reused without waste.

Relocatable - The unit can be moved to another site with little evidence of its past presence permitting natural habitat regeneration without loss of lodging income. However, the unit[1]s modular nature does not prevent it from being left in place and , when assembled, it does not look temporary.

Environmental Features

Clean Power/Clean Waste - Solar power, **composting toilets and graywater systems** reduce consumption. The need for utility infrastructure and hazardous waste disposal is eliminated.

Tangible Eco-Experiences - For camps or participation-oriented resorts, the Geo-Lite unit can be configured with energy, water and waste systems accessible to the guests, providing a "live-in science lab" atmosphere.

Adaptability to Local Cultural Styles - Our cylindrical structure with a conical roof, a variety of wall surface materials and the location of the dwelling on a raised platform, results in a structure which blends nicely with the architectural styles of many exotic locales.

Maximum Use of **Recycled Materials** - Wherever possible we use components made from recycled materials. Our support platform, for example is made primarily of recycled steel.

The Hub

Troubled Times

Housing Pyramid Homes

From after all I have read I feel my family has something seriously significant to offer to everyone interested in a cost effective, super strong, super energy efficient Survival Shelter/Home. Capable of withstanding an 8 on the richter scale seismic event and perhaps higher with modifications, Over 250 mph winds, and nearly fireproof with metal, or tile roofing. They are 4 times more energy efficient because of the natural ease to exhaust or recirculate BTU's. We have stand-alone off-the-grid models too utilizing off the shelf P.V. and freeze proof Solar thermo-siphon solar hot water and space heating appliances that don't require pumps or controllers and mount flush to the Pyramid’s ideal solar angle of 52". These pyramid also make awsome greenhouses and garage/shops.

I'm a builder of pyramid homes myself, and was an avoinics/electronics technician for the USMC. My electronics background keeps me keen on the newest alt/energy ideas coming down the pike. My Dad, Architect Ron Hexum, now has a website so all can read and study more about his version of the home of the future. Importantly, I'm not sending this information out as a sales pitch. I'm just trying to share with all something that I know blows away most anything I've read about so far on your hub or anywhere else for that matter. The new models of homes now use Structural Insulating Panels (SIP's), instead of a hand stacked roof. Even then they were quicker to build than a conventional home. But now with the SIP's a fairly large home can be constructed in days. Accomplishing 4 steps in one: Structural, Sheathing, Insulation, Vapor barrier. Plus importantly Shelter. SIP's construction uses a fraction of Timber resources importantly too. Dad figures 8 pyramid homes can be built with the same amount of timber resources as 1 conventional home.

Since the early seventies when I was a kid Dad started designing and building Pyramid Homes in Boise. Now there are over 60 in 6 Western States that he's been directly involved with. He lives in Portland now poised to be able to fill the explosive need for *affordable* Supershelters the world over using Sea Land Containers shipped from the port. He would also be glad to hear from any and all and can explain many aspects better than I. But first read the website info to not swamp him with questions that would be possibly addressed there. It also has pictures too both inside and out of some past homes, as well as a free downloadable 3D software program allowing PC and Mac users ability to virturaly tour inside and out the computer generated 40' Phoenix 2000 model. I would be glad to answer questions too.

Offered by Derek.

The Hub

Troubled Times

Housing Bunkers

I was talking to my friend in Europe last night. His intention is to use abandon military bunkers from 1st and 2nd World War for shelter. He is currently making an inventory in his area. I think this is an excellent idea for Europeans. He says that some of them are intact including sanitary and electrical installation.

Offered by Chris.

We have some along the coast that were used to hide guns in case of an approach from the Japanese. They don't have the plumbing et al to my knowledge, but are solid concrete shelters, covered by enough dirt grown over with grass and natural shrubs to afford an excellent firestorm shelter, the doors wide enough to allow escape or rescue, open doors actually, archways. But if well fitted, would not the military return to take them over, wanting to house their own?

Offered by Nancy.

Since I live next to an Army Post, I have discussed this very idea with a friend already. The bunkers would be a great place to possibly survive the shift. We have quite a few here also. We know where all (or most) of the hiding places are here. On the down side, so does the military and military men on post. I just have one of those gut feelings that if the military built it, they'll use it. They know where those things are. Remember, they can watch you walk down the street from satellite and know who you are. They can also keep an eye on those bunkers just as well. You may survive the pole shift here only to find yourself eaten alive when it's over. I personally think it's a bad idea. These places will be swamped with people, you can count on it.

Offered by Clipper.

What he has in mind is finding small ones. Maintained by 4-10 people during the war. Believe me there are too many of them to be controlled. Besides they have no military value at all today. Quite often farmers use them as storage.

Offered by Chris.

Troubled Times

Housing Fiberglass Radius

If money was no object and you could afford any underground disaster shelter - Radius P10 would be the one. They build them out of structural fiberglass and they sell a lot to the DC area (read politicians). A great feat of engineering. Read through the long list of specifications to learn about things you never would have considered in constructing your own shelter.

Offered by Steve.

The Hub

Troubled Times

Containers

The downside of containers is they really absorb heat from the sun, but since sun is not a real probability early on after the pole shift, it's probably a good idea. Make sure you buy one that doesn't leak. That's usually why they are for sale.

> Offered by John.

My current thinking is to use these things for supplies storage. One could load and pack them for the pole shift in the city. Support the walls with cross supports while packing as needed. Transport and put them partially underground at the site.

> Offered by Mike.

The intermodal shipping container is a beautiful tool as is. It’s very nearly the perfect box.

> Offered by Steve.

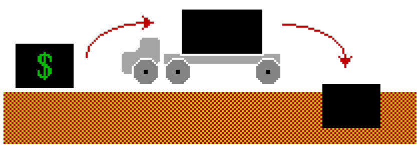
The Hub

Troubled Times

Connex Containers

Connex containers are the 20 foot and 40 foot steel shipping containers used by shipping industry to send goods over the seven seas. The manufacturer puts his goods in these and puts them on the backs of semi-trucks to go to the ocean liners where they take them of by crane and put them on the ship. After they get to their destination, they take them off by crane and put them on other semi-trucks where they are taken to the wholesale outlets. These shipping containers are sold as used in many places such as ship yards. We can buy one locally for about $2000. Remember to say that you want to use the container for a storage shed, not an underground survival site, so your survival plans remain confidential.

Our plan is to spray foam on the inside. Along with other plans we are working on for safety, the foam will act as a soft wall if any one should be thrown into it. (Foam about 4 inches thick). This container will be under ground with air vents and escape hatches on all sides. This will serve as protection during and after the pole shift. It may cost a few bucks, but we are planning on a few of these. One for just people and some for supplies and future information and technology. It's only money and you can't take it with you.



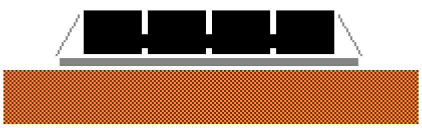
Offered by Clip.

The Hub

Troubled Times

Bolted Together

I have been for a while also thinking of how to use these nice seal-able steel containers. They were designed to keep the salt and humidity out of the products on ships in the open seas. My thoughts in the past have been along the lines of 4 bolted or welded into a square or rectangle, partly under ground, or not, depending on the soil, connected so as to be able to move from one to the other. Dirt could be piled up on the outside up to the roof to help hold it in place. Maybe other units could be totally hidden for supplies in case of retreat due to being overwhelmed by gangs. If partly under ground I don't know what to do about potential seepage due to all the water. The rectangular configuration would give a protected open area in the middle for entrance and exit. Also, for fighting from - like the old covered wagons -pull them all into a circle. Could have some small well protected windows facing inside so can look out and up at the sky during the pole shift.



Foam padding would provide heat/cold insulation and the ability to hang things after the shaking stops and provide some sound absorption or deadening on the inside. One would need to be careful not to use a product that will continuously out-gas toxic gasses like formaldehyde, etc. I personally don't trust the spray foams I have played with. One could consider prefabricated foam sheets, Some investigation may need to be done to choose this. Should it be open cell, cell tight, firm, or soft? I ran into some ecological (low out-gassing) building products a couple of years back. I just recently looked and was unable to find it now. It might be easier to do an Internet search. I was thinking of using body padding to protect the body as this would move with me in case I am outside when the shaking starts.

Here's another idea which may be even simpler. Take 4 storage units and bolt/weld them together side by side, doors at opposite ends. With a passage way to get from one to the other cut through the walls. Placed on a open rectangular frame work base made of I-beams that sticks out about 10-12 ft on all sides. This I-beam structure would be sitting on the top of the ground with the storage units welded/bolted on top of this. Supports from the edge of this base back to the roof of the nearest storage unit, would make a strong triangle, to support this outer edge. This would be placed in an open area so that if it slid around a lot during the pole shift you wouldn't care. I doubt it would tip over. One would want to keep it away from water, from flooding areas. Having some doors on one end and some on the other end would prevent all the doors from being blocked due to plowing up dirt as it moves during the shift.

Offered by Mike.

Troubled Times

Ship Contain

Spray Foam

Spray foam can be soft and easy to put on but *deadly* when burned, as it does give off a gas. If one is planning to use it only the short period during the pole shift, I wouldn't worry about it just normally giving off gas through age. The pre-fabricated sheets of foam are a good idea. They are not hard to find. You can get them at most lumber supply stores, at least where I live we can because of our cold weather. Soft cell would be good during the pole shift. It won't tolerate much walking around on if you put it in and let the kid's play on it. Tight cell would be more durable and I think it would stay on better. You could use a product called liquid nail to glue it on. I have used this stuff for years and if used on wood and plywood, the wood will break before the glue will give.

I love that idea about the triangle I beams. If this thing is built with that and it tips over, we picked the wrong spot to be in! As far as water seepage goes, spray foam on the *outside* will prevent most of that, especially under ground. Maybe when it's over, one could box in the I beams and make a second story for growing plants, or put a wind generator on top, or a lookout, or a gravity fed indoor out-house.

> Offered by Clip.

I would suggest spraying poly urethane foam on the outside of a container, then bury it. See http://www.monolithicdome.com for details.

> Offered by Steve.

The Hub

Troubled Times

Ship Contain Liquifaction

I live in Alaska amongst permafrost. The thought that a container may float out of the ground has crossed my mind. But we have tons of tanks of all kinds buried under ground around here and they never seem to come up. I think making the hole big enough to allow the addition of gravel and sand around the tank helps. This would allow the water to flow around the tank in the ground instead of floating it. Not sure how it will hold up during the coming earthquakes. The shaking may bring it up anyway but at least supplies that are inside will stay put.

Offered by Clip.

Water seepage and liquefaction forces become the issue if put below the ground. You will need to consider magnitude 9 or more jolts tapering off after the first less than an hour. There will be lots of rain and run off water. Don't place it at the lowest spot.

Offered by Mike.

The Hub

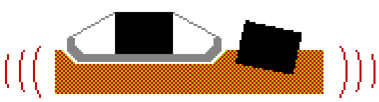
Troubled Times

Ship Contain

Noah's Arc

Put one or more shipping containers (depending on your need) side by side alternating ends, bolted/welded together with connecting passage ways. Put this on top of a square flat bottom concrete steel reinforced slab shaped to look like a symmetrical flat bottom boat. The slab would be square, and stick out well beyond the container(s). All outer edges of the slab would have a taper of say 30 or 45 degree angle like the front of a flat bottom boat. On the outer edge the slab could extend up above the top surface to form a concrete curb or rail around the perimeter. Drainage slots would be cut in each side to allow water to run off.

This concrete boat would be able to ride the waves of rippling land and survive the liquefaction (soil turning into a liquid) that is likely to occur in many areas. Depending on the ground conditions, this could be built differently. In soil that is not very deep to bed rock, one would not worry about sides and possibly the slab thickness could be less. In places where there is soil and it is very deep to bed rock then the slab should be thicker and sides higher and possibly the slab is a little larger overall. This would have use after the pole shift as a excellent closed water tight storage to keep out the humidity or as continuing housing.



Design considerations: Until one can get a structural engineer to look at it, estimate roughly a 14" thick slab for a bottom over liquefaction and about an 8-10" slab for a bottom close to bed rock. Use lots of large reinforcing rods and wire mesh. Use supports from roof top to slab to make a triangle. Fasten storage units securely to bolts welded to large plates embedded in the concrete. Make sure the slab is done at least 6 months before the pole shift day for maximum strength.

Offered by Mike.

The Hub

Troubled Times

Ship Contain Wind

One thing about containers is they are boxes and if you're in a box when the winds come, you could become Dorothy in the *Wizard of Oz*! I still think domes make more sense.

Offered by John.

You may need to modify it to withstand up to 300 MPH winds. Wind becomes a problem if the container is put on top of the ground. Every advantage of natural shielding should be taken into account. For example wind breaking hills, ditches etc.

Offered by Mike.

The Hub

Troubled Times

Secured

The very helpful owner/operator of a container refurbishment business showed me a few photos of some of the applications of containers he has worked with, and I noted with interest one set of photos detailing the footings of a container "home" arrangement. They appeared to be galvanised steel peers placed within concrete footings, welded to the base edges of the container, holding the thing off the ground by maybe 10 inches. I was thinking this may be much more cost and time effective than pouring and securing to a complete concrete slab. And just a point of clarification, I'm talking about securing to immoveable and, hopefully, not prone to fracture bedrock, not just shallow peers floating in the ground. In any case, shaking around will definitely stress any securing or supporting arrangement, so it is worthwhile knowing that the base of containers are made of steel beams around the perimeter and as floor joists so there are lots of points where peers could be attached.

Offered by Gino.

Troubled Times

Ship Contain

Fully Buried

I am leaning towards a partial-burial solution. hate that term burial-but I guess its technically correct. I don't want to discourage you but I do think there are additional problems with the full-burial which you will need to overcome. The full-burial alternative is a tricky one. Like I said, I tried to make it work out in my planning but it just became too problematic and that was when I wasn't even considering earth movement and rolling land surfaces. I think the unpredictable forces exerted on a buried shipping container during any earthquake activity could prove disastrous. I had to ask myself, "What is the main reason or advantage that I wanted to get from burying it in the first place?" Protection from the elements, and the near constant temperature of the ground. That is when I came up with the partial-buried plan. This plan uses the advantages but avoids the problems and the expense of full burial.

Offered by Steve.

I would be *very* leery about 3' of soil on top of one. It might not sound like much, but depending on your soil type, the weight could be several tons. Make sure that your container (including modifications can handle this load). Backfilling is one of the most important operations in buried structures. Any lose packing *will* cause shifts and possible create loads that cannot be handled. This is especially dangerous if the soil is generally rocky (rule of thumb is nothing larger than a softball within 5 feet of the structure). I would be concerned about the backfill in-between the container and the undisturbed soil as this is where the greatest danger lies. Another solution, a tad more expensive though ($10k), is to use culvert pipe. Here again, the importance of using materials designed for burial and the loads they must endure cannot be over emphasized (factor in earthquakes and you really have an issue).

Offered by Michael.

Your comments are well taken. I do like the culvert design and the web site. My discomfort is a design that buries these things so deep in the ground when there are Richter 9+ earthquakes predicted. I don't know if they are designed for that. That's why even with the culvert concept, I think I would prefer to see it mainly covered by berming. Maybe I'm just claustrophobic.

Offered by Kraige.

If something comes down on you, as in a landslide, or you sink a little more, you're looped. Personally, I would only half bury it so that it's not going to move but I don't find me and mine surviving but buried alive. Even a tree could have you stuck in there.

Offered by Regina.

Could you strengthen these by enclosing them in reinforced ferroconcrete before completely burying?

Offered by Cynthia.

In short - yes. But you are talking alot of money in concrete (12 yards for a 20' container, 24 for a 40' assuming 6" thickness) Rebar is relatively cheap. Spend just a bit more in concrete and you don't need the container at all. There's nothing stopping you from berming a culvert and it need not be so deep, though few structures are designed to withstand such extreme quakes. However with berming and only a year and half to go, the backfill will not have a chance to be completely settled, and that reduces the quake strength needed for liquefaction. That being the case, any structure you chose should have a substantial base. Think along the lines of floating to maintain vertical orientation.

Offered by Michael.

Troubled Times

Collapsing Walls

The container is constructed with high strength square-tube beams that run end-to-end along the top, bottom, and frame out the ends. The walls themselves, however are constructed with a staggered double layer of corrugated sheet steel. Thus the frame is stronger than the walls themselves and in a full-bury the weight of the surrounding soil will apply its pressure to all points equally. The middle point of a long wall section is thus the weakest point, and load calculations (strength calculation in /sq. inch vs load calculation in /sq. inch) should be crunched for the type of soil (density) that you are planning to install in. I have not had any luck finding engineering specifications on these containers yet. Yes, there is an industry standard for size and type but as far as the quality of steel, thickness, etc., I am not sure. Also keep in mind that a used container may have experienced more metal fatigue over its life compared to another seemingly identical unit.

Offered by Steve.

Sea containers, shipping containers, intermodal containers (whatever you want to call them) seem very sturdy, but their strength is highly concentrated to the corners. Corner strength is all that is needed to stack them 20 high (as well as handle them,) and the length supports are strong enough to prevent shape distortion. They have relatively little sidewall strength, and this can easily been seen if you look at any container graveyard. This fact makes them unsuitable for burial unless adequate measures are taken to reinforce the top and sidewalls. It will also be a concern if the container experiences any extreme circumstances (high winds, wind born projectiles, etc.) As a low cost alternative, used underground fuel tanks provide much more strength (since they were designed to be buried in the first place) though raw tanks will need to be cleaned prior to use. These are harder to find, but are a much more appropriate solution.

Offered by Michael.

The steel in the sides is usually 1.5mm or 2.0mm and most of the "raw" containers in the yard that I checked out had 2 or 3 holes in them, either from rust or from something piercing through. The job of refurbishment seemed to consist mainly of blasting or grinding the paint and rust off the surface of the container, cutting out sections of steel to replace damaged or rusted areas, welding in steel plate to replace and then painting. The floor of the containers are very thick (20-30cm I think he said) marine plywood and are very difficult to remove, apparently, or so I was told.

Offered by Gino.

The Hub

Troubled Times

Ship Contain

Warped Floors

Most of the container is steel but the floor is tongue-in-groove hardwood and sits on a steel cross-member framework, not a solid steel plate on the bottom. We can assume that the floor would be in direct contact with the soil unless some barrier is put in place, i.e. concrete, gravel, plastic, etc. While this is perhaps a manageable concern in an above ground, or partial-bury configuration due to the fact that there is at least some ventilation, full-bury implies no ventilation. This could yield warped or rotting floor, flooding, or even rodent/insect intrusion. So some additional barrier is needed.

> Offered by Steve.

You may want to build extra structure on the inside, for example a concrete slab could be put on the floor of the inside.

> Offered by Mike.

The Hub

Ventilation

One of the problems of underground home construction in general is that additional humidity settles into the lower cavity. Thus underground home builders favor areas in the midwest which are by climate typically more arid. The additional humidity is uncomfortable and causes things to corrode faster. Also, when steel is underground, it sweats, fiberglass does not, so any air space between your inner steel wall and the insulation however small it might be, will be damp, inviting corrosion, mold, bacteria, maybe even shorting out electrical connections depending on the setup. The only way around this that I can see is to use the much more expensive foam-type insulation which will adhere directly to the wall itself. An above ground or partial-bury can be ventilated much more easily, without the use of blowers and fans which can break and need a constant power source. Heavy gas collection is also a concern, i.e. Radon (radioactive carcinogen) carbon dioxide, propane, maybe more.

Offered by Steve.

Troubled Times

Corrosion

Containers make excellent *above-ground* storage containers. With some minor modifications they can even be made livable to some extent. But below ground is touch and go depending on the acidity of the ground and the degree of oxidation of the container. Rust will eat through such containers in about the same time as it would, say, an automobile. You would suffer moisture leakage, and probable contamination depending upon the water table contamination and the age or lack of positive seals on the doors. In most all cases, your first enemy underground is moisture.

Offered by Brian.

Electrical charges pass through the earth constantly and the soil has a resistance to these charges. Any metal object placed in the ground can act as a short-cut for electrons to get where they are trying to go, thus any buried metal experiences much more corrosive force underground than on the surface. Something along the lines of ten times as much! Corrosion is dependent not only on the shipping container itself and how well it is covered but also on the type of soil and amount of moisture in the soil. The corrosiveness of the soil can be tested ahead of time. For a full bury the container might be additionally protected by coating with a hot asphalt tar emulsion which you can get locally. Check with your highway dept., as they use it to coat and patch cracks in the road. There are other more high tech coatings which might be tried, but for cost effectiveness I like this one. In the partial bury solution the container is kept out of the ground and dry enough to not need any additional corrosion protection other than a good industrial coating. Allied Corrosion sell the zinc and magnesium anodes used to protect steel from corrosion.

Offered by Steve.

Transportation is an issue to consider if planning on using containers at your survival location. 40' containers require a semi-trailer (18+ wheeler) and a crane to transport and unload, which adds to the cost substantially and limits your distance from "civilization". 20' containers require a tilt truck and can get to any location accessible by road, including well maintained or sturdy dirt roads. A maneuvering area of 16 or 20 square metres, reasonably flat, was mentioned to me also. I've been thinking about partially burying a 20' shipping container (or two) into the a hill side with the doors opening outward, away from the hill. Yesterday I went to visit a secondhand container refurbishment business and learned that steel containers will rust badly if buried within the ground with the dirt piled against them. To counter this, though, I was informed to use fully galvinised containers or stainless steel containers. However, they are not as readily available and cost from $2500 (Australian Dollars), as opposed to $1800 for the standard steel ones. When buried in the ground with the dirt in contact with the steel, the standard steel shipping containers will rust to the point where they become unusable within 1-2 years. Or so I was informed.

Offered by Gino.

Pick up some Zinc bars and place them in the ground with a heavy wire running to the container. This will minimize rusting. Marine supplies have these sort of items. They use them in salt water and with boats to minimize corrosion and rust.

Offered by Mike.

Troubled Times

Ship Contain

Blocked Entry

One of the great things about shipping containers is that they come with two big swing-out doors for easy entry/exit, and loading/unloading. These doors are easily secured and their size is a great boon for customizing and outfitting. Full-bury implies that additional doors or hatches must be constructed on the roof. Any material brought in or out of the container after placement is limited to the size of the hatches and any openings made in the roof must be waterproofed and secured (read locks). There are ways around this that I have thought of, and ways to fit out the container before placement, but none of these are simple or easy. Also, if the container shifts during earth movement there is a chance of any opening becoming blocked or jammed as the box is not rigid but surprisingly flexible. Even in normal use it is possible for the large doors to become jammed if the container is not placed on a flat surface.

Offered by Steve.

My plan is to bury it only 1/3 to 1/2 in the ground and then berm soil up against the sides, with about 3' of cover over top (possibly with a water proof membrane buried over top). This would greatly reduce possible sidewall pressures and provide protection against winds and projectiles. I would still do some internal bracing with 6" x 6" wood beams to strengthen the sidewalls. I would also make sure there is more than one way in or out (I don't want to be stuck in anything with only one way out that could be blocked), in particular a second access that would be a hatch that could open from the inside and open inwardly. This emergency hatch should be buried on the roof but with most of the fill on top of it, say 2', would be pea gravel. You remove the hatch, the small volume of pea gravel falls into the container and you dig out the last foot of soil. This design is used in commercial under ground shelters and allows you to even dig sideways if there is an object directly on top. These container suppliers can do just about any modification you want.

Inside, a plywood floor and the whole interior painted white to increase light reflection with a small light source. An air vent and hand pump would be necessary (ala Kearney's *Nuclear War Survival* book). The one end where the main entrance is would not have soil directly against that end, but a berm that is offset from the entrance. I'm still thinking about this detail but I'm sure I can make it work.

Offered by Kraige.

The Hub

Troubled Times

Ship Contain Scenario

Picture with me this creative vision of process and placement. It is day one of my shipping container project and my brand new shipping container has just arrived on a flat low-boy trailer. Its a beautiful forty-foot high cube. Our site is a typical open field with a deciduous tree line of forest along the field. I have the driver drop the container perpendicular to and just twenty feet or so in front of the tree line on a set of railroad ties also set running perpendicular to the tree line. The next month is spent framing out the container with 4x4 posts, 2x8 cross-members, ISO board insulation (2" thick foam board), and 3/8" plywood walls which are well secured to the 4x4 posts which run every eight feet along the length.

Everything is screwed together using lag bolts for the big stuff and smaller #14 wood screws for the walls. Care is taken to pre-drill and countersink all holes for a good fit and attractive install. If a wall needs to be removed later to accommodate some unforeseen plumbing or wiring, the wall panels can simply be unscrewed to remove, and screwed back in place with no loss of strength. I wouldn't use nails for anything!

During this time, a plan is made to clear-cut out a section of timber 2 1/2 times the width and about 1 1/2 times the length of the container, in the forest directly behind the container. The timbered logs are set aside for use later as logs, not firewood. The second month a backhoe/loader is rented to excavate the cut site to three or four feet below the surface. A load of gravel is brought in and spread evenly. More railroad ties are laid down and even greased if necessary, staggering the seams so that the container won't dip and bind as it is slowly winched off of the field, back behind the tree-line, and down into the recessed pit. A common 12volt or hand winch is attached to the base of a tree at the far end of the pit to pull the container into the recessed pit in a straight line.

The three or four foot walls of the pit are lined and secured with a commercially available interlocking stone designed for this purpose. The short wall angles back slightly and has a neat finished appearance. If the wall were to be any higher and the pit any deeper, special engineering would have been needed to foot or hold the wall in place and avoid caving as the surrounding soil settles. The timbers removed earlier are cut to length, notched at one end, and placed with the notched end up against the top corner of the container and the other end about three feet outside the retaining wall. Railroad ties are buried about a foot and a half into the soil longitudinally along and outside of the retaining wall to provide a footing for the timbers. The timbers are then lashed together side by side and possibly covered with a galvanized sheeting to provide a roof for the now awning-like brace which covers the pit and runs all the way around the container leaving only the very front door section open in front.

The container is now partially buried and partially covered. The partially submerged nature of the site allows the air around the container to be cooled by the Earth in the hot summer thus keeping the container cool. Similarly in winter, the awning of the timbers keeps the cold wind at bay. The awning covered area between the container and retaining wall is kept dry and is ideal for a lounging area, outside grilling, and storage of less temperature sensitive equipment. The whole project is done economically and focuses on placing the container in an environment where it would not have to be extensively modified with complex or unproved methods, and where it can be kept dry and ventilated for long life and comfort. The recessed position and awning-like reach of side-by-side timbers covering the entire pit gives the project a flush-to-ground low roofline to protect against high winds..

Offered by Steve.

Troubled Times

Ship Contain

Advantages

A partially buried container can blend technology with nature at a very low cost. It is simple enough in the conception phase as to not hinge on any step too technically risky. It is simple enough to be doable with a good amount of certainty. While I am convinced that it will work, I haven't made any claims as to how well it will work in the face of earth changes. Indeed, I drew up this project on scale drawings in a desire to get off the grid, simplify housing issues, and to side-step governmental interference in the forms of licensing, taxation, and inspections. One might note that the above project as it is, does indeed bypass these things. No foundation has been poured so there's no building inspection. The site would not be considered permanent so there is no increase in the value of the land thus no increased tax assessment.

The above project parallels the idea of placing a container on a concrete boat-like cast .Instead of gravel, reinforced concrete could be used, and the timbers could be replaced with steel beams which could be welded to the top-side beams of the container and bolted to a concrete retaining wall. This thing could be constructed and cast in the ground and if the Earth gets to bumping-an-rolling, it would pop up out of the ground and ride across the surface! If after this ride the unit finds itself on an angle of say 10 degrees or less, the container and side beams could perhaps be unbolted, and a hydraulic ram used to lift the container more to level, and a hewn railroad tie of appropriate height chocked between the container and the concrete base. Rams are easily enough stored and of a capacity to handle such an after-shift leveling adjustment.

Offered by Steve.

The Hub

Cheap

I came across for Used ocean cargo containers for sale. Some have multiple roll-up doors which could come in handy.

> Offered by Steve.

Look in the yellow pages under trailers. If you live close to a port city or trucking hub you'll find thousands. They can be had rather cheaply and shipped to your door. Our used 20' was $1200 and water tight. These are also known as intermodal containers.

> Offered by Michael.

Troubled Times

Fixer-Upper

If you are in a cold environment now you might want to paint the outside black to adsorb heat from the sun. If you are in a hot climate now you may want to paint it white to reflect heat. Also, thermal insulation and/or foam should help. You may want to have an opposite or other color paints in storage for after the pole shift in case you want to change the color. Air circulation system could be a key also. Holes due to rust can be patched with bond-o or fiberglass, etc. However, I wouldn't recommend this rust spot sit immersed in water for extended periods of time as it could soften the bond.

Offered by Mike.

Troubled Times

Ship Contain

Before and After

Spray foam insulation is water-proof, light, paintable and also insulates from heat and cold. If the outside of the container is sprayed with foam, it will take care of all the above conditions. There are trailers and houses where I live that have been sprayed 20 years ago and they are still OK except for a little wear from the sun. We spray foam on all our septic tanks and fuel tanks before we put them under ground. It doesn't make for the best looking house on the block, but I'll bet their electric bills are less.

I am considering the idea of containers bolted and welded together setting on I-beams with I-beams forming a triangle over the top of them. Kind of like a dome as such. Because of the short time during any pole shift fire storms, I may cover these I-beams with metal to form a container within a container. After the pole shift, I would want to install wind generators on top of these I-beams for power. This should be enough for lights and ventilation (there are fans by the hundreds laying around of all types, they should be easy to find before and after the pole shift) and what ever else may come along that we may need to power.

If this metal on top is rounded enough and has no edges for winds to get under, It should work for the hurricane period. With this metal roof, it will protect from the firestorm, protecting the foam insulation and the container contents. The I-beams should protect and hold things together during the square dance of the earth's plates, even if the shelter turns over, it will still work. The extra metal roof will help protect from the rains later. I plan to make sure I am above the 750 foot sea level mark so this rounded pyramid can be used as base camp for a long time to come. Provided the 750 foot mark stays a 750 foot mark.

Offered by Clip.

The Hub

Troubled Times

Sites

Nebraska

I have found a catalogue of rural properties some of which are very cheap. I have seen houses as cheap as $3,500 full price and plenty in the $20,000 range with land. It is $16.00 a year and it is well worth it.
It is:

> **Rural Property Bulletin**
> PO Box 37
> Sparks, Nebraska 69220

Offered by Valerie.

Troubled Times

Michigan

In Western Michigan, there is 90 acres for sale (in July, 1999) by an older couple, 40 of the acres have been an organic farm. They have a small amount of frontage on a good size lake. While I have not seen the place, the area is where the headwaters of a couple of streams begin, so I believe it to be on the high side, certainly 930 feet above sea level or more. They also have a house that is actually two apartments, one 3 BR, LR, DR, kitchen and storage. The other apartment is "below grade", meaning on the ground, i.e. "where the kids stay when they come to the lake". If someone was looking to relocate to a safe location, this is an example of what Michigan has to offer.

Offered by John.

Troubled Times

Homestead Org

I ran across the Homestead Org site, which seems to have plenty of helpful information. For anyone still looking for property in a safe location, try checking out their rural real-estate section. Here's a description off their home page.

> *Have you ever dreamed of moving to the country, building a log cabin back in the woods, growing an organic garden, raising livestock, simplifying your life, working out of your home, and spending more quality time with your family? If any of the above applies to you, then you are a homesteader at heart, and you can't afford to be without the information you need to help make your dream come true! The Homestead.org Online Homesteading and Small Farming Resource endeavors to provide you with that information.*

Various resource pointers are used for the site, including links to other sites on the Internet, mailing addresses and telephone numbers. Homestead.org also contains information in the form of a developing on-line "magazine", with articles, pictures, hints and tips; hopefully a "search" function will be added eventually. It will be like a magazine and yellow pages directory rolled into one, and it will hopefully be a general meeting place for rural folk on the Internet, where they can help each other with problems and tell each other about their experiences.

Offered by Gabe.

Troubled Times

New York

Here is the product of my land search in and around Ithaca, NY.

> http://gesslein.com/landlots.htm

The elevations come from topo maps and is pretty close but probably not perfect. The elevations are as follows:

106 acres	920 ft. on East side	820 ft. on West side
158 acres	1,100 ft. on East side	1,150 ft. on West side
7.5 acres	1,100 ft. on East side	1,080 ft. on West side
36.6 acres	1,140 ft. on South side	1,170 ft. on North side

The last one includes 40 acres, a house, three barns, and a garage for only $129,000; which is a sweet deal and a helluva lot of land for so little money (if you took out the house, I bet the land would figure to be about $90,000 in all. That's only $2,250 an acre in a pole shift safe area..

I discovered yesterday that **Cornell University** is really big into hydroponics and have a huge greenhouse set up around here growing lettuce as we speak. Additionally, some of the land for sale on the pages I provided is near Ithaca's Eco Village, an ecologically minded residential community that grows its own crops and is even building a new compost center. Their compost specialist is really into closed loop systems of food production (i.e. fish with plants, etc.).

> Offered by Ted.

I'm in the Rochester area and have been looking at land in the **Finger Lakes** area. There are topographical maps available by USGS at most camping or outdoor stores. I've been looking at 1500 ft+ elevations. The foothills of the Appalachin Mtns are here in NewYork. Some good high land, mostly quite fertile, some rocky. You can probably find less expensive land off grid and undeveloped. Existing buildings and barns will probably be mostly unusable. The Ithaca community is quite progressive with the **Ithaca Hours** currency established now and the **Cornell Ag School** is excellent.

> Offered by Toni.

Troubled Times

Sites

Cold War

My corporation recently purchased about several dozen pieces of property once owned by AT&T (built during the cold war to house military microwave equipment). Each site typically contains a heavily-reinforced concrete building, a Diesel generator, and a heavy microwave tower, along with an acre or two of real estate. They are located in Missouri, Arkansas, Oklahoma, and Kansas. We are going to place about 36 of these sites on the market because they are not in areas of our primary marketing concerns. They were built to withstand a nuclear war and will be sold for a fraction of their original cost, some as low as $20,000 for a 1,250 square foot building, one acre of land, and an extremely stout microwave tower. If you would like more information, let me know.

As an example, this microwave site is located in the rural Ozarks of Douglas County, MO. There is one acre of real estate on a paved state highway, and the building measures 24' x 60' overall, with 15' ceilings. The building is solid concrete, 13" thick walls with heavy steel reinforcment. The roof is also solid concrete. The inside is basically one big room with a small (12' x 14') partitioned room for the Diesel generator. The generator is 35KW. The original underground fuel tank has been removed. There are heavy steel doors on the front and the back. A concrete protective "blast wall" is located outside the generator filter area (to protect the opening from the shock blast of a nuclear bomb). The site has an outdoor toilet facility and no indoor plumbing. A well could be drilled on site, however. The tower is 113' tall, extremely heavy and enclosed in an 8' high chain link fence. The ground elevation at the site is 1,480 feet above sea level. This site is priced at $20,000 including the real estate, building, tower, and generator.

Some of our sites have up to 19,000 square feet of floor space, deep wells, sewage facilities, dual 350KW generators, fallout shelters, restrooms, kitchens, etc. They range in price up to $400,000, and could support a fairly large group of people. They were designed to house AT&T engineers and technicians for survival and post-nuclear war long-term survival in the event of a war. We are eager to sell these structures and look forward to any inquiries.

Thanks,
Charles McCullough

The Hub

Contact Information

If you or anyone that you know is interested in building a biosphere of the type presented on this website, regardless of its size, whether it be for experimental purposes or for habitation, or both, contact me, Kurt Haberman, President of Slide Lock Systems of Wisconsin, Inc., and I would gladly be willing to act as a consultant for a project to the fullest extent of my capacity, because what I want most of all is to see a biodome of this type realized for the security of humanity.

In any case, I can be reached by several avenues, but some are better than others. First, then, try my cell phone at 608-434-1667. Second, try reaching me by email at kurtevanhaberman@yahoo.com.

Serious investors are invited to download my Business Plan.

With all sincerity, then, thank you for taking an interest in this website. It is people like you that are the roots of change in our world. Together, let’s just hope that our collective efforts towards this change will actually come to fruition in our time.

Sincerely,
Kurt Haberman,
President,
Slide Lock Systems of Wisconsin, Inc.

Recycling and Products

Now, these biodomes would produce no trash at all, because virtually everything that would be produced within them for consumption would be produced based on consumption pattern analysis—which means no waste—and would always be transferred directly to the point of consumption without ever being packaged and unpackaged, and when containers would be produced and used for consumables, the containers would always be reusable or recyclable. Finally, because all food in these biodomes would be served in restaurants, instead of in homes and restaurants both, the whole process of distributing food in the biodomes would be greatly simplified.

Regarding products, then, items such as paper napkins would be completely absent inside these biodomes and would be replaced by cotton napkins, which can be easily cleaned and reused over and over again for a long time. In fact, the presence of paper or wood products of any kind would not be used inside these biodomes for anything, because, regardless of whatever wood product there is for a function, there is always another material that could be used as a substitute that would save the life of a tree and would take less labor to harvest or make. In the case of using paper for writings or graphic communications, then, all visual information inside these biodomes would be communicated with the use of electronic devices instead.

Cleaning Solutions

Along the lines of biodome environmental issues, then, the only types of cleaning solutions that would ever be used in these biodomes would be citrus-based cleaners, because they can clean just as effectively as other cleaners without harming environments in any way.

Biodome Restaurants

Now, regarding how food would be prepared and served inside a biodome, preparing and serving food entirely within restaurants has several advantages over any other method. For one, building a biodome without any home kitchens and home dining areas would save a great deal of time, labor, and raw material that would go towards the construction of the biodome and all of the components that hundreds of kitchens would require, such as refrigerators and ovens, which, obviously, would save a great deal of money as well. Second, these types of components, in smaller sizes and larger quantities, would use up far more energy over time than fewer and larger components would. Finally, if food were brought to hundreds of homes within a biodome or delivered to hundreds of these homes, the amount of food packaging material that would need to be recycled over and over again would be far greater than the amount of packaging that would need to be continually recycled due to restaurant usage.

Regarding the food preparation areas of these restaurants, then, the only distinct difference between the restaurants of these biodomes and a typical restaurant would be the dishwashing area, because instead of having a labor-intensive rinsing sink and a sanitizing dishwasher to the side of the sink that uses high heat to kill off bacteria, there would only be a specialized sink that could perform the function of the sink laborer and the dishwashing unit. To accomplish this, then, this amazing but simple unit would employ two simple types of energies, those being: ultrasound and ultraviolet light. In this way, then, ultraviolet light would shine into this specialized sink from the sides of the sink to kill off bacteria, and the ultrasonic part of the sink would pass high-frequency sound waves through the water in the sink to vibrate all the food and particulate matter off of the dishes. With this system in place, then, all that would be necessary for a worker to do would be to put dishes into the sink, then flip a switch on for a about ten seconds, and then pull the articles out of the sink and place them on the shelving along the wall. With this type of system installed, then, the total amount of personal energy expenditure required to accomplish this task would be completely minimized, and high heat would be absent from the system, which would eliminate energy that would normally have been required to cool the dishwashing area.

The Crop and Farm Biodomes

Finally, in the crop and farm biodomes of these biodome complexes, all crops would be fertilized by nutrients that would be obtained from the composting toilets of the complexes and would be irrigated by a nutrient-rich water supply that would also be continually obtained from these composting toilets as part of a closed-loop nutrient cycle, where nutrients would be returned to the toilets by way of food that would originate from the crop and farm domes, which would then be digested and returned to the composting toilets.

Now, regarding the Methane gas and manure that would be produced inside these crop and farm biodomes by cows, it should be recognized that Methane is lighter than air, so, as a result of this condition, it will always rise to the uppermost regions of these biodomes, where it can then be periodically ignited by a spark, which would then split the Methane into water vapor and Carbon Dioxide—leaving no other elements behind. After this split takes place, then, these elements will both fall to the lowest regions of these biodomes and feed the crops there.

Regarding the manure in these biodomes, then, put simply, it would always be gathered and incorporated into the nutrients that fertilized the crops. And regarding what would be done about the vapor that would be produced by the chickens in these biodomes due to their urine excretions, the living quarters of the chickens would be completely sealed from the atmosphere of these biodomes along the perimeters of the biodomes, and the vapor that they would produce would then be condensed there by dehumidifiers and incorporated into the fertilizer that would be used for the crops of the biodomes. In addition, any crop within these biodomes that could be produced much more readily in a hydroponic system of fertilization, such as feed for cows and vegetables for people, would be produced in that way along the perimeters of these crop and farm biodomes.

The Biodome Nitrogen Cycle

Now, one last cycle that should be mentioned that will occur within these biodomes is the Nitrogen Cycle, which will take place between the atmospheres of these biodomes and their soils. With regard to this cycle, then, put simply, the plant life in these biodomes will use whatever Nitrogen comes into contact with its soils in very small amounts, which will come to it in the form of certain Nitrogen-based compounds, and in some cases in its pure form, but when a given life form dies, it will return that Nitrogen back into the soils around it and the atmosphere above it, so, once again, another natural cycle that will occur within these biodomes will keep itself in balance without any work on the part of the people of the biodomes

Biodome Nutrient Cycles

As stated previously, in a temperate climate, if a biodome is left uninsulated, the inner environment of the biodome will have seasons, but further yet, any temperate deciduous vegetation within a temperate biodome would drop its leaves to the ground every fall and thereby return nutrients to the soil for re-use by any life form in its area the following spring—including itself. Regarding the nutrients of these deciduous ecosystems, then, not only do fallen leaves add nutrients to the soil, but fallen branches and fallen trees will also slowly decay in these ecosystems and return nutrients to the soil. So these ecosystems are allowed to carry on within these biodomes just as they would in their natural environments.

Biodome Atmospheric Cycles

Now, with regard to the atmospheric cycles of this biodome, perhaps the most important process that would occur within it would be the natural exchange of Oxygen and Carbon Dioxide that would constantly take place between the vegetation of the biodome and the people of the biodome. In this exchange, then, in order to manufacture their carbohydrates, the leaves of the vegetation in this biodome would take in the Carbon Dioxide that the people would exhale, and would then emit Oxygen into the biodome as a by-product of this process. As a result of this process, then, almost all free Oxygen within the atmosphere of this biodome would be produced by this process, and the Oxygen produced would then be inhaled by the people of the biodome for use in their biological processes.

Now, the main thing to understand about the atmosphere of this biodome is that all the gases inside any biodome will stratify according to their weight because they will have no wind to stir them around, which would leave Oxygen occupying the lowest 21% of the atmosphere where it is most needed, along with Carbon Dioxide and water vapor, which are also most needed at this level. This, in turn, would leave all the trace gases at the top of the biodome, and Nitrogen occupying the remaining 78% of the atmosphere below that.

Now, in the case of deciduous ecosystems, which produce the highest levels of Oxygen in temperate climates, because the trees in these systems would drop their leaves in the fall and cease to produce Oxygen until the springtime when new leaves would form, certain types of evergreen trees would need to be incorporated into these ecosystems so that a balance of Oxygen could be maintained during these periods. The two types of evergreen trees that would probably cure this problem the best, then, would be Magnolias and Hollies, because they not only produce an adequate level of Oxygen throughout the year, but also because, unlike other evergreens, their root systems are very shallow, just like those of deciduous trees, and this means that virtually all the vegetation of these biodomes could be planted into a relatively shallow layer of earth, and this, in turn, means that less labor and raw material would be required to create these types of biodomes, as compared to biodomes that would require deeper layers of soil.

Biodome Temperature Levels

Regarding the temperature levels of this biodome, the main thing to know is that, in a temperate climate, if the biodome is left uninsulated, the annual temperature fluctuations within the biodome would be the same as those outside the biodome, because the alloy structure of the upper dome would transfer heat in and out of the biodome very readily. But in the summertime, because heat would accumulate in the biodome from its upper regions on downward, it would take time for indoor heat to reach the level of the people, and in the wintertime, cold would occupy the lower level of the biodome immediately and work its way upward through the biodome atmosphere. In any case, if a biodome was located in a cold climate, the biodome would definitely need to be insulated and heated, and in a hot climate, the biodome would need to be insulated and cooled.

Apartment Water Cycles

So, regarding the water cycles of this biodome, all water that would be used by the vegetation of the biodome would always be returned into the groundwater cycle in some way, where high humidity levels produced by vegetation would be condensed and transferred into the groundwater cycle of the biodome by dehumidifiers, and humidity from dead vegetation and natural mulch would be returned in the same way. These dehumidifiers, then, would be raised just above the level of the ground where humidity levels are the greatest inside the biodome, and would drain condensed water directly into the purifying sandstone aquifer that rests on the alloy foundation of the biodome—down beneath the layers of soil and gravel of the biodome. Once this water has entered this sandstone aquifer, then, it would flow through the sandstone towards a clean pool of water located in the lowest part of the biodome at the center of the foundation, where it would establish a new, slightly-raised water table. After that, then, clean water would be periodically pulled from this pool of water into the sprinkler system of the biodome, thereby dropping the level of the central pool of water to the same general level where it rested before it was previously raised. After the watering process, then, water would be returned to the groundwater cycle, and this water cycle would be complete.

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Biodome Water Cycles

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Biodome Humidity and Health

Now, as just stated, controlling humidity levels throughout a biodome and all of its apartments is primarily for health reasons. In order to do this, then, it is important to keep the relative humidity of the biodome and all of its apartments within “the optimum zone,” which typically lies between 45% and 55%, according to an article in Popular Science. Keeping relative humidity within this zone, then, would inhibit the survival of various viruses, including cowpox, influenza, measles, polio, and herpes. In addition, keeping relative humidity within this zone would restrict the growth of many bacteria and mites and fungi. Further yet, conditions such as respiratory infections, allergic rhinitis, and asthma would be completely eliminated when this optimum humidity range is maintained. Finally, with this humidity range, certain harmful chemical interactions and the production of ozone would be minimized as well.

Water Cycles

Regarding the water cycles of the biodomes, it is important to prevent the migration of water vapor between the apartments and the vegetated areas of the biodomes, because this way, it is much easier to control humidity levels for overall health purposes, and each area can maintain a consistent water supply as well.

Biodome Lighting

Regarding the lighting of this biodome, a full spectrum of natural light would emanate downward into the biodome from the entire inner surface of the dome from a special “phosphor,” which was developed by Sylvania of GTE long ago, which would be stimulated by a ring of ultraviolet lights that would be located around the perimeter of the dome. These ultraviolet lights, then, would be shielded in such a way that the ultraviolet light would shine upward onto the inner surface of the dome without shining onto the people or the vegetation of the biodome for the health of the people and the vegetation. This full spectrum of natural light that would fall onto the biodome would then be used to power photovoltaic cells that would be located on every balcony of every apartment in the biodome, thereby eliminating the need for electrical conduits that would be routed throughout the biodome to power the apartments.

Biodome Accommodations

Regarding the occupancy level and accommodations of this biodome, a biodome of just about any size would suffice experimental purposes for residential purposes, so no one should refrain from building a small biodome if that's what they want to do, but, for example, if a biodome were boldly built to a diameter of 1,000 feet, 50 families of 4 members each could be accommodated per level, which would amount to 200 people per level. So if 4 levels were built around the perimeter of the biodome, the occupancy rate of the biodome would come to 800 people, and the way in which the perimeter of the biodome is designed, each apartment would be afforded 352 square feet of interior space, with 186 square feet of balcony space provided for each apartment, for a total of 538 square feet per apartment. Now as small as this space amounts to, it is important to recognize that each apartment looks over 43-million square feet of biodome vegetation in a private way, so these apartments provide a great deal of enjoyment for every square-foot that they provide. In addition, each bedroom of these apartments would be equipped with its own private computer terminal, where access to an entire biosphere network would be completely afforded.

The Biodome Enclosure

The enclosure of this biodome, then, would be shaped as durably as possible, with a dome overhead, an inverted-dome foundation below, and a curved vertical wall connecting the perimeters of the two domes, as shown in (Fig. B), (Fig. C), (Fig. D), and (Fig. E).

When properly constructed, then, the shape of this enclosure is the strongest building shape there is against every type of live load or dead load, including lateral loads, vertical loads, bending forces, and shear forces. This is because this enclosure is entirely non-developable. In other words, the structure cannot be flattened or bent in any direction without ripping or tearing. And considering that the structure would be built entirely of a high-strength steel or alloy that would exhibit high toughness, this is not likely to happen. Furthermore, all walls and floors of the biodome would be completely interlocked with the perimeter wall of the biodome, thereby acting as vertical and horizontal structural ribs that would strengthen the perimeter wall beyond its own capacity as a structural membrane. So, with this type of perimeter structure in place at the base of the dome overhead, all loads that the dome would place on the structure would be resisted readily.

The enclosure of this biodome, then, would be built mostly of curved panels that measure no more than 12”-square, because, at this size, the panels could be cast of a high-strength, noncorrodible steel or alloy that otherwise could not be cast into buildable parts because of their larger size. These panels, then, would interlock in a way that would give maximum structural integrity to this enclosure, enough, in fact, for the enclosure to span distances of 1,000-feet or more. To add, these panels would be interlocked together in a way that would eliminate visible seams, so that all the water and air of the biodome would be prevented from escaping the enclosure, and so that there would be no seams for ice to form in, thereby permanently eliminating freezing and thawing problems.

The Biodome Concept

The concept of the biosphere shown here, which is justifiably named a “biodome” because of its shape, is that, in order to respond to the forces of extreme seismic activity and the darkened skies of extreme volcanic activity, all the processes that would take place within the biodome would be completely self-contained for an indefinite period of time within the most durable enclosure that could possibly be built within the constraints of acceptable efficiency and simplicity. (see Fig. A).

Introduction

As to date, there has not been one, single biosphere that has been built with success on this planet, because, so far, the best definition of a biosphere is essentially a self-sustaining environment where humans could survive for an indefinite period of time on the food, oxygen, and water that would be provided by the environment, as well as the protection that it would provide from serious outdoor conditions such as earthquakes, hurricanes, tornadoes, and floods. And so far, the only attempt at this sort of biosphere required the input of light from our sun and gave no protection from serious outdoor conditions. To add, inside this unsuccessful biosphere, human life was sustained for only a short period of time. In any case, if biospheres are ever going to be useful to humanity, if not all human life on Earth, they should be able to support many human lives—according to all of these requirements.

This presentation, then, proposes a biosphere that could live up to all of these requirements, which would survive all of the outdoor conditions just mentioned, and which would provide all of the sustenance needs of its inhabitants. Of course, any biosphere that could fulfill these requirements would cost a great deal of money to build, especially in high quantities. However, any effort in this direction would be a great step towards the security of humanity. Therefore, it is the goal of this presentation to find funding for the first successful biosphere that would ever be built here on planet Earth.

The biodome shell would be constructed with the Interlocking Panel System.

Contact Information

If you or anyone that you know is interested in building an IPS structure for any type of use, regardless of its size, contact me, Kurt Haberman, President of Slide Lock Systems of Wisconsin, Inc., and I would gladly be willing to act as a consultant for a project to the fullest extent of my capacity, because what I want most of all is to see one of my IPS structural designs realized, especially for the sake of the security of the populace.

In any case, I can be reached by several avenues, but some are better than others. First, then, try my cell phone at 608-434-1667. Second, try reaching me by email at kurtevanhaberman@yahoo.com.

Serious investors are invited to download my Business Plan.

With all sincerity, then, thank you for taking an interest in this website. It is people like you that are the roots of change in our world. Together, let's just hope that our collective efforts towards this change will actually come to fruition in our time.

Sincerely,
Kurt Haberman,
President,
Slide Lock Systems of Wisconsin, Inc.

Cost

Because a prototype structure that uses the IPS system has never actually been built as to date, it is very difficult to determine what the cost of any IPS structure would be at this time. To add, prototype costs are misleading, because prototypes are always expensive. However, because of the "bare bones" efficiency of the IPS system, after a prototype has been built, it is quite likely that the system would prove to be the most cost-efficient durable building system on the market. Of course, it is always important to remember that, whatever the cost of this system comes out to be, with regard to any product, people get what they pay for. And in the case of the IPS system, owners could be assured that they've built themselves a building that could be handed down through multiple generations, that would endure the most severe outdoor environmental conditions throughout those generations

The Advantages Of The IPS System

Durability:

Too many buildings have been designed that place efficiency over durability, when the reverse should be taking place. The IPS system, then, is capable of building the most durable buildings available for any function, in any size, and in almost any shape, because IPS panels can be cast and heat-treated of the most durable high-strength alloys and steels, which would undoubtedly remain completely intact through the most severe destructive forces of hurricanes, tornadoes, and extreme seismic activity. For instance, as mentioned, there is one steel that IPS panels could be cast of which is referred to as MAR 350, which is noted for its high toughness and is also the strongest steel in the industry. In fact, this steel has a tensile and compressive strength of 350,000 pounds per square inch, which is 70 times greater than the strength of cast concrete.

Simplicity and Efficiency:

Any building that uses the IPS system can be built of nothing more than the panels themselves and the fine lubricant that would be applied to their joints for sliding purposes. In other words, there would be no need for bricks, concrete, steel-reinforcements, or any other construction system. Further yet, there would be no need for nails, screws, nuts, bolts, welds, rivets, glues, sealants, or adhesives of any kind. To add, buildings of any size that would use the IPS system would be perfectly sturdy without posts, columns, beams, frames, trusses, or foundations because of the rigidity of all the membranes of the building, which would constantly support one another as a collective structural totality. However, large flat walls, flat walls that bear heavy loads, large areas of flat roofing, and large expanses of unsupported floor above the base floor would all need to be rigidified by continuous ribs or grids, but in all these cases, these ribs could easily be formed by the IPS system and would firmly interlock with the wall, floor, or roof concerned.

Fire Resistance:

Most high-strength steels and alloys will not soften until they have reached a temperature of almost 2,000-degrees F, which is the temperature of a high-temperature fire, so, if a fire could be extinguished within a reasonable period of time after it has started, it is unlikely that the fire would soften the steel or alloy at all, because it would take time for the fire to reach 2,000-degrees F.

Corrosion Resistance:

Most steels and alloys that could be incorporated into an IPS panel have excellent resistance to corrosion. The lowest grade of stainless-steel, for instance, would never corrode due to repeated exposure to water, and there are many steels and alloys that have particular resistance to a variety of chemicals as well. In addition, because any given IPS building would be built of only one steel or alloy, there would be no corrosion in that building due to electrogalvanic action between dissimilar metals.

Longevity:

Because all panels of an IPS building would exhibit extreme corrosion resistance, excellent fire resistance, and extreme toughness, any building employing the IPS system would last for an extremely-long indefinite period of time.

Airtightness:

Because the spacing between interlocked IPS panels would not exceed .020”, and because panel joints would always be subjected to tension or compression, at least one inner feature of every joint of the IPS system would come into firm contact with another after panels have been placed and loaded, thereby preventing air and water from moving in or out of the joints, making a structure that is completely airtight and watertight and completely free of problems that involve freezing or thawing.

Versatility:

Finally, the IPS system could be used to build domes, inverted domes, cylinders, toroids, curved walls, straight walls, pyramids, conventional rooftop shapes, floors, and structural ribs.

The Preferred IPS Enclosure

The most durable of these IPS enclosures, then, would be shaped with a dome overhead, an inverted-dome foundation below, and a circular vertical wall connecting the perimeters of the two domes, as shown in (Fig. B), (Fig. C), (Fig. D), and (Fig. E), which show a 1,000-foot diameter structure as an example of what can be built with this system. Of course, much smaller structures could be built by this system as well. When properly constructed, though, the shape of the enclosure shown is the strongest building shape there is against every type of live load or dead load, including lateral loads, vertical loads, bending forces, and shear forces. This is because this enclosure is entirely non-developable. In other words, the structure cannot be flattened or bent in any direction without ripping or tearing. And considering that the structure would be built entirely of a high-strength steel or alloy that would exhibit high toughness, this is not likely to happen. Furthermore, all walls of the structure would be completely interlocked with the perimeter wall of the structure, thereby acting as vertical structural ribs that would strengthen the perimeter wall beyond its own capacity as a structural membrane. So, with this type of perimeter structure in place at the base of the dome overhead, all loads that the dome would place on the structure would be resisted readily.

An Alloy Example

Now, there are many high-grade alloys and steels that could be precision-cast into the shape of an IPS panel, but if resistance to extreme seismic activity is the primary goal of a specific building design, than the steel known as MAR 350 would undoubtedly be the best material for the job, because, with a tensile and compressive yield strength of 350,000 pounds per square inch, it is the strongest of all steels and alloys, and it has a very high toughness rating as well. To add, this steel requires only simple heat treatment to obtain its strength, and it maintains high dimensional stability during casting and heat-treating. Furthermore, if any machining is necessary after these processes which would bring the dimensions of a panel into an acceptable range, this steel can be machined by more than one tool steel. Further yet, this steel maintains high strength in temperatures that would result from a typical building fire.

Introduction

The Interlocking Panel System (IPS) is a patented, building assembly system that uses ribbed alloy panels that interlock with one another with tongue and groove joints and similar joints to create highly-durable, high-quality, completely-interlocked building structures, including building enclosures, building floors, exterior building walls, and interior building walls. These panels, then, are not lightweight composite panels made of sheet metal that typically measure 4-feet by 8-feet across, which have little resistance to the winds of tornadoes and hurricanes. Rather, they are solid, ¼”-thick, cast panels with dimensions that do not exceed 12 inches in any direction, which weigh as much as 25 pounds each. The reason for the ¼” thickness of these panels, then, is two-fold. For one, panels that measure as much as 12”-square need to be ¼”-thick in order to meet the flow requirements of the precision-casting industry. Second, at a ¼"-thick, these panels could handle almost any destructive force imaginable, man-made or natural, and that is an absolutely true statement.

Now, there are three good reasons for the small size of these cast panels. For one, small-sized panels can be precision-cast, whereas larger parts cannot, and this means that high-strength, noncorrodible alloys can be cast to form these small panels, whereas larger parts cannot be cast with these special alloys. Second, the precision-casting process that would be used to cast these panels would produce joints so tight that it would be highly difficult for water or ice to even enter their seams, which would thereby permanently eliminate structural problems due to freezing and thawing cycles. Furthermore, very little air would have the capacity to pass through these precision-cast joints. Finally, panels that measure no more than 12 inches in any direction can be placed into a building assembly easily without the need for complex rope, cable, or lever assemblies, which only slow the progress of projects when precise results are required.

Now, these panels use only two types of joints, and can be fabricated with three sides or four sides, with their faces having no curvature, a single-curvature, or a double-curvature. When the construction of an IPS structure is complete, then, any type of sprayable insulation can be sprayed upon the interior of the building enclosure for fire-resistance, if necessary, or heat-resistance, if necessary, or both. In addition, whether an IPS structure has been sprayed with insulation or not, if desired, it can always be sprayed with a coating of gypsum for finishing purposes. These panels, then, would interlock in a way that would give maximum structural integrity to an enclosure, enough, in fact, for the enclosure to span distances of 1,000-feet or more.

Troubled Times

Tools

Type of Tools

> Troubled Times discusses everything from worms to complicated communication equipment. I can use my hands to dig with if need be, but what kind of meters or instruments are used for electronics, for example? Stuff for tearing apart an old car? Putting together a windmill? Welders and torches? The best to use, the most versatile, and where to get a certain type that would work best? Someone that is looking for information here may not think of this stuff.

Offered by Clip.

> You've already pretty much stated it by implication.
>
> 1. Mechanics tools - basic set on up to 3/4" drive
> 2. Wood working tools - basic, pre-electricity, modern
> 3. Metal working - pre-electricity, modern
> 4. Electronics - basic, special purpose

Offered by Ron.

The Hub

Troubled Times

Tools Non-Electric

I just watched a show on PBS about this guy who makes wood toys. It was not the toys I was interested in, but the tools he used. They were from the era before power. Like a treadle lathe. Human powered. I did a search for him and here it is. These may be some Good Books to have.

> Offered by Clipper.

I just looked at all the offerings at this site and find it very exciting; particularly because of my changing interest from steam power to power from moving water, which should be more than plentiful everywhere post pole shift. In particular, I'm starting to research 17th and 18th century technology which heavily relied on this form of energy. In fact, I owned a piece of land while living in New Hampshire that had an old pond and dam that supplied water to a "paddle wheel" driven saw mill.

While living there I was able to visit a reconstructed village centered around the "Power House" which also enclosed a saw mill that was quite remarkable. I was also able to visit two complete "Shaker" villages where everything was hand constructed. The technology in both places was strictly wood and hand crafted metal based and the craftsmanship required to construct these amazing places was quite mind-boggling. It is this sort of technology and craftsmanship that we may need to develop within our communities.

> Offered by Ron.

The Hub

Troubled Times

Hand Tools

There are useful primitive hand tools. The tools in this photo are a bit scarce now but can be found if you keep an eye open for them.

- A brace and set of bits are shown lower left. This is useful for drilling large holes by hand. Uses after the pole shift could range from holes for legs for log furniture to holes in the top roof logs for building a log cabin. The logs that cross to form the top or peak roof line are usually fastened together with wooden or metal pins. A round wood branch, reinforcing rebar rod or large bolt would work for the pin. The hole could be drilled in the log with this brace. The longer the bits you find the bigger the log you can drill. A "T" shaped handle for large bits is some times available. If you find one, buy it. It makes it easier to turn for large holes. Typically for a log cabin the logs are split in half and notched to rest on the lower logs at most places except the very top of the roof line.
- On the right in the picture is shown a smaller hand drill. This is for small holes in wood and light metal.
- At the top of the picture is shown a hand pull type knife for planing and smoothing wood.

For light construction after the pole shift a minimum set of other useful, and more commonly available hand tools, should be saved. These could include: different sizes of wood chisels, hand wood and metal saws, claw hammer, sledge hammer, several sizes of wedges for splitting logs, ax for chopping wood, cross cut saws of various sizes, wood and metal hand files of all sizes and shapes, a vice and several large C-clamps.

Offered by Mike.

I might add that pawn shops and yard sales are an excellent place to find these kinds of tools. I guess those that sell or pawn their tools, get rid of the "most useless" ones first. I saw everyone of those tools just the other day at a local pawn shop. (I already own tools like this).

Offered by Clipper.

Troubled Times

Wilderness Forge

I found an interesting article in a magazine called *American Survival Guide* but with their latest issue have changed to *Self Reliance Journal*. The article of interest is titled, "Wilderness Forge". Using only materials they found in the field (scrap metal and other junk which will be plentiful after the pole shift) they constructed a small metal forge. The only "tool" that they used was what is usually called a fencing tool. Other than that they constructed a bellows from a large trash bag, a pair of worn out camo pants and a hollow elk bone. Their forge was a coleman fuel can cut in half and covered with mud which was then sun-dried. In the article they made a chisel from an old spike and made a point drill from an old nail. They used a granite rock for an anvil. They didn't make anything fancy, but they were just proving that if you're stuck in the wilderness, you can make your own tools. You could use this technique to make Knives, utensils, spear heads, arrow heads, etc.

Offered by Michael.

Troubled Times

The List

Don't forget a few wrenches, hacksaw blades, screwdrivers, etc. in your emergency stash. The junk cars littering the landscape will be useful for all sorts of survival related technology, like alternators, halogen lamps, steel tubing, heat exchangers, wiring. It's hard to salvage an automobile with your bare hands. You'll probably want to stock up on nails. This is a good idea, but remember that nails are generally not very reusable. I suggest you also stock up on lots of good quality wood screws. Medium length ones suitable for attaching siding, sheathing, and longer ones appropriate for small limbs from trees (you know, 4" long or so). Be sure to include a good metal hand drill in your grab bag too with lots of high quality wood bits. Don't make the mistake of buying a drill with a plastic gear assembly. This plastic world of ours is designed to be disposable with pre-planned obsolescence, and there won't be an ACE hardware around the corner. It's more work to use screws, especially if you are drilling pilot holes by hand, but remember that these little fellows are reusable. Ever see the cartoon Rugrats? Tommy's only tool is his trusty screwdriver!

Offered by **Ron**.

I have a supply of "sheetrock" screws around my place. I use them for everything From hanging doors in a hurry to permanent fixes. They are fairly inexpensive and easy to get at any hard ware store.

Offered by Clipper.

Or better yet put in a supply of bar stock and learn to make your own nails and screws. Nails are reasonably easy to make, screws are a lot harder. Don't forget a good supply of rope, chains and wire. Plus a variety of adhesives and water proofers would be nice.

Offered by Mike G.

Troubled Times

Garage Sales

> The papers usually have garage sales which list tools as their item. One can collect quite a group of these if one frequents these sales, and looks in the paper before hand.

Offered by **Eric**.

> This probably would be the best way to find hand tools for wood working that would be invaluable to a settlement operating in a low technology mode, i.e. little or no electricity.

Offered by Ron.

Troubled Times

Tools

Estate Sales

Another place to find a "treasure throve" of late 1800's hand tools for wood and metal working is estate auctions. My ex-mother in law decorates her house with this sort of thing. We once went to one of these auctions and brought back a couple hundred pounds of excellent and hard to find wood working tools. They were all just thrown into a few boxes. She spent about $25 for them all!

Offered by Ron.

The Hub

Troubled Times

Heavy Lifting

It's difficult to anticipate what tools and equipment will be necessary to make our lives a bit easier during the aftertime; what to leave behind to lighten the load, what is absolutely essential. There will be some heavy labor required after the storms and winds abate, and an all important item would be a block and tackle system that can be used to move or lift just about anything. Functioning on the same principle to decrease effort is a come-along. For example, heavy logs can be moved using a come-along to pull them into a position where they can be more easily used for shelter. A good supply of rope will be necessary also, and heavy enough to carry the load, one half inch preferably. Some heavy link chain would serve well to enhance the workability of the equipment, as well as some pulleys.

None of these items would be what each individual needs to carry along, but in organized groups, particularly those who are already planning to work together in a survival group it would be a good idea to have them ready to move to a safe location. Chiropractors simply will not be around to adjust an injured back. Depending on where you live there will be plenty of logs available for shelter building. A block and tacklesystem cannot be purchased at any Walmart or Sears, but can be found at anyfarm equipment, or tractor supply outlet. Same applies to a come-along.

Offered by Mike.

Troubled Times

Tools

Welding

The following is a discussion from another list and indicates that simple welding need not be considered high tech. I think one member of each survival group we will need to know how to do this. If we have electrical power available in one form or another then welding will be possible.

> Does anyone have experience with 12 volt welding? What equipment is needed?
> **Ron**

My experience has been you need over 20-25 volts to be able to decently strike an Arc and hold it. Optimally one needs about 40 to 50 volts (open circuit) for easy arc welding. Spot welding can be accomplished by use of much lower voltages and higher amperages with the need to have a heavy gauge good conductor in good contact with both sides. The area is heated and melted until both piece's stick together. 1-6 volts can be used if heavy duty conductors are used up to the points of contact. Usually used to stick or spot weld thin sheet metal together. Both surfaces need to be cleaned and must make good electrical contact at the point of the weld.

To Arc weld I once used two 55 amp alternators mounted where an air conditioner used to be on an old car. The output was wired in series and gave about 24-30 volt open circuit. The current through both stator coils was controlled by use of a large variable resistor and was wired to the battery of the car. This worked well but I found myself wishing I had used 3 alternators or more voltage. Makes holding an arc much easier. The current you need depends on the size of rod you use. One needs bigger rod for welding thicker material. It doesn't matter how one delivers the voltage and the current - batteries, generator's all will work. Some control of current is needed. This could be on the input side of an alternator or the output side of a string of batteries. A salt water resistors can be made from a 5 gallon plastic bucket and metal plates or copper tubing. Change resistance by amount of salt, distance between plates, and changing surface area in the water. I like the idea of using metal strapping material as a variable resistor in a pinch.

One trick that I have been told that helps if the voltage is low and striking an Arc is difficult. Wind some heavy wire around a large chunk of iron to make a large inductor. Wire this in series with one of the welding leads. This will store energy when the rod is stuck and give you an instant of more voltage when the rod brakes loose to help form that initial arc. This was used effectively with a 24 volt aircraft 200 amp DC generator to make a welder.

Offered by Mike.

The Hub

Troubled Times

Battery Series

Mike has a good point. I ended up doing the reactor thing later, on the advice of a neighbor. I had a 12" by 4" mild steel core with three wraps of #4 THW (copper) wire wrapped around it. If I had to do it again I would use #6 so I could get more wire wrapped around the core. As well the additional voltage-drop would be helpful. I also had a 200 Amp fuse in the line to protect the batteries from a prolonged dead short. My first welder was (3) 8V batteries in series. I had 32 volts open circuit and about 20-25 under load. To regulate the current I wrapped 8 feet of steel band strapping (used for securing lumber and shipping crates) around some porcelain insulators and used a car-jumper cable to choose different spots on the strapping. Worked like a charm. I went through quite a bit of strapping though. That's how I built my first turbine. In the case of 12-volt batteries you will need two in order to get at least 24v. I used 4 but you could get away with the equivalent of 3 (or 2 12v batteries.) A 24-volt charger to keep the batteries topped up between weld cycles would be a good idea.

> Offered by Rob.

My only experience with his is seeing a welding kit in either the Northern or Harbor Freight catalogs, seems like a car alternator that had heavy windings that could either be powered by a power take off (pto) or by some form of engine or motor.

> Offered by Mike.

The Lower the voltage and the higher the amperage - the better it works. e.g. a 6 volt battery is a better current source than a 12 volt battery. Commercial welders typically use .5 volt current. Hint: use two 6 volt batteries wired in series from the 12 volt source for charging. detach the charging cables from the batteries and attach the welding cables to the batteries in parallel when you want to weld. In common parlance, this is called "stick welding". You need welding cables, welding rod of the proper alloy for the material being welded, and of course, welders goggles and/or hood. Out in the country, I have seen local gentlemen doing emergency repairs using jumper cables attached to a 6v. tractor battery and a wire coat hanger as welding rod. This is *not* recommended. I include this anechdotal information to suggest how easy it is. If you do not have text books on welding technique, I have seen encyclopedia articles with pictures depicting how the bead of molten metal should be layered on the work piece.

Offered by John.

The Hub

Troubled Times

Fiberglass Handles

I bought a few tools with handles made of fiber glass. Usual stuff - strong resistance to moisture, fire etc. The shovels were OK, however the ax handle acted as a spring. You can actually injure yourself trying to work with it. The ax has a tendency to bounce back if the wood is very hard.

Offered by Chris.

Troubled Times

Harbor Freight

I have one place, Harbor Freight Tools, that I highly recommend for anyone interested in tools, surplus, emergency, and survival equipment. Their frequent sales create excellent prices. Every time I visit the place I leave with my basket full. If you have one close by, visit it. A hard copy catalog can be ordered on line or by calling **1-800-423-2567**. I recommend getting on there mailing list and receiving a printed catalog. The catalog on the Internet does not do justice to what they have at what price.

Offered by Mike.

Troubled Times

Ancient Romans

There was a technique used or invented by the Romans a long time ago. A natural form of air conditioning / ventilation was used roughly as follows:

1. A trench 6 to 12 feet deep and 100 to 200 yards long was dug leading from the "house" in a straight line away from the house.
2. Into this trench a large diameter pipe (these days corrugated drainage pipe 2 or 3 feet diameter) was laid, with holes drilled into the bottom to drain water that condensed inside the pipe. The trench was then covered over.
3. At the far end a 90 degree elbow was attached and more pipe added so that it reached above ground and the end covered with some sort of wire mesh attached to keep out unwanted things such as rodents, etc., and then another elbow could be added at this end to shield against rain.
4. The house end of the pipe entered the house and was the source of incoming air.
5. The key to making this work is to add a convection chimney.
6. The Convection chimney is built such that it's inside opening is at a high point inside the building.
7. On the outside, two intersecting sides of the chimney; are painted flat black, and the resulting V formed by the two connecting sides face south (these days , after the pole shift, they may need to face the new south and be repainted). In other words, the V needs to face the mid point between where the sun rises and sets.
8. The two other sides must be transparent, Plexiglas or some equivalent. Also, the higher/larger the chimney, the better.

How it works: the sun heats up the chimney causing the air inside to rise, thus drawing air through the cool pipe. The pipe cools the air drawn from the outside to the temperature of the earth at the depth at which it is buried (which is virtually constant year around at this depth). By the way, an interesting note: Even in cold climates where the ground is frozen, the incoming air is only 32F when the air outside may be much colder, we need only heat the air by 38F to bring it to 70F; as opposed to heating outside air of say -15F to 70F we would have to heat the incoming air by 85F - quite a difference in the amount of heating energy we would have to supply by some other means.

Of course, without the sun to warm the chimney (or some other source) the system isn't worth fooling with.

Offered by Ron.

Troubled Times

Hot Air

I just was looking in the Real Goods catalogue, a home oriented magazine containing *products for an ecologically sustainable future*. Among other attractive items I saw a fan for use on top of a wood stove that is powered by the heat to disperse more heat in the room. I was just living on a ranch in central California using a wood stove each night, and I’d walk around with cold feet yet too hot at head level. This looks like a good thing to have if you’ve got a wood stove.

Offered by Aron.

The Hub

Troubled Times

Parts List

List of parts (WalMart)

$3.77 - Universal Size Washable air filter 20"x30"x1", cut it to size you need, self-supporting (one filter will makes 3 - approximately 11" circles)
$9.97 - Fan - lasko - model 3524 - Breeze machine pivoting air power 2 speed.
$2.67 - 5 Gallon pail plastic white. (Home Depot $2.77)
$3.47 - 14 Oz of Aquatica Activated filter charcoal blend by Wardley
$4.99 - 14 Oz of Activated filter carbon, Aquarium Pharmaceudticals, Inc.
$4.97 - Extra-loft Crib Size Quilt Batting 45" by 60" Polyester (has enough quantity to make about 3-4 complete bucket filter units) 29.84 total

Options

$8.84 - Purity saver filter - furnace/air-conditioner 4 stage filtration system charcoal and 97% of ragweed and nettle pollens 20x25x1 or 20x20x1
$5.96 - Vac bags type Z Hoover Micro filtration bags or whatever looks best.
$7.97 - Replacement Grill 10.5" diameter (Home Depot)

Conversion of an existing already purchased commercial air filtering units to use home made filters designed for your own purpose should now be much easier. That is if you wish to. This should give one some ideas. Let availability of materials and invention take care of the rest.

Offered by Mike.

Troubled Times

Using a Fan

The disadvantage of most off the shelf commercial air filter units is the expensive disposable filter element. Their advantage is the small particle size for the filter element. They are weak on amount of activated charcoal or carbon in the pre-filter. Making your own has some advantages with respect to cost and flexibility of what you wish to filter. The filter elements become reusable. The unit becomes rebuildable. Could be used after the pole shift for filtering volcanic ash and hydrocarbons expected in the tail of the 12th or could be used today after you see contrials (White jet trails in the sky)

How to build an inexpensive air filter, that uses lots of activated filter charcoal: The minimum air particle size of the filter is adjustable for your purposes depending on the fan and filter elements used. A squirrel cage blower will work with a higher pressure drop across the filter and allow filtering to smaller particles. In this case, one could use one or more layers of micro filtration vacuum cleaner bag material cut to fit the bucket. Hoover makes a filter paper that traps 100% of dust mites and their eggs and 99.98% of ragweed along with common grass pollens.

I built one to keep the air volume flow up. I used the basics and the optional 4 stage furnace filter. Note the filter components are washable or can be taken apart and blown off with an air compressor or cleaned with a vacuum cleaner. The Fan with the plastic hinge points (plastic screw with nut) cut off, just fits in the bucket, leaving a few inches at the bottom for the air to come out.

Offered by Mike.

The Hub

Troubled Times

Bucket

One drills 3-4 holes about 1.25" in diameter near the bottom.

Offered by Mike.

Troubled Times

Filter Material

The filter material is cut about .5" bigger in diameter than the bucket at the level it will be pushed down to. This makes it about 11" in diameter. The more flexible the filter material the less critical the size it can be made bigger and will still stay flat once put in. Start with a stiff "universal washable filter" or optionally the barbecue replacement Grill this holds the filters flat and a bit away from the fan.

Offered by Mike.

The Hub

Troubled Times

Filter Layers

If the Grill was used, add a layer of course filter material like the "universal washable air filter". Add some Polyester Quilting Batting and pore in some Activated Charcoal, spreading it out uniformly. Do not attempt to completely cover the area with charcoal. Add another layer of Batting. Repeat adding charcoal and batting layers until you have used up the charcoal. Took me about 4-6 layers.

Offered by Mike.

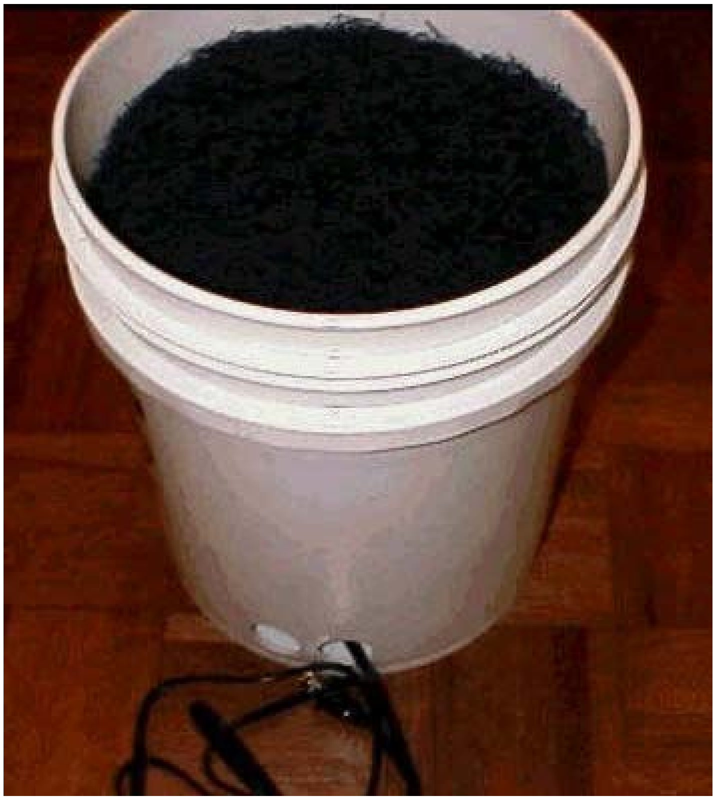
The Hub

Troubled Times

Air Circ Charcoal

I used the full 28 Oz of Charcoal. Add one more layer of batting on top and add a layer of universal washable filter material on top of this.

If you have or are using some other type of filter material, the general idea is to gradually get finer as you go down in the bucket. Coarse rags or cloth could be used as filter material if that were all that was available. From time to time check the air flow to make sure you can feel a decent amount of air coming out of the holes at the bottom. Use a coarseness of the filter material to insure a good air flow. The fan may heat up if air flow is limited too much. If you want to use fine filter material then find a fan that pulls a good pressure drop.



Offered by Mike.

The Hub

Troubled Times

Air Circ Vent Tube

Holes can be put in the top or one can use a splatter guard or simply leave the top open. A dryer vent tube can be put into the top and run to an outdoor vent in the wall or window, to pull in a percentage of the outside air. I put one hole in the top to circulate some air within the room.

Offered by Mike.

The Hub

Troubled Times

Cord

I left the fan on high when I assembled it and it doesn't make much noise. Run your cord out through one of the holes in the bottom or take a knife and make a hole folding back the plastic and bending it back after the plug and wire is put through.

Offered by Mike.

Troubled Times

Air Circ Charger

With any air particle filter one can use an air Ion and/or Ozone generator to charge the air making the particle filer action more effective. Several years back I picked up a surplus 5K Volt DC transformer-rectifier for about $20. One can use anything from 5-10K Volts DC. Make sure it will work if shorted out for a time and you can ground the positive without causing extra current flow that could burn it out.

Offered by Mike.

The Hub

Troubled Times

Ion Spray

I took two straight pins and soldered them to the end of a wire. A small round stainless steel wire brush soldered to the wire end would be an alternative option. I put this wire in some Teflon tubing, but one could use rubber or any good insulator. I used a rubber grommet where it goes through the aluminum air duct tube.

With the positive lead grounded this generates negative Ions being sprayed out of the tip of the needles. You can see the tiny sparks in the dark. If these ions are sprayed into a room without a positive grounded plate or without going through an air filter element, the walls tend to eventually turn black from soot (observed from experience). If one puts this in the pipe that is used to suck air in from the outside and passes this ionized air through an air filter element the soot tends to end up in the air filter. I didn't do this, didn't think it was necessary at the time, but one could use a copper wire screen mesh on top of the first filter element. The mesh would be grounded or positive to help attract the charged particles.

Air ions help filter out charged particles. They do not help filter out chemicals. Ozone sometimes breaks down chemicals to render them harmless. My current understanding is that both negative Ions and Ozone (of the right type) in the proper amounts are beneficial to animals and mankind. I use a separate Ion-Ozone generator once the air gets through the particle-charcoal filter into the room. Good Ozone generators tend to be expensive. They will be useful in killing off and preventing mold after the pole shift.

Offered by Mike.

The Hub

Troubled Times

Solid State

I have one of the **Ionic Breeze** silent air purifiers from the sharper image, and while not the most economic, costing 300 us dollars, it has *no* filter. It works on an anti-gravity idea of circulating negative ions through the air and collecting them on charged rods which one simply wipes clean with warm water. In my mind this is a much more sustainable way of filtering the air in our environments, as it is purely solid state circuitry, no moving parts to fail, and nothing to throw away. I plan to run a 120@60cps system after the shift so that items such as this can still be utilized. As an example of the effectiveness of this device, if I smoke a cigarette during a five minute period, the smell is gone in ten minutes. I think this is a really cool machine, and if I'm not mistaken is the type of technology they use in hospitals, or laboratory clean rooms.

Offered by Aron.

Troubled Times

Ozone

Buy a mercury vapor light unit from **Ace Hardware**, **Builder's Square** or similar place, about $20-25. This includes the "starter". A 100 watt unit is fine. Wrap the bulb in a towel. Carefully break the outer bulb. One blow from a hammer will do it. You will find a small rectangular bulb inside (about 1 inch long). Mount the unit in an enclosure with a fan as it gets hot. You have an ozone generator which is very useful for topical applications, ozonating water or cleaning air. If you wish to ozonate water make the exhaust hole small in the enclosure. Hook up any little hose and run it in a glass of water for about 5 minutes. Drink immediately as potency is lost rapidly.

Cordially, Jon Brooks, M.D.

Basic Principle

The key to insulation is to remember the three paths of heat flow:

1. Radiation
2. Conduction
3. Convection.

All different types of insulation work by utilizing one or more of these three principles. The most commonly used method is to create a thermal break by creating an air space between two adjacent areas, Foam, Fiberglass, and straw all work by creating static (dead) air space between two adjacent areas. This reduces heat flow by conduction and convection. The foil seen on many modern manufactured insulations will also reduces heat flow by radiation. To develope an insulator from indeginous material you can use this principle of creating static air space between the areas that will have and/or maintain a temperture difference. Example... an aluminium can with the pop (or zip) top has a static air space within the empty can, by stacking the cans together an effective form of insulation will be created. Other stable materials can also be used in the same manner. Note: The ideas mentioned here are for "insulation" and not for "thermal tempering" which is an entirely different method of temperture control in a structure.

Offered by Ray.

Troubled Times

Natural Materials

I got this out of the excellent book called *Tom Brown's Field Guide to Wilderness Survival*:

> The material doesn't make any difference, as long as it's light and airy. Use whatever you can find: Leaves, ferns, moss, grass, etc. These materials will insulate a structure even when wet. Try creating a latticework of branches and sticks to prevent the insulating material from falling through into your living space. Two-and-a-half feet of insulation of this type will keep you warm down to about 10 degrees above zero Fahrenheit. Four feet of insulation can keep you warm when it's 40 below. Find some protective shingling - bark, mats of moss, or whatever - to help keep out the rain. If you build a steep dome, that will help with rain runoff. On top of the bark or moss, you can even pile on something heavier to help keep all the insulation from blowing away in a storm.
>
> Offered by Mike.

Insulation that is fire retarding and able to keep out moisture made out of natural materials. A tough request. Melted sand will make a primitive glass. One could make glass plates or semi-hollow glass bricks from a primitive mold. Two parallel walls made of such plates or bricks could be held apart with straw, weeds or air to gain insulation. Melted sand with air blown into it to populate it with many air bubbles, made into bricks, would accomplish both insulation and structure from natural materials. To gain strength use less air bubbles. To gain more insulation properties use more air bubbles. Clay can be dried and fired to make fire-brick. This can be made into many shapes from solid to having some air space inside. Even two mud block walls constructed parallel to each other with air, straw, or weeds between them would provide some insulation.

> Offered by Mike.

The Hub

Troubled Times

Problems

I see a few problems with naturally available substances to use as insulators for a shelter:

1. Availability. How many sheep would it take to make enough wool to insulate a house?
2. They burn. I might be wrong but I can't think of a single natural substance that has insulative properties that doesn't burn.
3. They won't last. They will decay or rot or grow mildew, etc.

Solutions?

1. Move. Once things settle down and you know what the climate will be where you are, you can plan to move if it is too severe.
2. Different methods of construction. Once the shift has passed, build in the side of a hill or underground. Build a log cabin. The early settlers seemed to do just fine in log cabins. There will be plenty of trees, some of which might already have fallen due to earthquakes or high winds. You probably won't be able to run around in your 'skibbies' inside a log cabin in the winter, but I'm sure you could make it comfortable.

   Offered by Michael.

I don't know if this has been mentioned yet, but one method could be tires filled with packed dirt. There should be plenty of both laying around after the pole shift. This is used in Earthship homes.

Offered by Liai.

Troubled Times

Mineral Wools

Mineral wool insulation is partially available from Mother Nature herself. These products have been linked with various occupational diseases. I'm talking about substances known as "vitreous fiber insulation wools", which include such things as glass wool, slag wool, and most importantly, rock wool. Glass wool is actually fiber-glass, and is made from ground glass. Slag wool is made from steelmill slag. There's also cellulose, which is ground up newspaper to which some chemicals, primarily Borax, have been added to make it fire and insect resistant. I just got all of this off the Net, from a site that talks about Loose Fill and Alternative Materials.

Rock-wool is widely used to grow both hydroponics and aquarium plants. It seems that rock wool is made out of ground basalt rock subjected to a blast of steam. Basalt rock should always be in great abundance on our planet, as any geologist will tell you, and I suppose all we have to do now is figure out how to make the wool out of it! Maybe the manufacturing process will prove too complex for the simple Aftertime settler, but certainly both basalt and steam should be available, and so perhaps this subject should be further looked into, to see how exactly the stuff is made. I better add a word of warning that these mineral wools all have fibers that are known to irritate the skin, the eyes and the breathing passages, so protective clothing has to be used when working around them. Then it's put into the wall and basically forgotten about.

Offered by Sol.

Troubled Times

Fire Retardant

Technical Specifications for **Tripolymer** Foam Insulation: Tripolymer products are phenol-based synthetic polymers. Tripolymer can be installed in any cavity through 1” - 2” holes or sprayed into new stud construction. Initial set takes approximately 10 - 30 seconds. Final curing is within 48 to 72 hours, depending upon thickness. Tripolymer is a cold-setting process, independent of ambient temperatures. There is no further expansion once the foam leaves the delivery-hose. Tripolymer does not contain or emit CFC’s.

> **C.P. Chemical Company**
> White Plains, New York, USA
> (914) 428-2517

Properties	ASTM Test Method	Results
Fire Hour Rating	ASTM E-119	2 Hours
Therman Conductivity	ASTM C-177	
@ 75 degrees F mean		4.6 Hours
@ 35 degrees F Mean		4.8 Hours
@ 0 degrees F Mean		5 Hours
Surface Burning	ASTM E-84	
- Characteristics		5 Hours
- Flame Spread		0 Hours
- Smoke Development		0 Hours
- Fuel Contribution		
Toxicity	FHSA	Non-Toxic

Phenofoam, fire retardant thermal insulation is purported to be non-combustible, with very low smoke development and low toxic fumes.

> **Lewcott Chemicals & Plastics Corp**.
> 280 Greenwood Street
> Worchester, MA 01607 USA
> (800) 225-7725

Research Report issued by the

> **Building Officials and Code Administrators, Intl**
> 4051 West Flossmoor Road
> Country Club Hills, IL 60477
> (312) 799-2300

states:

> A 30# crib fuel cource was constructed of 1 1/2” x 1 1/2” sticks of white fir cut to 15” lengths. The cribdry wood has a weight of approximately 30# and had a 15” square dimension. One eight-penny nail at each intersection of two sticks held the formation together. The crib was pre-conditioned to a maximum 8% moisture content before testing. The crib was elevated a minimum of 3” from the floor by four corner

brick pieces 4” square. One pound of fluffed wood excelsior is distributed around the bricks with the excelsior extending from the wall surfaces and covering an area approximately 21” square. The excelisor is soaked with 4 ounces of absolute ethyl alcohol just prior to ignition.

The test, conducted on the Phenofoam panels exposed to the interior of the fire test room, was monitored by both continous video and polaroid pictures at 2 minute intervals. The test indicated that the combustion of the Phenofoam panel did not extend to the outer extremeties of the test area within a 15 minute period after ignition of the excelsior.

Report on Ignition Properties of Plastic, Report #IP84-132, dated July 5, 1984, was prepared by United States Testing Company, Inc. The tests conducted in accordance with the test starndard for the Ignition Properties of Plastics, ASTM D-1929 concluded in the following properties of the **Phenofoam**:

Minimum flash-ignition temperature	930 degrees F
Minimum self-ignition temperature	1080 degrees F

Offered by Nancy.

Troubled Times

Icynene

I am going to spray a travel trailer with Foam . When it is done, it will be backed into a culvert bunker where it will in all probability survive the pole shift just fine. It won't be good for travel, but it will be home.

Offered by Lou.

Icynene Insulation System is a soft open cell foam insulation - this means that the product is not water or moisture tight - it has the consistency of pillow foam. As to chemical resistance - as with all foam products - the only chemicals that will effect it is those that eat anything. As to heat, the maximum for any foam product is 240 degrees. If you are looking for a product that withstands higher heats, there is a phennolic foam product that is used by NASA. I do not have any info on this product, but it is manufactured back East.

If you are planning a buried residence or complex, you need to go to the rigid foam insulation, which is 93% closed cell, we recommend a 3# density product to withstand crushing from the burial. However, please refer to our chart on the various densities of foam for compressive, shear and tensile strengths. Even with the 93% closed cell foam, an exterior coating should be used. There is large variety of coatings on the market - look for exterior elastomeric coatings. As to surfaces, Icynene, because of it's characteristics, can not be sprayed to visqueen or other materials in this category. As to rigid foam insulation, it has its only strengths, however, it does effect plastic because of the heat generated during the expansion.

Provided by Sharon Rhine, icd@dswebnet.com

Troubled Times

Passed the Test

The monolithic domes are sprayed with three inches of urethane foam on the outside of the concrete. Recently one of them that was at an oil refinery had a fire nearby. While everything else burned down, it was found that the urethane only burned (and very very slowly) when in direct contact with flame. Without direct contact it only smoldered, and not terribly deeply either.

Offered by **Eric**.

Troubled Times

Foam

For a few months I have been working part-time for an insulation company which does mostly foam insulation. I have learned on the job that spray foam applications are indeed numerous because of the product's versatility. And I'm sure it is the best product out there for insulating structures such as monolithic domes. It is fire retardant, very efficient as a sound barrier, healthy, and more energy efficient than other insulation products. The compancy I work for uses two different spray foam products, Icynene and a product sold by North Carolina Foam Industries (NCFI). **Icynene** has a 100:1 expansion ratio and is therefore lighter than the NCFI product which has a 10:1 expansion ratio. As for insulating a dome, using a heavier product would make more sense because it is easier to make it conform to the shape of the dome due to its slower, reduced expansion rate. Unless sprayed into deep crevices Icynene usually requires cutoff because of its uneven expansion.

Offered by Bill.

The Hub

Troubled Times

Superior

New Types of Insulation
DOE (Department of Energy)

> Icynene Insulation System is a soft open cell foam insulation - this means that the product is not water or moisture tight - it has the consistency of "pillow foam". As to chemical resistance - as with all foam products - the only chemicals that will effect it is those that eat anything. As to heat, the maximum for any foam product is 240 degrees. If you are planning a "buried" residence or complex, you need to go to the rigid foam insulation, which is 93% closed cell, we recommend a 3# density product to withstand crushing from the burial. However, please refer to a chart on the various densities of foam for compressive, shear and tensile strengths. Even with the 93% closed cell foam, an exterior coating should be used. There is large variety of coatings on the market - look for exterior elastomeric coatings. As to surfaces, Icynene, because of it's characteristics, can not be sprayed to visqueen or other materials in this category. As to rigid foam insulation,, it does effect plastic because of the heat generated during the expansion. If you are looking for a product that withstands higher heats, there is a phennolic foam product that is used by NASA.

Troubled Times

Groworld Module Project

The Gardination of the Groworld Module Project - is a handbook of techniques, materials and reasonings, rationale and expectations, floor plans and elevations, many pictures demonstrating the alternative building techniques and materials and aesthetic and ergonomic results, performance evaluation of dramatic natural convection of heat energy and storage through the ducts buried in the 187 ton insulated thermal anchor, 52 degree food storage, carbon dioxide monitoring aspects, letting insects manage themselves, liquid fertilizers especially urine, and growing mediums and semi-hydroponic methods, soils and wood ash potash, hydraulic hand deep-well water pumping, sunflower pressing for cooking and lighting oil, chickens, crops and companion planting, and most importantly, the seed as physician, as widely practiced in Russia.

Here is a Manual for survival in a houseosphere. It is a double-envelope ultra-insulated residence for ten or more entities demonstrated to survive without fuel, electricity, or technology and grow its own food in a two-story gardination. Crane-erected r=35 Structural Insulated Panels for exterior walls and roofs reduce labor costs and facilitate erection, providing easy 'super insulation' to this low-tech no-tech self-sufficient 'solar' construction, developed over the last 30 years through 40 solar houses and a Buddhist Temple by this alternative designer/builder/artist/author.

This 58 page PDF file color Manual is easily downloadable at http://www.geometryofplace.com/groworld.pdf

Offered by Llan Starkweather.

The Hub

Troubled Times

Parts

How do you replace things you can't manufacture? Copper wire, varnish, bearings, brushes, belts, gears, bolts, screws, etc. With careful thought and stockpiling most likely needed spare parts, then the chances are improved. I suspect civilization to brake up into small group type survival units and reach a low point at about 4-5 years after pole shift on the average. Scrounging and consumption being the main thrust during this time, then after this time things turnaround and growth cooperation, building begins to flourish. Slowly at first then growing more rapidly. But, only after a long dark time. A pole shift dark ages so to speak. I hope and plan, there will be exceptions by the well prepared, but now I am talking about the average populous.

Ball bearings could be cleaned and re-greased until they fall apart then replaced with spare parts until that runs out, then one would make bushings out of nylon, bronze, brass, or copper. Depending on what one had. Use as much as possible common easily purchasable items. This allows the solution to reach deeper into society and gives a better ability to scrounge for parts. I see availability of lubricants and ball bearings being a continuing challenge for any approach we take.

Offered by Mike.

The Hub

Troubled Times

Handy Items

Rolls of plastic are also excellent items to have, either clear or black in a heavy gauge, they perform varied uses from collecting water to providing shelter to keeping out the rain and wind. Parachute cord is an item I include when I think of this area. Its available from any surplus store, I buy 100 foot for less than $6.00. Its stronger and not subject to decay as readily as other natural fibers. I like it because it is compact when rolled as compared with say cotton clothes line cord. Having some line is useful in constructing shelters among hundreds of other uses around your camp.

Offered by Matt.

The Hub

Containers

What could we use to pack up supplies for the pole shift?

Cardboard Boxes

Advantage of being about 1/3 the price of plastic crates. Many times you can find them for free. Disadvantage of low strength and will fall apart in moist wet environments as will be the norm after PS. Unless packed inside a much stronger container these cardboard boxes are highly likely to fall apart during the polar shifts sharp jolts.

Plastic Crates

Advantage of greater strength. I was able to turn one over and holding weighs in my hand stand on the bottom near the edges with a total weight of about 200 lb. with no damage. Would not want to try this with cardboard. After they are unneeded for supplies, they will hold 12 gallons of water and could be used for hydroponics food growing. If some of them break up during the pole shift the plastic can be recycled and used to make other things. They have 2 small holes in the lid so that one could bolt it closed. This could keep the contents contained in case it tips over. Empty they stack on top of each other will add an additional 3" of height for each crate.

Cost in my area is $5.95/crate at **Home Depot**. Outside dimensions are 21.75"(55.25cm) long by 15.25"(38.74cm) wide by 12"(30.5cm) high. Disadvantage, they are slightly tapered and waste a bit of space (1.25"-1.5") around the base and sides. But if one stored additional building materials in this open space between these containers it would add additional support. For example a 2"x8" will fit nicely in this area with room for some smaller items. I have seen these crates used as reusable containers by a tool store to ship and restock there shelf items.

Offered by Mike.

Garbage Cans

Garbage Containers

Plastic/rubber (even galvanized) garbage containers are in the same price range here. They have countless uses. They can be bought and stored (stacked into each other) 'til the Big Event. Food can be stored in them after the ground stabilizes (post pole shift). The holes can be "roughed in" shortly before the pole shift. Bury the containers in the ground so the top rim is just above ground level (non washout area). Place these in different locations to "squirrel" away your community food supplies. Be sure they are not punctured or leaky, then add enough weight of food/supplies so that hydrostatic pressure does not push them up out of the ground.

Use silicon caulk around rim to seal the lid so that water, insects and vermin cannot intrude. After placing the container into the ground to near rim level and sealing lid, you can camouflage (without crunching the lid) your storage using dead leaves and branches and/or other obviously useless debris. Be sure you remember where your storage is located. After unearthing your stores, the containers can be reused as mini-root cellars, etc. or removed for water storage, hydroponics, etc. *Remember, it is absolutely essential that you seal the lids and protect them from being “crunch unsealed” in order to avoid intrusion of moisture and pests.* Insect consumption for survival notwithstanding, I would rather eat my beans than ant larvae any day!

Offered by Granville.

Troubled Times

Recycling

Recycling can go a long way and is more energy efficient. In addition to the immediately useable materials that are preserved it would be useful to have a big pile of just miscellaneous junk close to your settlement, because you never know what you might need. I would recommend the stockpiling of selected raw materials for use in manufacturing:

> **Beads of borosilicate glass** (Pyrex). For manufacturing tubes for lighting and many other uses. A stockpile of glass tubing as is.
>
> **Metal stock and tubing**, all shapes and sizes.
>
> **Nylon beads**. Can be used to manufacture tubing, machine parts, fibers, oil-less seals, very versatile.
>
> **HDPE (High Density Polyethylene) beads**. Can be used as containers, items that don't need to be as durable as the Nylon. Plumbing parts, valves etc.
>
> **Polyetheleneterepthalate** (Chopped up soda bottles) High strength, high transparency, widely available, very versatile.

A good tip from the Biosphere 2 project: Use food grade machine oil for lubrication, like canola oil. All these resins and beads don't need to be just taking up space in storage. They can be used as packing fill to protect items we want to preserve. All these items are recyclable. If it wears out, breaks, melt it down and make a new one. We could go on like that for quite a while before having to figure out how to make the stuff from scratch, if we haven’t found a better way by then.

There is a low practical limit to the web of technologies we would have to integrate to have a workable, life sustaining system. For some things we may have to go back 100 years or more to find a practical solution, but here are the criteria as I see them. Depend as little as possible on items that are consumable and not recyclable. As much as possible, integrate items that use the same materials. That way when it comes time to recycle you have fewer processes to maintain. Integrate items that use the same parts. You can use one type of part on many different devices, you don't have to know how to make as many different parts. If you do need special devices to get over the hump make sure they have a long lifespan, 20-30 years or more if possible. Priorities: Shelter, air, water, food, energy, very basic medicine, maintenance of the previous priorities, new solutions, growth.

Offered by Steve

The Hub

Troubled Times

Land Fills

Recycling has only become a fad in industrialized countries in recent years. Consequently, land fills could be a rich source of raw materials. Land fills could be mined for wire, scraps of metal, sheet metal - to be used as is or melted down into ores. This would be a far more effective way of securing metals, for an individual or small group, than conventional mines. Broken glass could also be salvaged and melted down to be re-blown.

Offered by Nancy.

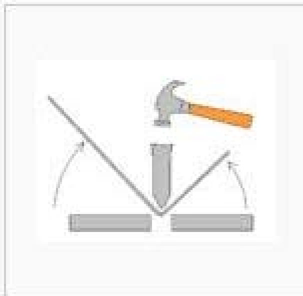
Yes, landfills will be a place to get materials *but* they also are a dangerous explosive place because of methane and hazardous materials (poisons) that for so many years were dumped and mingled because of no restrictions that are nearly impossible to enforce today. It is hard to find the things you need in landfills because you never know if you are going to dig up what you need. Most likely you will find a lot of what you don't need. Like disease (pathogens) and it would be better to let these chemical stew pots pop and sizzle for another 200 years or so to get most of the nasty reactions out of the way. It would be better to use things found in auto bone yards and what will be cluttering the streets, as there won't be much gasoline to use anyway and we will need that for farming.

Offered by Glen.

Troubled Times

Sheet Metal

Source: Appropedia Org



Sheet metal can be cut and bent without expensive machines; simple hand tools such as a machete, knife or axe along with a hammer will do the job. Sheet metal, especially very thin tin, can be cut by scoring the metal with a sharp metal point, then bending back and forth to fatigue the metal. When bent a few times along this scored line, the metal will separate very accurately. Thicker sheet metal, from 1.5 to 3 mm, can be cut by cutting a groove with a hammer and a sharp chisel into the sheet metal surface on an anvil. On turning the sheet over the marks of the cut can be seen, and a second groove is then cut with the chisel. Again, bend back and forth along the scored lines until the pieces separate. For still thicker metal plate you will need more force than you can apply using bare hands, but you can get the extra force with leverage. Simply attach one or more levers to the metal plate with the lever(s) arrange at right angles to the scored line but not crossing the line. The levers may be timber or metal, whatever is available, and they can be reused for other projects. The levers can be attached with wire, screws, clamps, rope, whatever you have, as long as you can easily remove the levers from the cut metal plate.

The Hub

Troubled Times

Mining

In order to manufacture one must mine and refine the raw materials. To mine and refine one must be able to find the raw materials. To manufacture one must know how things work and be able to design and build. It goes on-and-on endless overwhelm of technology that we have today in the long drawn out text and reference books we have today. The trick to this is "the evaluation of importance" and finding "the essential information", not the overwhelm of the total of what is available today.

Offered by Mike.

Mining for some raw materials could be quite easy in some locations as volcanic activity brings new materials to the surface.

Offered by Steve

Troubled Times

Smelting

Blacksmithing is definitely something that you need to do first hand in order to get reasonably good at it, but the entry level tech is easy to get. I built my forge out of a truck brake drum, a 55 gallon drum some 2X4's, and some plumbing fittings. I scavenged a vacuum cleaner out of the garbage that still worked and the plumbing fittings I had to buy. While power would be hard to come by PS, hand crank blowers and other ways to move the air over the fuel works. I use propane because it is easier on the neighbors, but low sulfur coal is really good to get that deep down "burn the metal" heat. My first forge was more like a coal fired jet engine because we did not have a good way to control the air blast.

I met a woman this summer who smelts her own iron. She takes iron rust and turns it into metal - really neat but very very expensive in fuel and in the work it takes to refine the bloom of metal into something you can really use for anything. The tech is very low - clay and straw for the smelter, charcoal to fire it and a airblast. The trick is getting it all to work correctly because the airblast has to just right so that there is not too much air in furnace. I have been doing this for about two years. It is great fun and very therapeutic too!. I am beginning to start my collection of strange but useful hammers and tongs because of this.

Offered by Gus.

The Hub

Troubled Times

Medieval Art

The group I participate in is Medieval Re-enactors then you can from there find local information for your area. We are pretty much all over the world. I think the best and coolest information about Norse and Anglo Saxon technology and culture is on the Regium Aglorum page. They are a very focused group in the UK and they have very informative and attractive web.

Offered by Gus.

This topic is covered by "Medieval Societies". Every major city has one. Quite often during community events they have their own stands. They demonstrate cooking, blacksmithing, archery etc. and they do it the way it was done in the past. Check your local city or town. This could save us some work.

Offered by Chris.

The Hub

Troubled Times

Galvanized

Be sure to stash heavy a stockpile of galvanized nails, as the galvanization will prevent rust that will result from the ultra-high humidity during the years following the pole shift.

Offered by Charles.

The Hub

Troubled Times

AlumiWeld

We have a company right here in town that makes and sells **AlumiWeld** boats. The best boats in the state. It is *very* good stuff. I found some facts on how to use it properly - good information.

Offered by Clipper.

AlumiWeld is as strong as heliarc!

> One pound will make hundreds of repairs and save you thousands of dollars. All you need to make repairs is a simple Propane torch and a stainless steel brush. Comes complete with a comprehensive training video rated number one in the industry, and a made in the US Stainless steel brush. You have seen this product advertised through our infomercials on television and now you can purchase it on line! **AlumiWeld** allows anyone from the house wife to the professional to weld aluminum and make repairs that were once impossible on not only aluminum but zinc based metal such as pot metal, white metal, magnesium alloys, and even galvanized steel.

General Metal Assembly / Repair

1. Designed for Low Heat / Propane application. 728 degree F Melting Temp
2. No specialty equipment (welding/heliarc) required. JUST Propane
3. No flux required.
4. Provides a Tensile Strength of 47,000 lb./sq. in.
5. Withstands Hydraulic pressure of 650 psi

Low Heat application is ideal for field installations and repairs.

> Power Tools, Radiators, Cooling systems
> Farm Equipment , Irrigation lines
> Metal Roofs, Storm Shutters
> Aluminum Ladder's, Engine Cases
> Galvanized Metal Pipes
> Welding Screen Enclosure's
> Satellite Communications
> Sign Companies
> Aluminum Awnings
> Gutters & Down Spouts
> Boats and all Marine equipment
> Hulls

AlumiWeld is non-corrosive and will not deteriorate in a salt or fresh water marine environment. Leaking Rivets, Props, Brass & Bronze Fittings, Engine Parts, Pot Metal, White Metal General Mechanical, and 1000's of other uses! Purchase one pound of **AlumiWeld** from our on-line site and be entered to win a guided fishing trip to Alaska.

Stock up today!

Troubled Times

Material

Arc Welding

I am assuming the construction is done before the pole shift. Your local rental store will have a gasoline powered trailer mounted welder that can be rented by the day and hauled behind a car to the site. Or, you can buy a used unit through looking in local news papers.

A person can teach themselves how to arc weld in less than an hour. I did so at age 11. Take some scrap iron for test learning. Pose welding rod close to the metal. Pull helmet down. Strike an arc like scratching a match. As soon as you hear a sound like frying of eggs and you can see the spark or arc - hold the rod in one place about 1/4 inch away from the base metal - now move the rod tip slowly toward your body keeping the arc formed. If you move too fast you get droplets - if you move the right speed and gently move the rod to the right and left a little it will melt into each of the two metals being bonded. If the final bead stands up on the metal then you didn't use enough amperage. If it puddles through then you used too much amperage. The rest you can learn by practice.

Don't under estimate the power of hurricane force winds and magnitude 9 earth quakes.

Offered by Mike.

The Hub

Troubled Times

Metal Working

Welding depends on heat and the thickness of the two pieces to be welded. The art of the blacksmith comes into play at about 2500 F. We are going back about 80 years in technology. The key fuel is charcoal. If you don't have electrical power, get the book on producer gas as was used down under to run cars in W.W.II, convert a 3 phase motor into a 3 phase generator and run it with an old V8 engine. Instead of my going into long and boring instructions on heating and pounding together for spot welding, at very fair prices you can get metal working books.

> **Lindsay Publications Inc.**
> PO Box 538
> Bradley IL. 60915
> 815-935-5353
> Send $2.00 for catalog.

Learn how to:

- Build a **cupola**, melt and cast iron, bronze!
- Build a **foundry**, melt and cast copper, aluminum and brass.
- Learn **green sand casting** and the use of **cores** for those hard to get places like engine manifolds, food grinders, well hand pumps. Making patterns.
- Make your own **charcoal** to fuel a backyard foundry operation!
- Build a **forge** out of an old waterheater the **Wimberly** way.
- Learn from the master of junk (raw materials) **Dave Gingery**. Make your own out of junk, lathe, milling machine, metal shaper, drill press and much more! Learn how to cut **gears** from the best, **Colvin & Standly** from 1937!
- Learn how to make your own **drill bits**!
- Build a **water resistor welder**, couple it with a carbon arc and use it with compressed air to do cutting. (Rail repair yards and ship yards still use this today).
- Hardening, tempering, annealing.
- Or do you need to weld two pieces of heavy I-beams or railroad track together? Easy! Mix up some **Thermite** and weld it like before **Edison** and **Tesla** were around. Do it at night and have a great light show.

Don't take my word for it, get the books, start your survival library and get ready to teach others. We are going to have to rebuild just about everything if we live. It is not going to be fun and games, it is dangerous and you need full information that is tried and true. I've had in early days green sand molds explode while pouring molten iron and could have been fatally burned without protective clothing and shields. It is as serious as the battlefield.

Offered by Glen.

Troubled Times

Ferro-Cement

Found an interesting article in the use of cement to build simply and inexpensively.

> Offered by Pat.

Ferro-cement on the Homestead
by Ken Davison

> While we have very little money to do what we want to get done on our homestead, we do not feel that we are "poor". How can anyone be "poor" when they own their own land and grow their own food and all their vehicles are paid off? While we don't think of ourselves as poor, we still have very little cash and many projects. We have found that you can do projects with little money and lots of labor, or you can do them with little labor and lots of money. We usually have more time than we do money, so we are constantly looking for ways to complete projects and save.
>
> My experience with ferro-cement started as a young man, by reading about how to build ferro-cement boats. The idea of using chicken wire and cement construction is not at all new. The old timers called houses with this type of construction "Chicken wire & cement houses", which pretty well described them. The main difference between the old "Chicken wire" walls and the "ferro-cement" is the amount of chicken wire used. In the old type of construction, only one layer of chicken wire was used and this was just to hold the cement to the side of the wall. With ferro-cement, 2 to 5 layers of 1 inch mesh chicken wire are used, depending on where they are being used and what strength is required. Cement is the strongest when it is less than one-forth of an inch away from steel reinforcing. In ferro-cement, the overlapped chicken wire is the reinforcing, and all of this wire is what gives it its great strength and ability to withstand stress. By having several layers of chicken wire, with the cement being forced to fill in all the spaces, a very strong cement structure is the result.
>
> If this is sounding pretty simple, it's because it is simple, but it works. There are many ferro-cement boats, still in service that are over 50 years old. Think of the stresses these boats have to endure while on the high seas. Hopefully your house or barn will never be subjected to this kind of stress. If it ever is, I don't want to be in your neighborhood! If the use of chicken wire and cement for outside walls has been around for such a long time, how well does it hold up? Even with one layer of wire, the walls work well. Many walls never had any sort of "sealer" applied and many were never even painted, and yet most lasted for as long as the house was used. Many did develop cracks and had to be repaired from time to time, however. This was not due to flaws in the cement work, but from the house settling as it aged.

The Hub

Troubled Times

Material

RASTRA

I have been recently doing some research into alternative building materials. My reason is to find a fast system that I can assemble myself on weekends and evenings. There are three systems I have found: **RASTRA, Hebel Blocks** and **Bluemaxx**.

Hebel Blocks are expanded (air) concrete elements that are heat (fast) cured which I suspect may reduce their inherent strength. They are light weight but smaller than either of the other system elements. Bugs wont attack cement though.

RASTRA elements incorporate cement to provide the bonding agent for the recycled EPS aggregate. Requires rebar for the concrete pumped into the interior voids to provide strength. Bugs won't attack it because of the cement (caustic) environment. Same for mildew and fungus. Ten foot standard element length and light weight fits my "do-it-myself" requirement.

Bluemaxx offers more manufactured elements than **RASTRA**, but I don't see that as a major concern. Their elements are of similar size again fitting my "do-it-myself" requirement. The **Bluemaxx** system is two solid EPS panels separated by ABS plastic grids that extend through to the outer surface of the two EPS panels to provide nailer strips. These grids also serve to provide rebar clips in the interior voids. My big problem with this system is the solid EPS panels. I have a friend with a log cabin and the wasps are carrying away the foam chinking! These might be good for interior walls.

Offered by **Steve**.

The Hub

Troubled Times

Material

Substitute

I live in an area where limestone quarrying and kilns was a big industry towards the end of the 19th century. I'd wondered how it was done. I watched a PBS **Nova** episode of *Secrets of Lost Empires* today, and it told how the ancient Romans did it. If limestone is heated red-hot for long enough, it turns into chunks of light weight, white substance called quicklime. This is mixed with water which makes a chemical reaction (as in portland cement). I think they called this slaked lime, but I'm not certain. To this bubbling white goo they added sand for mortar, or sand and gravel for cement. To waterproof it they liked to add volcanic ash, but since that was rarely available they used crushed clay tiles instead. The red clay in the tiles made their mortar pink. So, when I can't buy a bag of Portland cement anymore, I at least know how to make it.

Offered by Wendy.

The Hub

Troubled Times

Panel Systems

A company based in Ann Arbor, MI does panelized building systems that combine the skin, frame and interior wall in one structural panel, a New House construction. Contact them by E-Mail.

Offered by John.

Troubled Times

R-Control

From an article in today's (August 22, 1999) paper about **R Control** panels, offered by Team Industries.

> *Team Industries, part owner of the national company Advance Foam Plastics Inc., makes R Control Structural Building panels for placement in basements, walls and roofs. The units resemble giant sandwiches, or oversize Oreo cookies. Each panel is made of engineered wood facings adhesively welded to expanded polystyrene insulation. Combined, these elements create a monolithic, or one piece, structure that the manufacturer says is strong and resilient. R control panel houses have survived hurricanes in Florida and earthquakes in Japan while nearby buildings crumbled. In Coopersville, the home of Larry and Valerie VanZomeren, reinforced with R control paneling, sustained only light damage during windstorms exceeding 125 mph, and that damage was caused by trees going through windows.*
>
> *The big sandwich panels range in sizes from 4 by 8 feet to 8 by 24 feet. Widths offer a choice from 4 1/2 inches to 12 1/4 inches. The inside foam of the R Control panels is like a styrofoam cup with higher density said Joe Ellsworth, part owner of Controlled Environmental Structures in Greenville, MI. The whole thing is basically a big box...there's nothing to break apart. R Control homes usually are heated with nothing more than a standard hot water heater, equipped with an air handler. Heating costs run about $40 a month during the coldest months of winter. An R panel is 60 styrofoam coffee cups thick. It retains its R value pretty much forever. The technology has been around since 1935 and there is an Experimental sandwich building intact for the past 35 years on the University of Wisconsin campus. Cost is comparable to wood structures... and it's non toxic.*

Team Industries is a dealer for R-Control. **R-Control Building Systems** is located at:

> 24000 W. Highway 7, Suite 201
> Excelsior, MN 55331
> Fax 612-474-2074
> Phone 877-726-6876

AFM Corporation of Excelsior, MN, manufacturers of R-Control panels (the thick core of rigid expanded polystyrene insulation adhesively welded between stranded lumber facings to form a structural panel that will not twist or warp) state that their normal structure, which is the panels with a foundation and normal roof, have withstood the Kobe earthquake, and are rated to withstand 180 mph winds. They are very much against steel instead of wood. Steel uses 9 times the energy of wood in manufacturing and is not a renewable resource. There are manufacturers out there who do something similar to what they do with steel for refrigerated and/or frozen buildings. These would cost a great deal more!

> Offered by John.

My understanding is this material puts out gas for many years. If this does not give a sick house syndrome then the material could be quite useful for interior room constructions - say inside a large dome.

> Offered by Mike.

The Hub

Troubled Times

Rectangle Shape

I got some information in the mail from R-Panels. My package included a 17 minute construction video. The panels are a great idea for conventional construction, but don't seem to apply to pole shift survival. The panels come in different sizes, but are all rectangular in shape for square building construction. The panel is constructed of 2 plywood sheets with a foam core center, so using them to reinforce a dome is out.

> Offered by Brent.

I asked **AFM Corporation** of Excelsior, MN, manufacturers of R-Control panels, about octagon structures which they said are easily done. Their product has been used in dome structures by **GDI** of Flint, MI. I believe **GDI** does buildings of church size or larger. They may have other builders that do domes. You get a list of builders from their website. They have done buildings that are continuous panels instead of a separate foundation. They put polystyrene under the product for additional protection against insects. I think this is worth pursuing. Between the ability to do a geodesic dome and a continuous panel structure, this should greatly enhance a structure already capable of withstanding strong earthquakes and the most major of hurricanes.

> Offered by John.

The Hub

Troubled Times

Rope

Does anyone know a good source of information on making rope from hemp or other materials. I know hemp is taboo in our current society, but when it hits the fan I don't think anyone will mind.

> Offered by Mike G. (Gibbons)

I learned how to make hemp rope from the Boy Scouts of America Field Book. Albeit, that was many many years ago. Maybe you could locate an older copy of the book.

> Offered by Shekhina.

Web sites also offer information.

> Rope Making Materials - Any of the following materials may be used to make rope: binder twine, bailer twine, plastic twine, jute twine, ...

The Hub

Troubled Times

Hemp

Another item to save is Hemp seeds as this is a hardy plant with many good properties very useful to a pole shft society! It has medicinal as well as industrial qualities. It grows easily and plentifully with few enemies. It is one seed to be considered. One of the reasons it was banned was due to a strong lobby from cotton growers way back then!

> Offered by Pierre.

I was only thinking of the importance of hemp the other day as the only real means for sustainably manufacturing many of the basic materials that we consume and require. Hemp is an excellent plant, producing oil, fibers and biomass. I have a number of hemp clothes (jeans and shirts) and find they are both robust and durable. Furthermore, the fibers can be used in place of wood pulp for the production of paper. So make that: clothes, paper and oil as well as rope, sacks and mats. Basically, hemp replaces the need for cotton, wood pulp and the synthetics industry. You will definitely find it a useful plant. I am unaware of a more useful, general utility plant and will be incorporating it's use into my planning. I feel obliged to share the information below, just in case there are people who consider the topic of hemp a bit of a giggle.

> Offered by Gino.
>
> *In 1914 the USDA calculated that hemp crops could make four times as much paper per acre as trees. Although this statistic may appear too old to be deemed valid, one must remember that hemp prohibition has made it very difficult to research hemp's use and productivity. Paper made out of hemp has many advantages. It can be recycled several times more than paper made from wood. Also hemp paper is resistant to decomposition, which is why ancient Chinese hemp documents can be found today. Hemp paper is naturally resistant to age related yellowing. Furthermore, hemp paper can be whitened with out dioxins, which can be extremely detrimental to the environment, especially streams and soil. Hemp can yield up to 4 times more paper over a 20 year period than wood. Finally hemp's low ligning content reduces the need for potentially polluting acids used in pulping.*
>
> ***Textiles:***
>
> *Hemp's long fibers are perfect for making textiles. The fiber can be made into any type of cloth. Hemp textiles are better for us than the cotton and other textiles we currently use. Cloth made out of at least 50% hem, naturally blocks the sun's harmful UV rays. Cloth made from hemp fiber is stronger, warmer, more durable, more absorbent, and softer than cotton. The fiber (bast) of the hemp plant can be woven into almost any kind of cloth. It is very durable. In fact, the first Levi's blue jeans were made out of hemp for just this reason.*
>
> *Tons of Fiber per Acre:*
> *Pine (30 year growth cycle) 3 tons per acre*
> *Kenaf 6 tons per acre*
> *Hemp 12 tons per acre*
> *Cotton 0.3 tons per acre*
> *Flax 1.3 tons per acre*
>
> ***Food:***
>
> *Hemp as a food can be more diverse than the soybean, which currently has thousands of uses, it is also easier to digest. In fact, hemp is often prescribed as food for those who have difficulty with*

digestion. Hemp seed is very high in a protein resembles protein found in the human blood.. It is also high in calcium, magnesium, phosphorous potassium and vitamin A. Hemp seed oil contains over 70% cholesterol- fighting fatty acids, the highest of any known seed oil. These 'good' fatty acids help the body heal. Also, hemp oil contains a very rare nutrient found in mother's milk known as gamma linoleic acid (GLA). Hemp, most especially hemp seed oil can be made into breads, cakes, pastas, cookies, non-dairy cheese milk and even ice-cream. With hemp seed, a vegan or vegetarian can survive and eat virtually no saturated fats. One handful of hemp seed per day will supply adequate protein and essential oils for an adult.

Fuel:

The hydrocarbons in hemp can be processed into a wide range of biomass energy sources, from fuel pellets to liquid fuels and gas. Hemp seed oil can be chemically combined easily with 15% methanol to provide a premium diesel fuel substitute. This hemp bio-diesel fuel burns 70% cleaner than petroleum diesel in soot and particulate pollution. By burning cleaner, hemp fuel would help to reduce acid rain. Furthermore, the industrial use of fossil fuels increases the amount of CO2 in our atmosphere; however, hemp flues maintain the earth's natural O2/CO2 balance. Finally hemp is renewable very quickly, while fossil fuels take thousands of years to renew. Development of hemp based biofuels could significantly reduce our consumption of fossil fuels. Hemp may also be used to produce ethanol (grain alcohol.) The United States government has developed a way to make this automobile fuel additive from cellulosic biomass. Hemp is an excellent source of high quality cellulosic biomass. One other way to use hemp as fuel is to use the oil from the hemp seed - some diesel engines can run on pure pressed hemp seed oil. However, the oil is more useful for other purposes, even if we could produce and press enough hemp seed to power many millions of cars.

***Plastics**:*

Conventional plastic are not biodegradable and are currently filling our land fills. However, once plastics were made from plant cellulose. The hemp hurd is one of the richest sources of plant cellulose, a building block of modern industry. Plastics made from hemp instead of petroleum would be biodegradable. `Bio-plastics' have already been used though out history - way back in the 1930's Henry Ford had already made a whole car body out of them - but the processes for making them needs more research and development. Besides being biodegradable, bio-plastics can be made without much pollution. The addition of hemp fibers enables the reduction of the amount of plastic required. In addition to a reduction of pollution during production, the widespread use of hemp plastics has the potential to dramatically reduce the consumption of unsustainable and environmentally negative petro-chemical plastics.

Paints and Varnishes:

Through out history, hemp seed oil was used to make paints and varnishes. For example, in 1935 116 million pounds of hemp seed were used in America just for paints and varnishes. The use of hemp seed oil would allow for a reduction of the harmful chemicals generally used in and associated with paints and varnishes.

Other Uses:

Hemp is an amazing plant with literally thousands of uses. Other things hemp can be used for includes make-up, soaps, detergents, building materials, insulation, and packaging. In nearly every case, the use of hemp as opposed to the current resources used, would be somehow benefit the environment.

The Hub

Troubled Times

Natureworks PLA

Cargill Dow Polymers LLC NatureWorks

> *A renewable resource such as corn is milled, separating starch from the raw material. Unrefined dextrose, in turn, is processed from the starch. Future technology enhancements may eliminate the milling step and allow for utilization of even more abundant agricultural by-products. CDP turns dextrose into lactic acid using a fermentation process similar to that used by beer and wine producers. This is the same lactic acid that's used as a food additive and is found in muscle tissue in the human body. Through a special condensation process, a cyclic intermediate dimer, referred to as a lactide, is formed. This monomer lactide is purified through vacuum distillation. Ring opening polymerization of the lactide is accomplished with a solvent-free melt process. A wide range of products that vary in molecular weight and crystallinity can be produced, allowing Cargill Dow Polymers to modify PLA for a wide range of applications.*

The Hub

Troubled Times

Bamboo

Bamboo can be useful in some places, if it is available. Bamboo, as a material, has the following features:

- elastic
- hollow, so it can be a pipe if the stem is drilled through
- lightweight
- strong enough to build a ladder and scaffolding, 9 cm Diameter (3.54")

This photo shows four bamboo tied together. They should be of a similar diameter for ultimate strength. Fresh bamboo contains rich oil and water. Chemicals that bugs like are removed to some degree to prolong it's life by rolling through the fire gradually. I hear bamboo takes 4-6 years to grow this big.

Offered by Kerne.

What a good idea. Bamboo grows very quickly and has many uses from wind breaks to water carriers to even flutes. (I do know you need to keep it a long way from any structure as the roots will lift concrete) Bamboo will not absorb water like more porous wood and could serve as building material if kept out of the wind since it is so lightweight.

Offered by Mary.

Another use for bamboo might be as burning material. I've heard of it being grown for the sole purpose of fuel for biomass generators. Imagine being able to grow a fuel that will generate electricity!

Offered by Doug.

The Hub

Troubled Times

Lashed

Photo by Kerne.

Troubled Times

Tall Structures

Offered by Kerne.

The Hub

Troubled Times

Scaffolding

When used in constructing a scaffolding, skillful workman tie them with iron wires, diameter from 0.5 to 2mm or more, which varies depending on application. In these photos, iron wires are used for quick construction. Never use a Nail, which could break them, sooner or later. There is no triangular bamboo scaffolding. All I have seen are formed with squares, in a 3 dimentional scaffold. Maybe it is so due to the direction of walls of a building.

Offered by Kerne.

The Hub

Troubled Times

Canola Oil

Crop Provides Alternative to Motor Oil
Colorado Crop Provides Environmentally-Friendly Alternative To Motor
by Dell Rae Moellenberg

> Imagine a motor oil that cuts automobile pollution by 40 percent. Duane Johnson doesn't have to imagine such a product anymore--he's made it a reality. Johnson, a Colorado State University Cooperative Extension new and alternative crops specialist, developed a lubricant made from canola oil, a seed crop grown in Colorado. The canola-based lubricant drastically reduces automobile engine emissions compared to emissions from traditional motor oils.
>
> Canola oil is traditionally used as a cooking oil, especially in Asian foods. However, with processing adjustments, it is as effective an engine lubricant as any traditional motor oil.
>
>> "The benefits of using a canola-based oil in place of petroleum motor oil don't stop with reduced automobile emissions" said Johnson. "Processing canola into oil produces no waste. By-products include only oil and ground seeds, called meal, which can be feed to livestock. There is no waste from the plant, and the production of the oil does not contribute to air pollution."
>
> Johnson added that because canola oil is produced from a seed, it is a renewable resource--unlike petroleum. It's also easier to dispose of canola oil than its petroleum counterpart. The oil meets United States Environmental Protection Agency standards for solid waste disposal, and accidental spills are considered non-hazardous.
>
>> "Using canola oil in place of petroleum oils would drastically cut hydrocarbon and carbon monoxide emissions from cars" said Johnson. "That's a great benefit in areas such as the Front Range. And, when burned in an engine, canola oil smells like popcorn."
>
> Used canola oil from automobile engines can be recycled into greases and chain oils. These products are called "total loss lubricants" because they leave no residual or waste. Johnson, who drives an old Volkswagen Beetle lubricated with canola motor oil, can also attest to its efficiency and durability.
>
> So why isn't the oil available to the general public? Besides competition from petroleum products, there are several other obstacles to overcome.
>
>> "Because canola motor oil is essentially a vegetable oil, the American Petroleum Institute will not certify it," Johnson said. "And, automobile manufacturers require that only API-certified oil be used in their engines or manufacturer warranties are void."
>
> Johnson, who identifies markets for new and alternative crops that can be raised in Colorado, initiated a canola-crop project in Colorado's San Luis Valley in 1986. The canola crop flourished, but the cost of shipping the harvested crop to a processing plant proved too expensive. Two years later, however, Johnson and John Rhodes, a Monte Vista farmer, raised funds to design and build a facility to toast canola seeds for salad topping.
>
> In 1990, Johnson used his personal funds to purchase an oil press to produce cooking oil. Through such projects, Johnson is able to achieve his most important goal--providing rural development and support and

improving profitability for farmers through the commercialization of new products.

Johnson started developing canola motor oil in 1993 at the request of Agro Management Group Inc., a Colorado Springs-based agricultural research, development and marketing corporation. Johnson teamed with Agro Management, a business that specializes in finding new uses for old crops and developing new technologies for alternative crops. As a state-funded educational institution, Colorado State is prohibited from marketing products for commercial use. Agro Management acquired the patent rights to the canola oil, which is now patented in Europe, Canada, Mexico, Australia, New Zealand, Argentina and Japan.

Canola motor oil is gradually gaining commercial acceptance. Wisconsin and Michigan state governments are in contract negotiations with Agro Management to use the oil in state-owned vehicles. Canola is already an emerging industry in these states, and Johnson estimates it will take 200,000 acres of canola to supply motor oil for Wisconsin's fleet of state vehicles. Officials in New Zealand are considering a similar agreement.

If canola motor oil replaced just 5 percent of the petroleum oil used today, the United States market for canola motor oil would be roughly 50 million gallons. To meet that demand, canola crops would require as much land as is now devoted to corn production.

Canola motor oil, which is about the same weight as 10W-30 oil, is expected to be priced at $1.50 per quart, only a few cents more than petroleum-based motor oils. But consumers won't have to pay to dispose of used canola oil as they do petroleum oil.

The Hub

Troubled Times

Material Peat Moss

I was doing some gardening today in preparation for planting some things I want to test grow over the next few months. I was using lots of Peat Moss mixing it in with the clay-sandy soil. Began to realize the value of the stuff and the quantity that would be needed over a number of years after the Pole Shift. I and possibly others may want to stock pile some of this Peat Moss. It is a bit spongy and yet stiff at the same time.

I began to think about using it as packing material for the pole shift. If the Peat Moss is repackaged in loose plastic bags like a loose bean bag then it should be able to be used to fill the voids needed when packing up our items for the pole shift. One could plastic bag the items being packed before boxing them. In this case Peat Moss may be able to be pored into the box directly to fill the empty spaces. May not work for everything but could cut down significantly the cost of other packing materials.

I consider the plastic foam pop-corn to be almost useless for the strong shaking of the pole shift. These could be squashed to nothing with any constant shaking of the boxed items. This all depending on the mass of the boxed items. The pole shift will generate some high G forces with the inertial mass of the boxed items accelerating/decelerating compressing the foam to nothing. Peat Moss should be about the right stiffness to keep things from breaking and will not compress to nothing.

Obviously, if one packs dishes in it, then they would need to be washed before use. I think in general it would work only with the very dry peat moss that I was using, that I hope is common place. Over time does this give off corrosive gases or possibly explosive gases? Will more ventilation be needed of our storage area? I suspect Mulch would fall in the same category as a potential to use for packing.

> Offered by Mike.

I think the only danger would be if the peat or mulch got damp, it would begin to decompose further which could lead to gas production (methane is not a good thing for your precious supplies). Also, if you were packing material you want or need to keep dry. If you set the peat (or mulch) out in the sun for a day before packing it, it should be dried out enough. Just use one of those Rubbermaid containers to make sure no moisture leaches into the packing material!

> Offered by Roger.

Peat moss is an awfully heavy packing material, as long as the container can handle it.

> Offered by John.

The Hub

Troubled Times

Diaper Gel

A guy in Florida, inspired by disposable diapers that wouldn't burn, has invented a fire resistant gel that you can apply with a garden hose to your house to keep it from burning. John Bartlett of Tequesta, Florida is looking for a corporate or government "sponsor" to market the gel to homeowners and the industry. Strangers pull into his driveway looking for the gel and he has sold 500 1 gallon jugs at $35 each in just 10 days. Florida Power and Light used it on telephone poles during the recent wildfires and none of them burned.

Offered by John.

Troubled Times

Natural Glue

I was once told that glue can be made out of ground up horse hooves. I have no way of verifying this. Does any one know if this is true or not? Another glue source is ground up flower (wheat). Add water to make a glue-paste. Sap or resin from trees could make a good glue if forced to dry with heat.

Offered by Mike.

When I was a kid I was told of a glue factory that used whale bones to make glue. I guess you can use any bones to make glue, but I'm just not sure of the mechanics of it. I guess it's the gluten in bones. Maybe that's why its called *glue*.

Offered by Ian.

About 2 years ago, I saw a program on TV that said ancient humans used all of the parts of the animals they killed. Meat for food, hide for clothing and shelter, bones for tools, tendons for cord, and cartilage for glue. When they made arrows, they inserted the arrowhead into the shaft, wrapped it with tendon, then painted the area with glue. They then used the glue to fletch the arrow. Information from another source:

> *Cartilage has two main components: reinforced gel and very strong collagen fibers (made up of glue-like protein). The reinforced gel is made up of proteoglycans (long molecules covered with bristle-like texture, the chondroitin sulfate molecules. The chondrocyte cells make collagen and proteoglycans, which are spread about the cartilage matrix. The chondrocytes also get rid of old collagen and proteoglycans. Chondroitin sulfate collects nutrients for the chondrocytes, because cartilage has no blood supply to provide nutrients.*

Offered by Larry.

I've discovered that most glues are derived from protein. Collagen is such a protein and is available in all animal tissue. Sinew/hide/bone and blood can all be utilized for this purpose, (although bone glues require the use of acids to separate the minerals from the collagen). Similarly fish skin and air bladder are also useful. So are some tree pitch or resins. Also curdled milk or low-fat cottage cheese. Any source of protein should yield glue when boiled down. However silk, animal hooves and horns are not sources of glue even though they are protein based, despite common belief, dictionary definitions, encyclopedia entries, and other literature. According to my source this is pure myth and glue cannot be made from any of them.

Offered by Brian.

Troubled Times

Milk

One method to make glue is from milk. You need:

> skim milk
> vinegar
> non-metallic pan (enameled o.k.)
> baking soda

Heat a pint (half a liter) of skim milk and six tablespoons (90 ml) of vinegar slowly, stirring constantly. When it begins to curdle, remove from heat. Continue stirring until the curdling stops. Let sit until the curds have all settled to the bottom. Either strain the curds or pour off the liquid until they are dry. Add 1/4 cup (60 ml) of water and a tablespoon (15 ml) of baking soda (borax also will work). When the bubbling stops, you have made glue.

What is happening in this process is that the milk solids are being separated from the liquid. These solids, the curds, dry to form a hard plastic-like substance called casein, which also acts as an adhesive. The vinegar functions to curdle the solids so that they can be separated, and the soda neutralizes any acid that is left.

> Offered by Steve.

Information provided from *The Traditional Bowyer's Bible*, Bois d'arc press:

Curdled Milk Glue
: Casein glue can be made from curdled skim milk or low fat cottage cheese. They can be used on wood with up to 15% moisture content as well as oily woods. Commercial casein glues contain dried curd casein, lime, sodium salts and fungicide. However, insects, mice, mold and bacteria also love casein glues.

: Milk becomes somewhat water resistant after curdling. When dry, it loses considerable strength after some time in water, but does not dissolve. The curds do not make a smooth textured glue, but by adding lime, about 5% per volume, the curds break down to a smooth consistency. Lime also makes curd glue fairly waterproof.

Cottage Cheese Glue
: Wash and strain the cottage cheese until the curds are clean. Drain for fifteen minutes - removing as much free water as possible as it yields thicker, stronger glue. Add 5% lime per volume, stir well and let set one hour, stirring occasionally. Strain and use. Apply liberally, no sizing needed. Apply pressure to hold work in place.

Troubled Times

Blood

Information provided from *The Traditional Bowyer's Bible*, Bois d'arc press:

> Simply thicken the blood with wood dust or lime, use and allow to dry. Produces a moderately strong, water resistant glue. (Pig and cattle blood were used to manufacture plywood up until the mid-40's .)

Troubled Times

Fish Skin

Information provided from *The Traditional Bowyer's Bible*, Bois d'arc press:

> A moderately strong glue, but weaker and more brittle compared to the weakest hide or sinew glue. Remove flesh, fat and scales. Wash the skins. Cut into strips or squares, then proceed as for sinew and hide glues. Fish Skin glue does not jell at room temperature, but remains liquid. Pour into trays and let dry down to a medium syrup. To store as a liquid, add boric acid as a disinfectant. Fish glue can be dried as a solid: Once the "leather" stage of drying is reached peel the glue free from its tray. When hard and dry break into small flakes for storage. Like hide glue, dried fish glue has unlimited shelf life. Fish bladder glue jells like animal glue. It is also as strong and flexible.

The Hub

Troubled Times

Hides

Information provided from *The Traditional Bowyer's Bible*, Bois d'arc press:

Hide Glue

Hide glue has approximately 10,000-plus lb. of tensile strength. Hide scrapings, a by-product of buckskin tanning work well. Hide scraps should be pulverized, since the paper thin hide scrapings release their glue faster than sinew. Quick-cooked first-pouring hide-scrapings glue takes only one hour. Otherwise, let the mixture simmer at 170 degrees for ten hours, or until the scrapings are no longer diminishing in bulk.

You can make permanent liquid hide glue by adding acetic acid, or vinegar. Flexible hide glue can be made by adding glycerin in weight equal up to the dry weight of the glue. (Used for book-binding in times of old.) To make it water resistant just add tannic acid, formalin, or formaldehyde. These can be added either to the surface to be glued, to the glue surface, or can be mixed with the glue. Tannic acid can be extracted from tree bark, especially oak. Old literature reports that hide glue can be waterproofed by adding 40% linseed oil, but tung oil works slightly better, however the results are only mildly water resistant. (Formaldehyde occur naturally in woodsmoke so if the glued surface is held above a smoking woodfire the treatment is applied at the same time as it is dried by the heat.)

To make hide glue water resistant just add tannic acid, formalin, or formaldehyde. (Formaldehyde's occurs naturally in woodsmoke so if the glued surface is held above a smoking woodfire the treatment is applied at the same time as it is dried by the heat.) I believe this method for making glue water resistant applies to plant resin as well.

Offered by Jan.

Here's another source for Hide Glue.

Offered by Lou.

The Hub

Troubled Times

Sinew

Information provided from *The Traditional Bowyer's Bible*, Bois d'arc press:

Made from leg or backstrap sinews, or from sinew scraps.

- Place sinew stock in a large pot, with lid and cover with water.
- Simmer at approx. 170 degrees for about 24 hours or more, stirring occasionally.
- Towards the end remove lid and let the mix evaporate down to a light syrup - just barely thicker than water.

During the last hour of simmering occasionally scoop off any fat, foam and impurities. Bring the mix to a light rolling boil for the last ten minutes or so. This will help bring the impurities up to the surface. So keep the temperature high enough to prevent a skin forming on the surface. The strongest part of the glue skins up first so you'll end up wasting the best part of the glue if you allow a skin to form.

The longer glue cooks, the darker and weaker it becomes so the first pouring, after ten hours or so of simmering, is the strongest glue. Continued simmering of the remains for a further 24hours, or until the stock mass no longer reduces, results in a slightly less strong glue, but still excellent. If you're in a hurry don't bother simmering.

- Bring the sinew to full boil right away and hold it there for two to three hours.
- Strain off impurities as above.
- Let the mix boil down to a light syrup and that's it.
- The quick glue will be virtually as strong as slow glue.
- Pour the light syrup through a fine-weave cloth to filter (optional). Then pour into wide trays or plates to allow them to jell. Pour 1/2" deep or less.

At this stage bacteria can convert the glue to a smelly gruel before it has time to dry. To speed up drying cut the jell into 1/2" to 1/4" cubes, sprinkle onto a clean surface to dry. Wind speeds up the process, but keep cool and out of direct sunlight to prevent melting. When hard and dry, store out of reach of insects and rodents. If kept dry its shelf life is unlimited. If the mix is watery it may not jell rigidly enough to hold its shape for cutting. Only freezing will allow this mix to set.

To Use

- Soak the shrunken granules in sufficient cold water to cover.
- Wait a few hours, until that are plump and jelly-like throughout.
- Heat to 160 degrees and stir until uniform, then let cool to a working temperature of 110 to 140 degrees, depending on the materials to be glued. If necessary thin to a medium-light syrup. The glue pot should be kept below 140 degrees. At 175 degrees animal glues loose over 2% of its strength per hour. Successive re-melting also weakens animal glue.

Troubled Times

Resins

Information provided from *The Traditional Bowyer's Bible*, Bois d'arc press:

> Injured conifers, especially pines and spruces, "bleed" pitch or rosin, and although not particularly strong, if prepared correctly it is flexible and waterproof. Fresh rosin is too sticky and must be heated or boiled to thicken. (Caution pitch is flammable and should be heated outdoors and with great care.) Heat the rosin just enough so that when cooled to room temperature it is firm, but not brittle. Old, hard rosin can be softened by melting and adding new rosin or beeswax. To increase strength, add about one-tenth (10%) powdered charcoal to the melted rosin. Charcoal can also be pressed into the surface after application to eliminate any stickiness.

I have watched the Australian Aborigines making their spears. They split the wooden shaft of the spear and insert the spear head, (a deadly looking long barbed head carved from hardwoods), along with tree resin from Eucalyptus or Acacias, then they bind it tightly with string made from human hair, cover the binding with more resin. Then they twirl the join over a smoky fire.

Offered by Jan.

The Hub

Troubled Times

Water Proof

I decided to put the concept of it to a test. I took one packet (.25 ounce) of **Knox Gelatine** (collagen extracted from animal parts commonly sold at grocery stores to make **Jell-O**) and emptied it into an old tuna fish can. I put about 3/8" of water - it quickly adsorbed all of the water. When heated it liquefied nicely. But, didn't harden rapidly and was rubbery week. I determined I had used too much water. Next batch was just enough water to cover the bottom of the can and added **Knox Gelatine** powder .25 ounce. This made a thick paste even when heated. It covered nicely and got rubber hard when first it cooled. Over 24 hours the glue got harder and harder, the surface of the excess glue that squeezed out of the joint felt harder than epoxy. Yet, the excess glue left in the can was still somewhat rubbery. I did a brake-apart test of two pieces of wood glued together after 24 hours and the wood broke .5" from the joint, the glue didn't break. Bottom line I think if the wood is dry this will work well. If a wet environment and wet wood then I think we will need to dry the wood (or item) before gluing it.

Offered by Mike.

Total saturation of the wood would soften the glue and cause a failure of the joint, but then so would most modern day white glues. Normal moisture should have no effect on the bond, but that will however depend on the degree of saturation. Even bonds joined by the new-technology glues suffer if the wood is poorly prepared or over-saturated with moisture. This could be minimized by sizing the surfaces with a weaker mix. Like a coat of primer, it seals the surface. Without it a thirsty surface may soak up too much glue, leaving the glue line starved and weak. Use slightly thinner sizing for dense wood, thicker for porous wood. Allow to dry and then apply the final thicker glue. Moisture prevention can then be minimized with after-treatment of the wood surface, i.e. oils, (there will be a plentiful supply of motor oil which makes excellent creosote,) animal fats or wax.

Any glue has its limitations depending on many factors. I do not claim that natural glues are perfect, in fact the data obtained is not my own, but based on the experiences of hand craftsmen that have built and maintained their own glues for a variety of uses. They in turn have taken information handed down from times of old when epoxy/super-glues just didn't exist. The glues in question worked back then so should work just as well today.

Offered by Brian.

The Hub

Troubled Times

Scrounging

Scrounging is the ability to determine a need and to spot-use locally items that will produce the intended functional result. It helps to first understand the problem or how the intended result should work.

Let's take an example: It is after the PS and you need to move some valuable items (a bit too heavy to carry) though mud and slush to higher ground. The problem could be defined as how can I build a simple lightweight pull cart that will work in mud out of the available junk found in the local environment? You recall the most mud vehicles have wide base tires. So with the idea of wide base wheels in mind you start you're scrounging (looking around). You happen to find 4 empty 5 gallon cans (plastic or metal doesn't matter) and this gives you an idea. You could make wheels out of these by cutting a hole in the center of the lid and bottom with your knife. Now you now need an axle. You keep looking and find an old broom stick and a section of rebar. One will be used for the front axel and the other for the back axel. You find a couple of short wood boards that you put between and on top of the axels. You find some old electrical wire that you use to hold the boards to the axels. You find a short section of PVC pipe and put a wire though this and back to the cart as a pull handle so that it will not cut into the hands.

You now load on what you need to move your heavy item off to high ground. You pull it about 10 feet and a wheel falls off. You wire a short stick to the side of the end of the axle (now notched to hold the wire) to keep the wheels from falling off. You make it about 100 yards more when the pressure of the mud on the back wheels at one point causes the board to slip off the rear axial on one side. You now put a notch in the board to keep it from slipping with your knife and rewire it tightly. You foresee this happing on all such connections and you rework all 4 connections to have notches in the wood. Obviously it will not hold together as long as a regular cart but with care (staying in present time) and some rebuilding as you go it gets you to where you are going.

Successfully scrounging takes place when unusual forms and items are fit to useful function. With the concept of what is needed in terms of function fixed in mind, one looks around at all the available items that could be used. One does a mental mockup trying out different items. Do an extended think by mocking up the result in use, to estimate its workability. One tries to chouse items most likely to succeed. Sometimes after constructing it you find it doesn't work out. When this happens it's back to square one scrounging again for parts. Be patent with your self. You are learning valuable lesson each time something is tried.

In the above example suppose the ground turned out to be too bumpy or rough for the above cart to work? You mock up in your mind a sled, then a large wheel cart and then a couple of poles that you drag along. You mentally test each one doing an extended think as to how it would work over the time of need. You chouse to make a 2 wheel pull cart out of two long poles tied to an axel with two large wagon type wheels. Looking around you find some plywood you can cut with a hand saw into a circle. You screw several sheets together to make a thicker wheel. You find some metal strapping and screw this to the edge of the plywood sheets to make it longer lasting wagon type wheel as it roles over rough ground. The wheel ends up to be about 4 ft in diameter and you estimate they should become easy enough over semi-rough ground to pull as long as one misses the big rocks. Or maybe you chose to make a sled. You get the idea. Scrounge, make it, try it, scrounge some more and try something else. There are no right answers. There are only less workable or more workable answers. Those good at puzzles should take this as a puzzle fitting different parts together type of challenge.

From past experience I can say it helps to take your time and physically go around looking at each potential usefully item in your environment before deciding on what you are going to use to build for the intended result. Do a mock up of that item in place and mentally test it to see if it will work. Do this walk around for each item you need while building. Don't go on memory of what you have. It helps to actually see the items you can potently use each time you have a need. Planning or designing time can sometimes take as long or longer than building time.

As a side note: Once one gets good at this, one finds oneself collecting all kinds of things that others might think are totally useless. This can be frustrating to those significant others who think it is junk. To you it has many valuable future uses. You can see it in the items. The way out of this is to teach the value of scrounging. After a PS there will be no corner stores to get all you need. Scrounging will be your corner store. The bigger the junk pile you have to choose from the more possibility of success.

Offered by Mike.

The Hub

Troubled Times

15 Richter Scale

I just got another reply to my "seismic safety of an underground structure" e-mail. Here it is:

> In response to your e-mail to ATC, 8/8/97:
>
> Underground structures would fare better than surface structures, other things being equal, because the ground shaking is less there; it increases as it ascends from bedrock to the surface. The seismic structural engineering design community can design for you a structure that will fare well against any ground shaking; it might cost, though. The Richter scale loses much of its meaning higher than 7 or 8; you must talk "moment magnitudes" after that. **The maximum shaking doesn't get much bigger as the magnitude rises above 7 or so; it lasts longer instead**. Reinforced is fine, but domes or geodesic domes are nothing special in the horizontal shaking of an earthquake; they are just lightweight roofs that hold themselves up against their own weight, which is acting vertically. The comment on underground structures applies to domes, too. Your question regarding magnitudes of 15 indicate naivete.
>
> Regards.
> A. Gerald Brady, P.E., Ph.D.
>
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Offered by Peter.

The Hub

Troubled Times

Earth Waves

I recently e-mailed a number of geologists and asked their opinion of how an underground structure would fare in a severe earthquake and here's the response I got. Here's what I wrote:

> To whom it may concern:
>
> I am doing a research project and was wondering if you could help me. How do you feel an underground structure would fare against a major earthquake? By major I mean at least 9 on the Richter scale. This underground structure would be made of reinforced materials, and be constructed in a dome or geodesic dome shape, because of it's amazing strength. Do you feel such a structure would fare better or worse than an above-ground structure? Also, if you do feel it could survive a 9 point earthquake, do you think it could also survive a 15 point quake?
>
> Thank you for your help.

Here's the response I got:

> Hi there. Interesting question. The first thing I have to explain to you is the earthquake measurement problems. The most common measurement scale is the Richter Magnitude scale. On the Richter scale, quakes of 2.0 or less are usually not felt by people. The largest quakes in the world have had magnitudes of 8.8 to 8.9. Although there is no limit to the upper end of the Richter scale, the theoretical limit is about 9.5 simply based on the fact that rocks experiencing enough pressure to break that violently will actually bend or melt before they break. The Seismic Moment measurement is becoming the more often used (and more accurate) form of measurement. The largest known quake on this scale measured at 9.6. There is no scale or measuring method which could result in a "15 point quake" as you suggest.
>
> OK, now on to your specific question. There are a lot of assumptions. Are you building this structure in or near a fault? Faults as you may know are the locations of highest stress on the rocks. I would be willing to guess that any structure, no matter how reinforced, could withstand the pressures of an earthquake at or near a fault zone. Think about it ... quakes occur from two plates "bumping" or "sliding" along each other and getting stuck. If the forces pushing these plates can push up mountains, move entire contents, break miles of rock ... how well can even the strongest steel fare?
>
> If you are talking about building this structure in an area where there are no "crushing" forces (that is somewhere a bit distant from the fault or epicenter), you have to now think about the surface waves of an earthquake. These are waves that roll along the surface like waves on water. People have seen surface waves which are several feet from top to bottom during a quake. It may be theoretically possible, I believe, to build a structure to remain intact through these waves, but I would not want to be inside it getting tossed around!
>
> One last thing...you are thinking of building a structure that is solid and sturdy - and a geodesic dome is a good idea, but modern engineers have given up this approach for the most part, and are looking at the problem of building bridges and buildings differently. Bridges, buildings (particularly tall ones), and other structures are now being built to be *flexible*! They have found out that it is better to let the structure rock along with the waves rather than try to resist them. Something to consider. I hope I have answered your questions. Please feel free to contact me directly at cleger@mines.edu if you would like clarification or if

you have any other questions.

Thanks for using the Ask-A-Geologist program!
Chris Leger

Offered by Peter.

Troubled Times

Resist the 15

After 8 on the Richter scale, *the scale does become meaningless*. Numbers beyond that if represented at all, do mean: *time of shaking*. Now lets imagine a multiple shaking quake, with vertical and horizontal wave patterns back and forth. They usually last for 10-35 seconds. A monolithic dome may stay together for that length of time. But when you extend the shaking to 2 minutes, 5 minutes, 15 minutes: any building structure or even large plant (like a tree) will start to come apart at the connections. Even domes that are not welded steel will begin to break apart at the moment of shaking here represented. The only thing that will hold up in those conditions would be a welded dome without moment connections - meaning a molecular bond, or a structure where movement of constant nature is expected.

Now the problem here is wind. We can design a structure to hold up under any possible earth quake (this is not to specify that the inhabitants or the contents will not come apart), but a structure of this type will blow away in a tornado type wind. Basically we want a steel mesh tent for the shaking and the falling ash. But we need, an underground structure for the tornado winds.

Thoughts by **Eric**

What if we were to build the structure completely underground? That way we wouldn't even have to worry about winds, we would obviously be concealed so we wouldn't have to worry so much about raiders in the Aftertime, and the answer I got from a geologist as far as what's safer, and underground structure, or an above ground structure, was an underground structure. He said the closer to the surface you are the worse it is. So wouldn't it seem logical to just make a structure completely underground?

Thoughts by Peter.

If the duration of the shaking is close to what I think it will be then the ground in many areas will simply become like a liquid and slosh back and forth. One would need something akin to a submarine with ballast so as to stay upright. You wouldn't want to end up upside down. You would not want winding corridors or anything that could break off as this unit gets sloshed or moved around.

An analysis of the weight of the unit compared to the weight of the ground it displaces would need to be done. For as soon as the soil or ground liquefies the unit could conceivably pop to the surface displacing it's weight in soil. Then your back to the surface exposed to wind and flying objects, etc. Not all soil-ground would liquefy. If you built in bed rock then I suspect no problem. If you built it in some of the tough clays found then we get a gray level answer of maybe. Then there is the problem of digging your way out if the entrance gets blocked. Then there is the problem of all the rain and how to keep it out if cracks appear.

Thoughts by Mike

The safest places are easy to configure now: those places which have had almost zero incidence of earthquakes in the past 500 years. The eastern USA Appalachians are a good example as they are a very old mountain chain with very little earth activity. While they will move, they will tend to move with the whole plate like an ice floe in the ocean, but they won't be coming apart.

Thoughts by **Eric**

If one were building near a tectonic plate edge, then one will get lots of very strong up and down thrusts. If one is say over 1000 miles from the edge of the plate then one gets more gentle horizontal thrusts and very weak vertical thrusts. So part of the answer is what is the minimum distance from the plate edge for safety in an underground structure.

Thoughts by Mike

Troubled Times

Seismic Safety

If you are thinking of trying to retrofit or build a house of a non-dome nature to at least withstand earthquakes, check out Seismic Safety basics to get a quick lesson on the basics.

Offered by Steve.

Troubled Times

Base Isolation

I believe there will be a number of items to consider before actually building a house for the after-time:

- It must probably be classified as a barn or a shed to get approval for walls without or with only few and small windows
- One story only
- Protection of windows and doors from winds and fire during the pole shift
- Construction of water pipes, electricity etc. to survive the quake
- Internal protection of furniture and stored goods during the quake

I want to use base isolation technology. There is only one problem: Since we have no earthquake activity in my part of the world, we have no knowledge of such technologies, nor is it possible currently to buy it here.

Offered by Jan.

I did a quick search in Infoseek, listing "base isolation technology" as the term. Six pages were brought back, the most promising one seeming to be the National Institute on Standards and Technology. It also includes a bibliography of materials that cover your area of interest. I wish you the best of luck in your research. Ultimately, your biggest challenge may not be finding the data and resources for construction design, but the bureaucracy that approves (or not) and does the inspections. Some of them in the US find the prospect of having to face new ideas as being quite threatening! Others are quite open to learning along with you.

Offered by Granville.

Some earth quake designs are to withstand at the most a 8 magnitude. Many are much less than that due to economics. Magnitude 8 is what most peoples concept of the biggest is. A magnitude 9 is 10 times stronger. A big difference. If one used an extra thick steel heavily reinforced concrete slab with a flat bottom sitting on a layer of sand on flat bed rock or hard thick clay base. Then, the slab will slide or role around on the small round particles of sand. Make sure the slab is thick enough to hold together if bouncing takes place. Attach the walls to the base very well so that each joint is as strong as the base or wall. Remember rounded surfaces are stronger than large flat surfaces, and that triangles are stronger than rectangles. Use lots of both.

Offered by Mike.

Troubled Times

Groundwater

A recent study by geologists at Western Michigan University has concluded that the stability of a building site on a hill or bluff has a direct relationship to the presence of groundwater and/or lacustrine clay within the soil. Should either or both be present, you probably should not be building there. In order to make sure that is not the case, you should get a professional evalution of the property by an engineering geologist or a civil engineer. Costs can run from a simple on-site inspection at $500 to as much as $10,000 for a thorough evalution. The other thing you can do is search well records. For those interested in a low cost method of determining if there is ground water perched on their property, search county well records. While time consuming, and I quote, “if your hill is 65 feet high and well records show your neighbor's well hit water at 30-35 feet, it’s a safe bet your property has ground water at that level as well”.

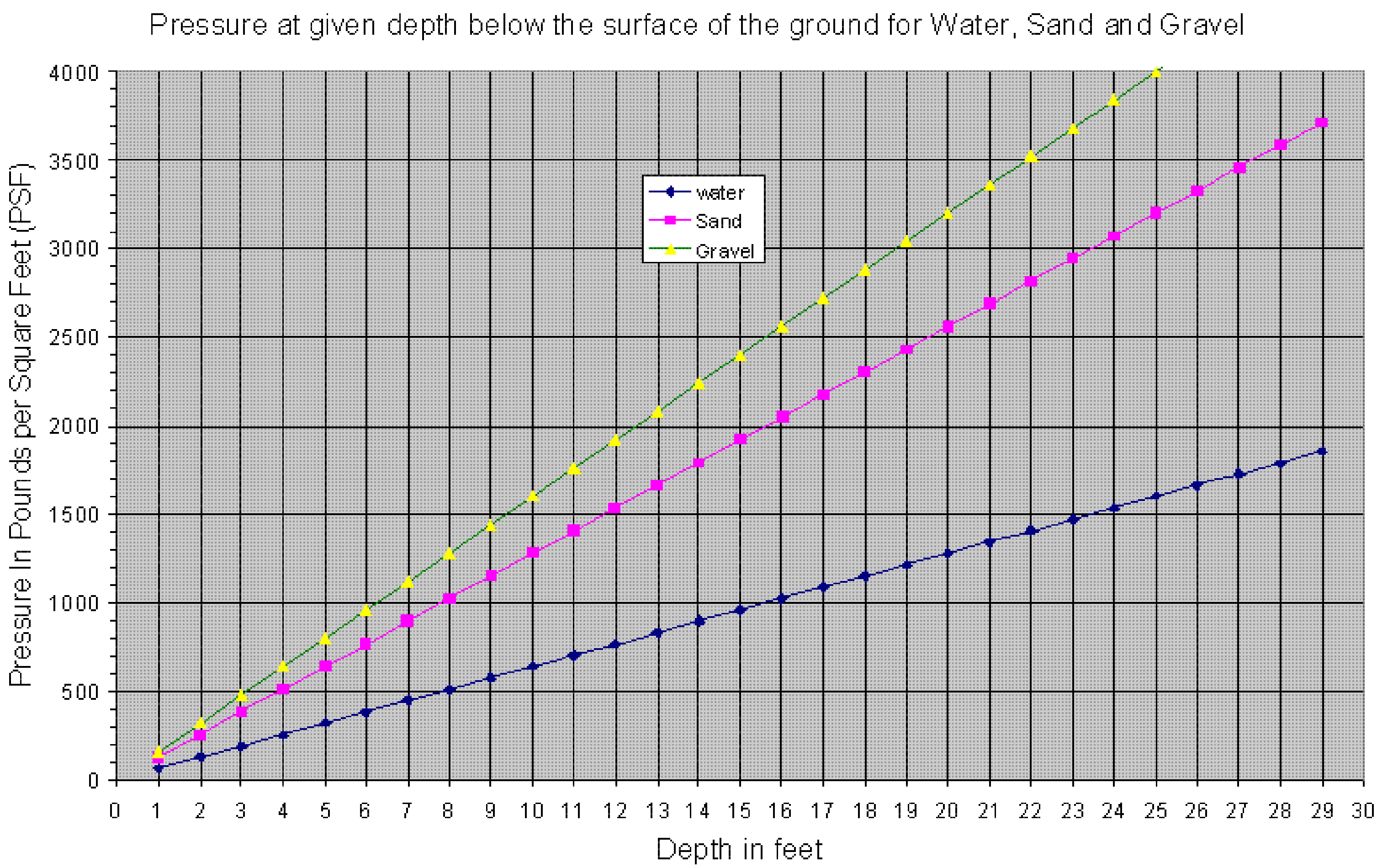
Offered by John.

Troubled Times

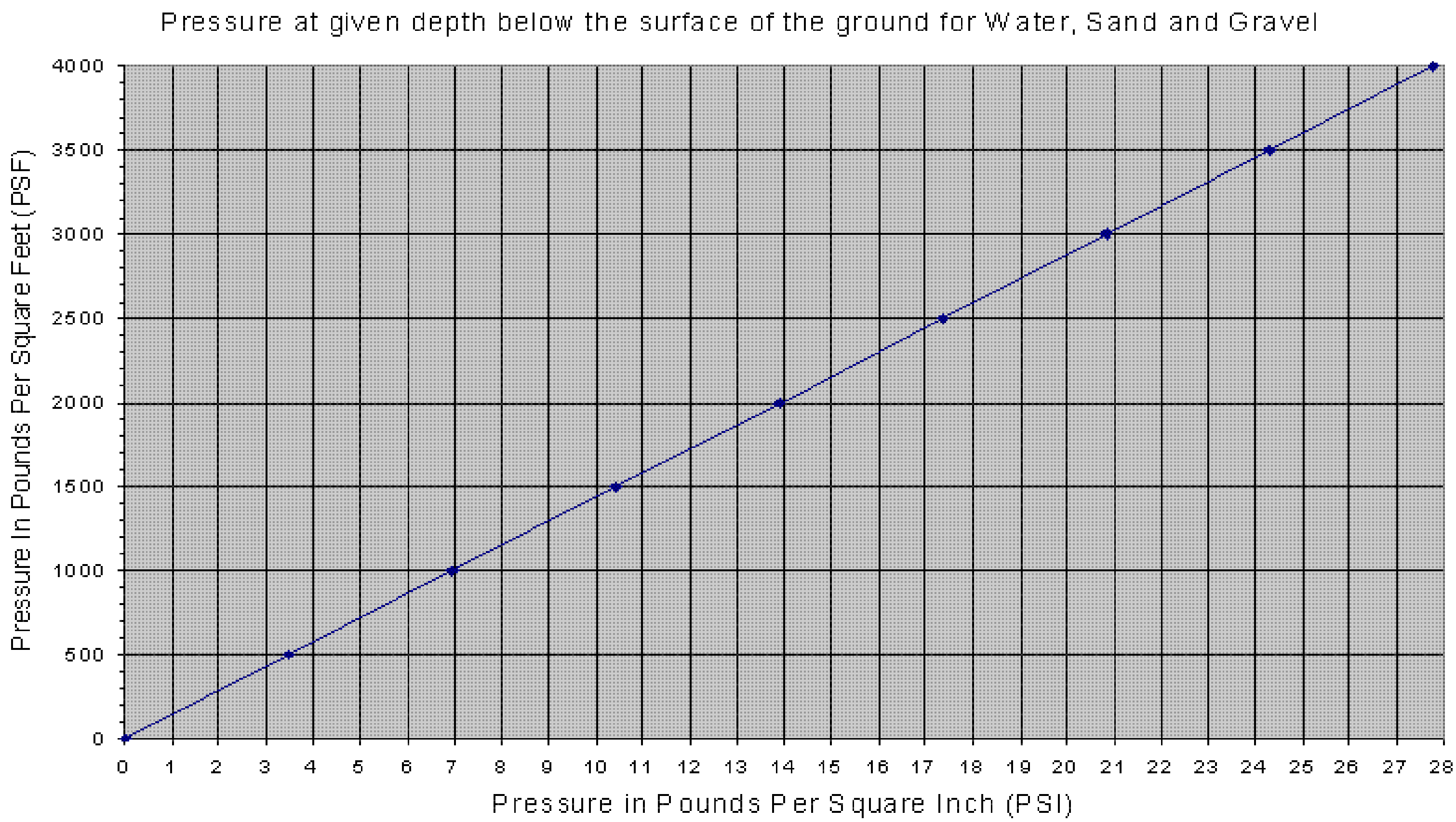
Liquifaction

If one plans to build a survival structure below ground then certain pressure can be expected when liquefaction takes place during the near continuous shaking at the time of a pole shift.

Different kinds of sand have different densities; however 2.3 g/ml is a typical value. Water has a density of 1 g/ml. The following chart can be used to predict the amount of pressure on a container or survival quarters at a given depth below the surface of the ground.



The following can be used to convert pounds per square foot (PSF) to pounds per square inch (PSI).



Offered by Mike.

Troubled Times

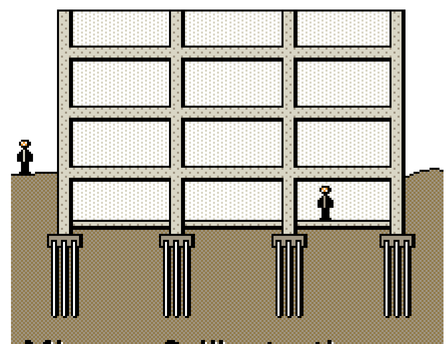
Quake Proof Reinforced Concrete

I work in the construction field and asked one of our engineers what would be the best foundation to build a structure on that would be as earthquake proof as possible. His answer:

> *Your foundation should be at least 3 feet in depth, reinforced with rebar that is placed in a double birdcage formation. This cage should be tied together where the rebar touches. Wrap the entire formation with strips of rebar that extend into holes that are sunk into the ground at a depth of 4" x 4" by 6 ft. deep filled with more concrete. Use at least 8 holes, more if you want (4 corners and 1 additional at least on each side).*

My best way to describe a double birdcage is to cup your hand with fingers gently curled up, do the same with the other hand, put the fingers from one hand into the palm of the other at cross angles and you kind of get the idea. The idea is that this foundation will float along with up and down shaking that comes with earthquakes. He said that in Japan, this is now the required code for all new construction.

Offered by Mary.


Microsoft Illustration

The Hub

Troubled Times

Concrete Cellar

A variation on dig a trench and put a sheet of metal over it.

Build a stronger than normal but traditionally shaped concrete slab with a concrete cellar. The access opening ideally should come up in the middle of the slab. Securely water seal this opening at the ground level with metal recessed (so as to not catch the wind) and bolted to the slab. In the middle of this metal plate attach a hinged steel door or bolted plate that opens to the inside. This need not be any bigger than 21 to 24 inches square. Several accesses, well separated, to the surface can be made. Each just big enough to unbolt after the pole shift and dig your way to the surface of whatever might have blown over the top. Each needs to be sealed so as to be water tight. Blowing water can run up hill from other areas.

Bury underground (near the surface) enough building material to build a living and food growing space on top of this slab. This can be stored in buried concrete or steel culverts that either parallel to, attached to, or are totally separate from the underground cellar. Be aware of the possible force of shifting of storage items. It may be better to have an underground culvert that runs close to the cellar with no, or at most a smaller, perpendicular connecting pipe. This would allow for lots of things to be thrown around in the storage area without braking through walls to damage the occupants of the cellar. Curved is stronger than flat. Building a cylindrical circular cellar with a rounded bottom is stronger than a rectangular shape.

If you have a choice build in ground that will be difficult to liquefy during the constant shaking. If the ground liquefies then expect storage areas and cellar to float up to a point of equilibrium. The total weight of the concrete slab and cellar equals the weight of the ground displaced (density of earth times volume displaced). In this case expect connecting underground pipes to be broken off or bent. If the slab does float up from the surface, the wind may catch the edge and flip it over. If you suspect this is possible have an inwardly opening hatch in the very bottom or improve the anchoring with some concrete deep posts.

Build on slightly raised ground so as to not collect water and flying dirt. Have no vent pipes higher than about 4-6 inches from the slab. If anything is higher it may catch flying debris and hold it to the area making it harder to dig out. Any pipes lower than this may take in water. Have a battery or hand operated sump pump in case you need to pump water out. If you build a pipe or something else higher, build it to break away at about 4-6 inches from the slab surface.

Some existing houses with concrete slabs and cellars may be able to be converted. Expect the house to blow away. Have enough material stored underground to rebuild on top of the slab if you wish to stay in the area. A partially buried concrete or metal dome would be more ideal. However, the above option does not raise any suspicion for it looks like a normal house in process of being built or a normal house built but converted.

Offered by Mike.

Troubled Times

Box Construction

The higher the momentum the more likely that buildings with more than one story will get into an oscillation where the lower story and the upper stories are not moving in the same direction. What you want is a structure that will ride on top of an ocean of ground. This means that the ground will turn into a very rough lake. If you are unlucky enough to be in a hill the whole structure will slide down the hill. This means you need very simply - a houseboat.

Step1: a small reinforced concrete pad.

Step2: a three layer base of 8 x 8 pressure treated timbers:

- layer one: bolted together
- layer two: placed at a 90 degree angle to layer one, bolted together, and bolted to layer one
- layer three: placed at a 45 degree angle to layer two and bolted together and also bolted to layer two

This will give you a structure that won't roll, and will slide on anything big moving. Bolt this structure in five places to the pad, but only to hold it on up to quake of about 6-7, after that the bolts will break and let the foundation slide free

Step3: The strongest structure known to man is the cube. Build a series of 12 foot by 12 foot cubes, bolted together and reinforced with metal stripping. Built the roofing structure with isosceles triangles, bolted and metal reinforced to the cubes, which are bolted and metal reinforced to the base.

Step4: Support the outside of the structure with 1 inch plywood sheets glued and bolted to the frame, on both the inside and the outside.

When you're finished with this structure, you'll be able to let it slide down a hill, run over twenty trees on the way down and be intact at the bottom. At that point you get out your hydraulic jack, and 8 x 8's and bring it back to level.

Offered by Eric.

The idea of having a structure layingloose on top of the ground may be useful for decoupling horizontal shaking, but if vertical displacement forces are over 1g the structure will be dashed to bits as it is repeatedly tossed into the air and slammed into the ground. I have a problem with the statement that the cube is the strongest shape known to man. The failure mode of the cube is a complete flattening or "pancaking" caused when it succumbs to shear forces.

Offered by Steve

Troubled Times

Amplitude

Descriptions from the **USGS** on motion amplitude state that in earthquake magnitudes and intensity we find a magnitude 5 earthquake at about 10 kilometers from the epicenter to be 1.1 millimeters of motion. If we use the increase by 10x for each one magnitude change, then for magnitude 9 earthquake we would get 11 meters (about 36 ft) amplitude of motion. If you are closer than 10 kilometers to the epicenter then this is some larger factor. None of these references talk about what happens when the whole tectonic plate moves. The experts simply have no experience with it.

Offered by Mike.

The Hub

Troubled Times

Lexan Windows

Lexan put into the window jams of a strong structure such as the box construction described would be the most earthquake resistant. These windows are actually hi-tech. Hi-tech materials are great, but hi-tech construction means we can't fix it ourselves. But the lexan windows are the same material they make jet fighter windows out of - nearly unbrakable. I'd still put a 1 inch plywood or steel diamond cover over it, however.

The Hub

Troubled Times

Secure Your Home

Source: Pole Shift ning
Video: http://www.youtube.com/watch?v=lLhg8YxlzlU&feature=player_embedded

Structurally Secure Your Home

> Step 1: Find out if your house is bolted to its foundation. If your house was built after 1935, chances are it is. If your home is older, you can have your house inspected and install bolts if necessary.
>
> Step 2: Make sure your chimney is soundly attached to the structure of your home. Collapsing chimneys are one extremely dangerous outcome of an earthquake. If your home was built before 1960, you may have to have it reinforced.
>
> Step 3: Have shear walls installed if your home was built on a raised foundation. Older houses often have cripple walls in the crawlspace between the foundation and the floor. To earthquake proof your home, you'll need shear plywood reinforcement.

Securing Furniture and Appliances

> Step 1: Bolt down the water heater. This will help prevent gas leaks.
>
> Step 2: Equip all cabinets with child-proof latches. This includes kitchen cupboards and medicine cabinets. These latches are cheap, easy to install and keep the contents of your cabinets from flying during and earthquake.
>
> Step 3: Store the heaviest objects, along with hazardous materials, in floor-level cabinets.
>
> Step 4: Secure tall furniture and hanging picture frames to the wall. Bolts will keep heavy furniture against the wall, as will Velcro installed at the corners. Pictures will probably stay put if you use a security hanger to keep them in place.
>
> Step 5: Place your T.V. on a lower, sturdy stand. It shouldn't be perched on anything too small.
>
> Step 6: Move beds out from under windows. Ideally, a bed should sit against the room's inner wall, which is the most stable.

The Hub

Troubled Times

Wind Proof

Worst Case

The forces involved in hurricane winds and high magnitude earth quakes are equivalent to a drop from 500 ft high. This gets the object going 200 MPH by the time it lands. This would be like a car crashing going 200 MPH crashing into a brick wall. You take any common building and run it mentally through a jolt like this and see how well it will stand. Let alone do this kind of start and stop jolting (as in high magnitude earth quakes) for any period of time. This doesn't say anything about the pressure of the hurricane winds.

I looked at a home video documentary on a recent TV show of a large tornado where the winds were about 180 MPH (best I can remember). It showed an RV and other large objects bouncing around many hundreds of feet above the surface of the earth. It showed total destruction to the foundation level of all houses and structures in it's path. This was not even up to 200 MPH yet. What can we expect at 300-400 MPH. The bottom line - this pole shift is not going to be a Sunday picnic.

Offered by Mike.

The Hub

Troubled Times

Wind Proof

Roger's Travails

Well folks, the greenhouse is no more. Last Thursday the jet stream was positioned directly over my house and the dome was getting ready to take a trip so I had to remove the plastic. Actually, it was a hot day so I propped open the door. For reasons that I can not describe I had decided to face the door to the West and this wind (50 mph sustained, 75 mph gusts) took hold of it and tore it right off. The now open doorway allowed the wind to pick up the dome, tearing the 12" tie downs clear out of the ground, and moved the dome 3 feet before my plants and water tubs caught it. All this happened before I got home. I wrestled with the door for a while in hopes that I could save it, but I wound up having to cut it free and then had to frantically cut loose all the plastic (triangle by triangle) while my wife did her best to hold the dome down. It took 45 minutes to cut out all the plastic and get the dome to settle down.

What's left? The frame survived and the plants look like they're going to make it, though the cabbage is mowed in half! I saved the door as well. An interesting observation was that even in this high wind, the 3.5 mil plastic I used didn't show any signs of tearing or shredding. I had to cut it free with a knife. Improvements I will make this summer: much longer tie downs! I will also design and build hinged flaps that can be opened to allow air flow. I will position these openings so that high winds will be able to blow through the dome rather than getting caught by the dome and lifting it. I will listen to my elders and put the door in the Northeast this time.

Offered by Roger.

The Hub

Troubled Times

Any Edges

Has anyone thought about using an abandoned gasoline truck (tank only)? I've seen dome houses with a dozen windows that will never stand up to the high winds that we know are coming. It's obvious these people didn't build them with disaster in mind, probably just liked the style and energy efficiency. What a waste.

> Offered by Doug.

First, anything with that much metal is *never* abandoned; it is sold for the price of junk metal. Second, if you could get such, if it *only* had carried gasoline it could probably be cleaned sufficiently to be safe. *But*, there would have to be quite a bit wrong with it to not be repaired. That's why I chose a new, never used propane tank. No thin rusted places and no residue.

> Offered by Ron.

Troubled Times

Wind Proof Foundation

Why would you want to reinforce your basement from high winds? Because the winds that the Z's say will hit us might be enough to blow a house off of it's foundation, or worse collaps it. Nancy says that the winds in North America will be mostly from the North and West. So you want to pay special attention to the South and East walls. The picture is of a stop I made to keep the house from shifting. I have poured reinforced cement for my basement walls, so it will be easy to attach metal braces to the wood and screw them to the wall. That will help keep the floor in place even if the rest of the house blows away. Even in a tornado the entire house is gone, exposing the basement. With a floor over the basement you at least have a place to survive from the cold. If you own a farm and have a front end loader you can also push dirt up agenst your house at a 45* angle so that the winds will easly blow over it.

Here is one such reference of houses blown off their foundations from the Z's.

> *They bottle water, commandeer food and supplies from local stores, assess individual and family needs, and try their best to function as a governed community. The shift comes, and houses are blown off foundations, injured everywhere beyond what the trained medical personnel can deal with, and many heart attacks and strokes occur, a medical nightmare.*

Posted on the Pole Shift ning.

The Hub

Baffles

Wind traveling at high speed is not any different in behavior than flowing water. Creating sloping earth berms or concrete baffles taller than any structure that you want to protect can be somewhat effective. It would be like creating an above ground "hole". The top of any structure may need to be reinforced, the baffling would probably need to be at least 25% higher than the structure with at least the same amount of baffle to structure distance (dead space) to allow eddy currents to dissipate and/or be redirected. This would be similar to what you would see to protect coastal areas from heavy tides and storms.

If you build next to a cliff, a grooved earth berm would work effectively. By grooved, think of a curve on a race track, now think of what a normal trajectory of a race car would be through a curve *without* a driver. It would curve somewhat before it goes over the wall. That trajectory, or close to it, would be the type of grooves to be dug or etched into the baffle. This type of redirection is what Viktor Shauberger (known as the water wizard) used in creating "negative resistance" in logging plumes to send heavier than water timber down a mountain.

Offered by Steve.

Troubled Times

Wind Proof A Frame

While I am still a fan of the monolithic dome, there are some factors which will probably prevent me from building it on my site.

1. It takes specialized equipment and skills which are not readily available in my neck of the woods
2. I do not have these skills and could not develop them in time
3. The structure is of limited acceptability to others. If the world did not end, or if society somehow limped along afterwards, the dome would be not acceptable in resale except to a narrow group
4. While its utility against wind and fire in unquestionable, its ability to handle quakes is probably limited to a max. of 8.5. When it breaks it will crumble all at once with out warning.
5. Windows, doors and other accruements will be hard to put into it as the won't fit in the dome.

For these reasons I would tend to have an A-Frame Chalet constructed of I-beam construction. The upper structure would be light, and the lower structure integrated into a concrete foundation for weight protection in wind. The roof would be corrugated steel with 4 inches of foam insulation. With the appropriate cherry picker, it could be constructed quickly and with a minimum of fuss. You can put a shelter in your backyard if you are worried about tornadoes, but the A-frame would probably be proof against very very strong winds.

My design would put a forward I-beam from the roof top at an angle to the ground. This would give two triangular panels on both sides in the front and the back. When there is no earth shift, these would be largely lexan, but on the onset of difficult weather or not being there, they would be paneled over with protection. At no point would there be any straight vertical walls--airflow would slid up from all angles.

Offered by Eric.

The A-Frame profile is not conducive to survival in high winds, and it is likely to fail due to shear stresses because of horizontal shaking along the axis of the vertex. The large flat walls of the A-Frame are subject to enormous wind load forces no matter what the angle.

Offered by Steve

The Hub

Troubled Times

Projectiles

Hurricanes can easily pick up small stones, like pebble size and turn them into projectiles. Structures may be penetrated without much effort by hurricanes during and shortly after the polar shift, and even more dangerous, you may be penetrated by projectile pebbles/small stones.

Offered by Michel.

If the high winds last 30 minutes (conservative probably longer) and reach say 400 MPH, then a stone can travel up to 200 miles from it's original position.

Offered by Mike.

Troubled Times

Steel Reinforced

I saw a program on tornadoes on the *Learning Channel* last night. It seems that a major concern in the tornado belt is protection from flying objects. Standard frame houses and even brick houses offer little protection from a 2x4 traveling at 200 MPH. Researchers have found that a layer of steel-reinforced concrete is generally adequate protection from "projectiles." They were shooting 2x4's at a brick wall, and they went right through. When they added a layer of steel-reinforced concrete behind the brick, the 2x4 disintegrated on impact. Many municipalities in the tornado belt are now requiring new structures to have at least one area surrounded by steel-reinforced concrete.

Offered by Michael.

Troubled Times

Monolithic

A floating slideable foundation has advantages to survive strong jolts. The wind pressure is one thing, and flying rocks and trees are another. You could put a dome completely above ground that could withstand the wind pressures but will it then withstand flying boulders and trees that act like battering rams. If the dome is partly underground then flying items can only hit and make a glancing blow. The less of an angle the dome makes with the path of the object the more likely it is to not break through but to glance off.

Monolithic domes will not take much if any flexing, they are rock hard inflexible when it comes to something hitting them. So if hit by something heavy going fast there is a likelihood of such an object breaking through to the inside. You cut down on this by pushing dirt up on all sides (done in such a way that it doesn't blow away) or building the dome partly underground. The decision depends on whether you think the greater damage will come from wind or earthquakes, as a result of the pole shift. Right now I am leaning in the direction of greater damage from flying objects. However, if your dome is shielded from high winds by close surrounding hills or other not likely to move objects then sliding may become the primary consideration.

With regard to the wind speed for which a dome should be designed, does anyone on this planet know what the limits of hurricane force winds are? We have been assuming 300-400 mile/hr but is this really high enough?

Offered by Mike.

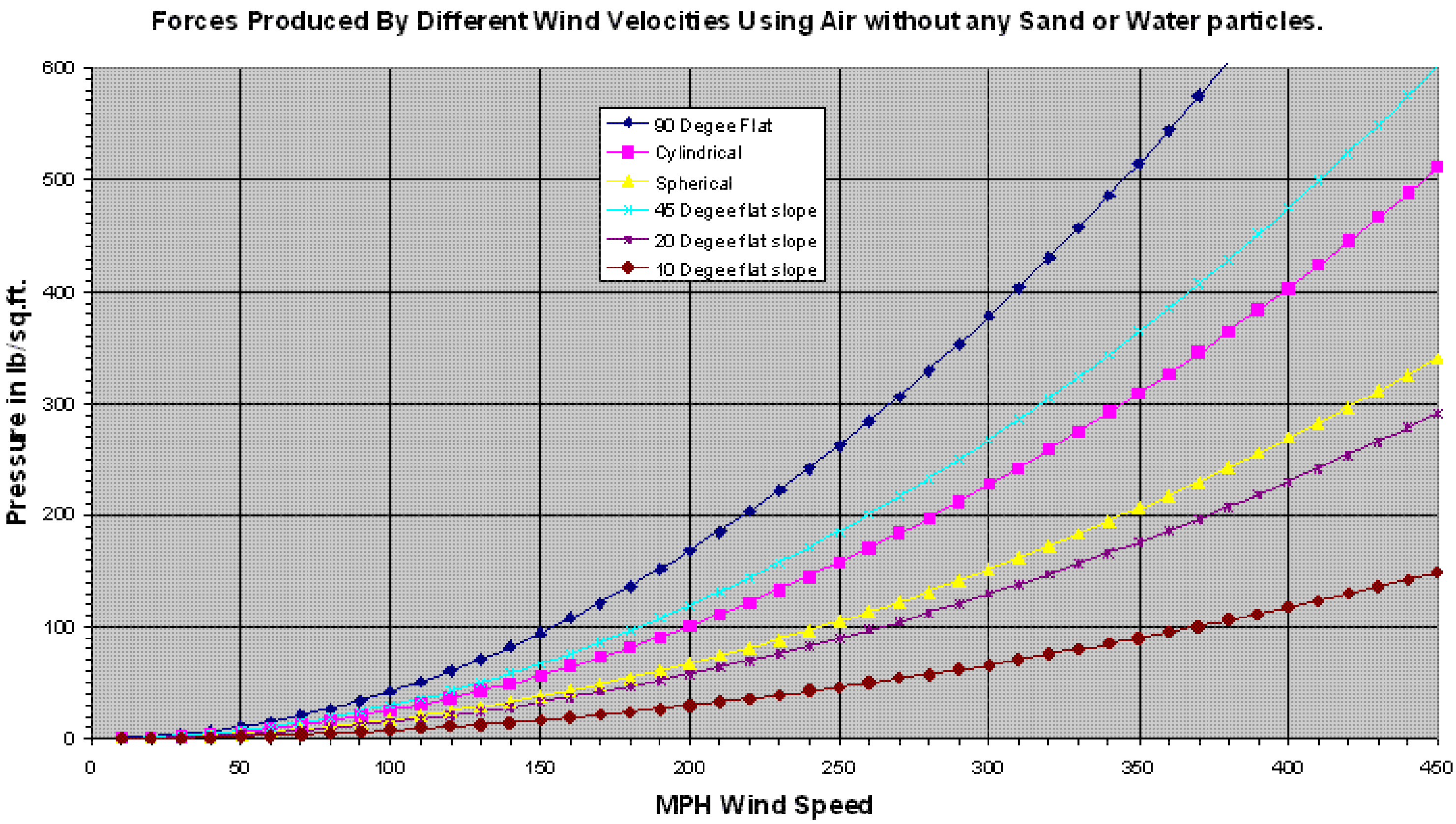
According to the engineers at **Monolithic**, a 300 MPH wind will deliver a force of about 400 psi to a flat wall. Very few structures can survive this magnitude of force, an exception, of course, being the **Monolithic Dome**.

Offered by Michael.

Troubled Times

Slope

This report is intended to give a familiarity with the forces of wind. It is intended to aid in the building of polar shift survival quarters by giving engineering design considerations. The force of wind on the outside of different shape structures is shown in the following chart



Note that a wind at 300 MPH (482 KM/Hr) will exert a pressure of 378 lb/sq ft (2.6 lb/sq inch or 1845 Kg/sq meter or 185 gm/sq cm) and wind at 400 MPH (672 KM/Hr) will exert a pressure of 672 lb/sq ft (4.7 lb/sq inch or 3280 Kg/sq meter or 328 gm/sq cm) on a 90 degree surface with respect to wind direction. Other shapes and sloped surfaces result in less surface pressure. A dome would be similar in shape to a sphere. Note the smaller the angle the wind makes with the surface the less the force.

The formula for pressure in lb/sq ft = (wind speed in MPH)^2 times K where K = .00420. For conversion 100 lb/sq ft = .694 lb/sq inch = 48.8 gm/sq cm = 488 Kg/sq meter and 1 mile/hr = 1.609 KM/hr. This graph was constructed from a table of measured values found in a CRC handbook of tables for "Applied Engineering Science" (R620.03 CRC) see page 436.

The explanation below the table says: The wind-pressure forces on structures are larger than the impact pressure of the wind, due to suction forces on the leeward side. The pressures are also higher on tall structures. The net force is usually 40% to 100% higher than that due only to the stagnation pressure (impact) of the wind. The factor used for the flat plate in the above table is 1.68.

Offered by Mike.

Troubled Times

Airborne

A 8ft by 40ft long container full of household goods typically weighs about 20,000 lb. Next assume our container is loaded at about 40,000 lb of after PS building materials and equipment and is sitting on the ground or on a slab at ground level. Now assume wind blows perpendicular to and of equal strength on all parts of one side of this container. The floor is 8 ft by 40 ft long or 320 sq ft. This results in a floor loading of (40000/320) = 125 lb/sq.ft. Typically the floor is about the same size as the sides in surface area. From the graph of wind force on a flat surface we get that at wind speeds roughly greater than 170 miles/hr (274 KM/hr) the unit would begin to slide, assuming a coefficient of friction of 1 or less. At this wind speed there is an equal force on the side to what it weighs. If anchored down it would begin to receive tipping forces trying to pull the near side out of the ground.

At 300 MPH the container will be pushed on the side with more than 3 times it's weight (378/125). With a wind of 400 MPH the container will have a force of 5.3 times it's weight (672/125). Now wind tends to be slower near the earths surface, so in actuality there would be a gradient of wind speed due to height above the earth's surface. Thus the above numbers give only a rough order estimate to give an order of magnitude for the forces involved for average wind speed hitting the side of a container. If hills and other wind barriers surround the container, then this would help increase the maximum wind velocity before the container would move. I doubt the sheet metal sides unprotected would hold up under this kind of air pressure. At this point we assume no blowing rocks, sand or dirt. If the unit ever breaks loose from the ground it would easily tumble or become air born at wind speeds around or greater than 170 Miles/hr (274 KM/hr).

Now one might ask at what wind speed does it take before things in general begin to blow away? Assume coefficient of friction = 1 or force to move it is equal to it's weight.

Assume a 1 ft square rock of density about 3 gm/cc resting on the ground with wind blowing on one side. One ft = approximate 30.5 cm. Thus weight= volume times density = (30.5^3)*3 = 85118gm/(454gm/lb) = 187 lbs. Thus from the wind pressure table if wind only (no sand or dirt) were blowing at greater than 212 miles/hr (341 KM/hr) then this rock would begin to move and begin to take off and rapidly accelerate.

If say the wind speed were 312 MPH then one can expect the maximum projectile speed of this large rock bouncing along the earth surface to be something like about 100 MPH. The best I can recall from a TV show I once watched the trebuchets (siege engines) that were used to break down castle walls could use a round sand stone projectile that could weight up to about 90 lbs and traveled about 60 MPH and were about 19 to 20 inch in size. The many feet thick castle walls were no match for these impacts.

So the bottom line is anything of any weight or size to it becomes a deadly dangerous projectile once it leaves the ground at around 200 MPH.

Assuming a car of about 3,000 lb with a side surface area of about 15*4 = 60 sq ft. This gives about 50 lb/sq ft pressure on the ground. With a drag coefficient of about .5 then a wind that produces about 100 lb/sq ft would be enough to start to move it with the wind. This is equivalent of a wind blowing at 160 MPH (257 KM/hr). Yes, as the wind increases in speed expect cars and vehicles to start tumbling before boulders do.

Summary: In general with just air blowing in the wind (no sand, water, or dirt) one can estimate most objects will begin to move and become airborne at between 160 miles/hr and 220 miles/hr (257 KM/Hr to 354 KM/Hr).

Offered by Mike.

Troubled Times

Blowing Sand

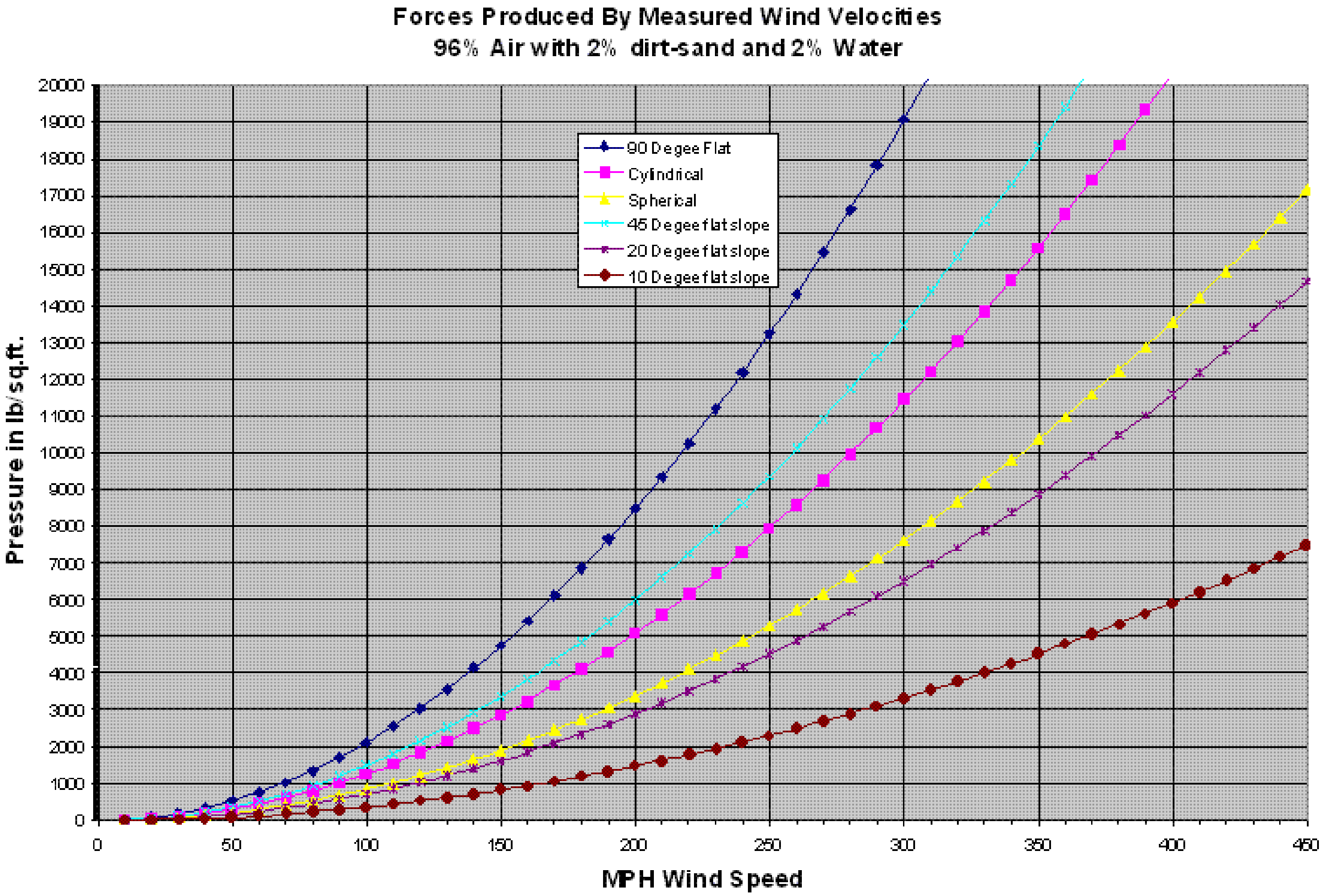
Now lets take a look at what it takes for dirt and sand to start blowing across the land.

Any one who has been to the desert, beaches or dust boll knows it doesn't take much wind to start sand and dust blowing. What the amount or percentage this is with wind speed I have not been able to find measured reference data on yet. The concern is that as more and more sand and dirt gets picked up into the air then the pressure it exerts at any one speed goes up proportional to the weight of a cubic ft of this mix as compared to a cubic ft pure air (density ratio).

During the PS it is likely to have earthquakes of vertical g force greater than one. This means that dirt, sand, and rocks will bounce into the air. If at the same time winds are of sufficient magnitude to catch the dirt then this will begin to move as a dense cloud rapidly across the landscape. I would expect rather dense clouds of blowing dirt and sand to be possible with winds above 160 miles/hr (257 KM/hr) under these conditions. Dirt could be moved great distances and easily completely cover things up. It's just a chance we all will be taking.

As an example: If one assumes its possible for 2% dirt and 2% water blowing with sufficient wind speed to stay airborne then how much additional force does this result in?

Density of air is about .00119 gm/cc (cc=cubic centimeters). With water = 1 gm/cc and sediments (sand-dirt) about = 2 gm/cc. Assume high winds cause a blowing mixture of 2% dirt, 2% water and 96% air. Resulting density is about (.98*.00119)+(.02*1)+(.02*2) = .0612 gm/cc. Since wind force is proportional to density we get .0612/.00119 = 51.4 time more force of pressure than air alone. At this time I can only estimate this to occur around or above 160 Miles/Hr. This would result in a force of 51.4*107.6 = 5530 lb/sq ft (38 lb/sq inch or 2700 gm/sq cm or 27000 KG/sq Meter) for a surface 90 degrees to the wind. This is equivalent of the weight of about two cars for each square foot for a wind of just 160 miles/hr (257 KM/hr). I don't know many structures that will withstand this much force.



Summary: With wind picking up sand, dirt and water (total of 4%) it can easily produce over 51 times the surface pressure, as compared to pure air, at above an estimated 160 Miles/hr (257 KM/hr). At one percent the force is approximately 13 times that of air alone. Wind blowing water and dirt can produce significant forces on anything standing in it's way. With sand, dirt and water in the air even at low percentages of .15 to .2% one can expect double the forces of air alone. This extra force would significantly lower the speed at which things in general become airborne.

Offered by Mike.

Troubled Times

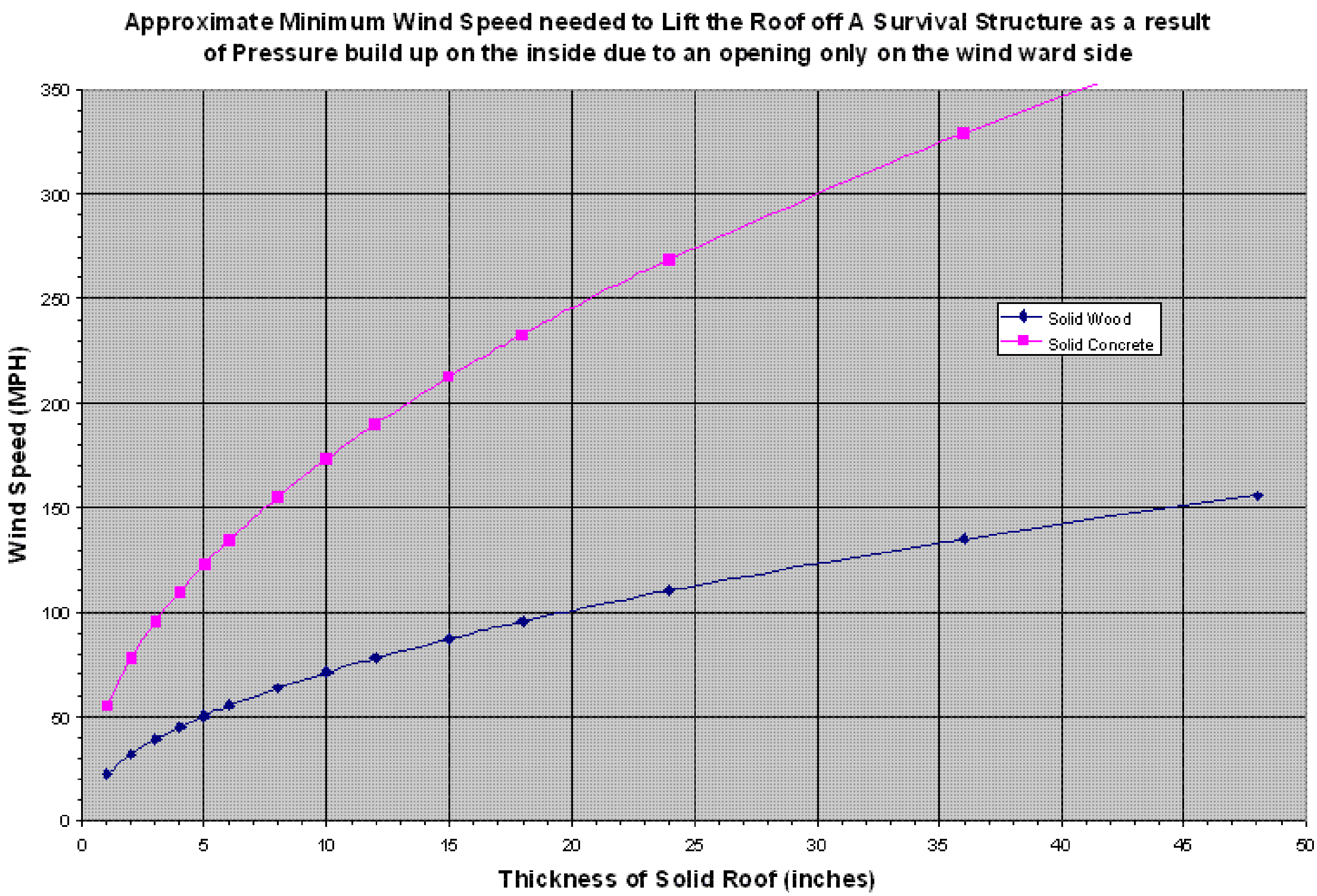
Wind Proof Rip Apart

Accumulating wind pressure inside the structure: You might have seen TV news pictures of tornados or hurricanes where the house suddenly blows apart from the inside out. These are examples of this pressure build up.

Lets look into the amount of pressure that develops inside a structure with wind blowing from one side. Assume the wind leaks into the up-wind side by way of cracks around the door, a hole in the wall due to tree trunk punctured hole, a broken window(s) or a small vent hole left open as examples. Assume that the other sides of the structure do not allow the pressure to leak off as fast as it builds up.

Lets ask how much wind speed does it take to lift off a roof only if not securely attached to its walls or foundation due to only this inside pressure gradient build up.

Concrete weighs about 143 lb/cu ft. If one built a box or rectangle out of reinforced concrete then, how much would it take to lift the top slab off if it were 12" thick and not securely attached to the walls? Looking this pressure of 143 lb/sq ft up on our chart for wind speed we get anything over 190 Miles/hr should apply an upward force grater than it's weight. For a 6" slab that weighs 71.5 lb/sq ft a wind of greater than 130 Miles/hr (209 KM/hr) would be needed.



Now if the walls are securely attached and expected to break away at the slab or floor, then in order to use the above chart one would estimate the average resulting thickness as if all of the wall weight or area were distributed over the ceiling. My thinking is an average wood house roof thickness would range somewhere in-between 2 to 6 inches with about 4 inches as an average. This gives approximately 45 MPH as the theoretical separation of unsecured walls from foundation.

Now from past experience we know average houses can stand more wind speed than this. A more likely answer would be around 90 MPH. There are other factors to be considered. As the flow of wind goes over the roof does it push down on half the roof and tend to lift the other half. If so the above chart results for wind speed need to multiplied by a factor of approximately 2. Some shapes create a vacuum like the surface of a wing some shapes would help hold the roof on. Take your best guess based on shape, size, location and surroundings.

Offered by Mike.

Troubled Times

Water Stores

Bottom Fill

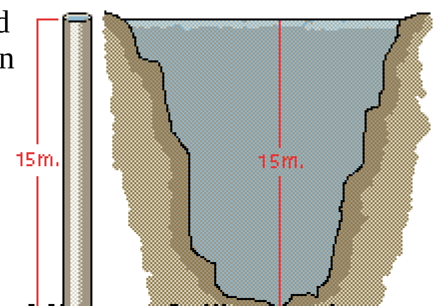
Which requires the more force?

The following question frequently presents itself: Which requires the more force, to fill an elevated tank by pumping the water directly into it through the bottom, or to fill it by means of a pipe leading over the top?

The answer is that more work or force is required when the water is pumped over the top of the tank. Contrary to the popular notion, the water going into the tank from the bottom does not have to lift the entire weight of the water into the tank; it lifts only a column of water of the same area as the pipe. The level of the height and not the weight of the water governs. If you lift a column of water over the top of the tank it is clear that you must lift it higher than if you force it into the tank from the bottom. The pressure of a column of water in pounds to the square inch is calculated by multiplying the height of the column in feet by .434.

This came from the *A Book About a Thousand Things*, by George Stimpson, copyrighted in 1946 by Harper and Brothers.

This brings up a good point to remember if you are limited in piping supplies and power to push water. One could have a storage tank fed from the bottom and covered on the top (no trash, debris or kids could fall into the tank) with an outlet for water on the side of the tank near the top or the bottom. A shut off valve could be installed in the inlet tube going into the bottom of the tank to stop the water from back flowing into the pump until next time water is needed to fill the tank. Need to prime your pump? Just open the valve a little.



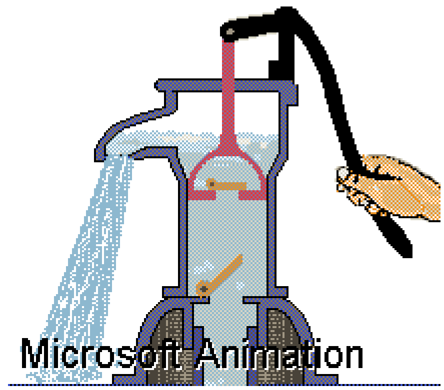
Microsoft Illustration

Offered by Clip.

The Hub

Troubled Times

Water Stores Hand Pumps



I grew up on a farm. For years my family used manual pumps. (before electrical pumps) I remember watching uncles and community members take turns pounding metal pipes with sledge hammers, threading the pipe manually with a small vice held threader and connecting the 10 foot lengths of pipe by hand. There was a strainer attached to the first segment of pipe that kept the pipe free of most debris and when water was reached the water would gush out mud, sand and small rocks that might be trapped in the pipe. I remember the water shooting off like a small oil well. The family would just let it flow until the sand stopped coming up. I remember once the sand did not stop and the well digging had to continue 20 or 30 more feet. When water was reached (about 65 - 100 feet) a manual pump was installed, and primed. We as children got a kick out of pumping the water. The only small problem that I remember was that you had to keep a small amount of water present at all time to prime the pump. I think that this procedure could also work after the pole shift.

> Offered by Pat.

There's a simple quality manual water pump for existing wells.

> Offered by Gary.

This site also has some interesting data on Hand Pumps.

> Offered by Mike.

The Hub

Troubled Times

Rotary Pump

The one on the left is a rotary barrel pump. It is designed to fit 15-55 gallon drums. The one on the right is the traditional old fashion lever water pump. Both can be purchased from Harbor Freight tools http://www.harborfreight.com for about the same price.

Both pump about the same amount of water for a given input energy. Both were new and were not broken in when I test them. They were stiffer than normal to work. Both needed priming with water before they would pump water.

The rotary pump will not work at pulling water up to the same height that the lever pump will. The top of the lever pump tends to come off if not tightened well enough. The set screws in the front may need to be changed out for bolts in the long run. It also may rust if not in continuous use. It defiantly needs to be solidly mounted to a wood platform that one can hold onto if used as a barrel pump.

This rotary pump is new at Harbor Freight Tools. It is made of all plastic except for the bolts that hold it together. This version of the pump is a definite improvement over the all steel older version that will rust if one tries to use it for water.

I recommend having at least one of each around for emergency use.

For the lever pump, one can use plastic PVC 1.25" pipe from Home Depot to make the stand pipe. A notch in the pipe near the bottom can be cut to allow water to come in just above the settlement that could collect at the bottom of a tank. Sanding the inside of the housing where the seal goes up and down with fine sand paper before use, would make the seal last longer.

Hand Operated Water Pump

This pump requires no gas or electricity to draw water from wells and cisterns. Built with old fashioned common sense and proven by pioneers across the United States. Includes threaded inlet at the bottom for watertight installation. Rust-resistant paint.

- Lift: 25 ft.
- Inlet size: 1-1/4"
- Thread: 11-1/2 TPI
- Weighs 18-3/8 lbs.

  ITEM 1318-2VGA - Cost $29.99

Multi-Fluid Rotary Barrel Pump

- Nonsparking mechanism--safe for use with flammable liquids

- Polypropylene components--safe to use with antifreeze, detergents, windshield fluids, glycerin, won't rust or corrode
- Stainless steel hardware
- Viton seals
- Fits 15-55 gallon drums
- Delivers 1.3 gallons per 20 turns
- Threaded polypropylene suction tube, 2" bung

  ITEM 94666-1VGA - Cost $25.99

Offered by Mike.

Troubled Times

Bike Pumps

> Have you toyed with pedal powered water pumps to reduce wear on 12 volt pumps and power consumption on PV systems - primarily used to fill gravity hydro systems?
> **Todd**

With respect to pumping water, I haven't found a good water pump to use yet. I have considered using two of the $3 drill motor (Harbor Freight tools) garden hose type rubber impeller type pumps. This could be mounted shaft facing shaft with one or more stiff rubber hoses over the shaft. A steel cylinder sleeve with a hole for the shaft and set screws at each end would be a better alternative. The resulting pump assembly could be held with a spring to a tire of a bicycle. Estimated results: I consider the turning torque of these units to be rather high and inefficient. Also the lifetime of the shaft seal is not that long. One would need to try it to see if it lasts.

Offered by Mike.

Troubled Times

Deep Well

I have been thinking about how to adapt the typical modern country deep well, with 220 volt AC submersible pump, into a post pole shift system that still allows us access to that pristine deep-well water. Granted, earthquakes will disturb and cloud the deep-level water, possibly even destroy the well, but it is worth the effort to acquire simple, preferably inexpensive, hardware so that existing deep wells might be retrofitted for post pole shift service. Keep in mind that water pumped up from over a hundred feet, or so, typically has not seen the light of day for over one million years. Presumably, that's a lot of pole shifts! Except in extremely severe quake areas, galvanized or stainless steel deep shafts may very well survive the pole shift and be retrofitted to an earlier technology.

Offered by Granville.

> Dear Wes;
>
> Thank you for your reply. Actually, I was looking for something simpler - hardware to store for a "just-in-case" scenario. (I'm happy with my electric deep-well AC pump.) Considering the circumstances I am considering, solar might not be a viable option for a while. My well is only around 130 to 140' deep. What I had in mind was something like we see in the old westerns: a well with a water-pumping windmill over it and an above-the-house-plumbing cistern to store the water. If that is too expensive and complicated for now, I picture mounting the hand-pump up on a tower/platform which holds the cistern. I cannot afford anything elaborate ... we're talking emergency scenarios ... and we're talking simplicity. The more expensive and complicated the technology, the greater the challenge of maintenance. I appreciate your willingness to dialogue on this. There are others I am associated with who are seeking similar solutions, so I plan to share your replies with them as well.
>
> Thank You,
Granville
>
>> From: Wes Kennedy [SMTP:wkennedy@jademountain.com]
Sent: Friday, May 22, 1998 12:04 PM
Subject: Re: Deep Well Hardware
>>
>> Hello,
>>
>> You have a few options. We carry the only deepwell hand pump, called the Mark II. It sells for $817, including the pump cylinder, and will lift water from up to 220 feet. In terms of retrofitting your existing well with minimal hassle, the Bowjon Wind Pump may be the best all around solution. You can put the wind tower where the best wind is, up to 1/2 mile away from the well, then the wind drives an air compressor, which blows air thru a flexible hose to the bottom of the well and bubbles water to the surface. You would then need a cistern for water storage, and a small solar powered pressure pump for water to the house. The Bowjon sells for $1250. You could do a complete solar pumping set up for about $1700. Let me know if any of these suit you.
>>
>> Best Regards, Wes
>>
>>> Dear Persons,

I live in the country, where I have a deep well (I recall 150' deep and 7" diameter). It works fine with the submersible 220V pump, but I would like to have economical adaptable hardware in the event of changes that leave us without electricity for an extended period of time. This might include removing the electric "cap" and installing a hand pump, or even running the line up a tower to store water for gravity feed. If feasible, windmill driven pumping could be considered. What can you recommend that would meet these needs?

Thank you for your reply,
Granville

Troubled Times

Archimedes Screw

Has anyone ever used an Archimedes Screw for water pumping applications? I know farmers in ancient times used them for irrigation. I could easily envision one attached to a bicycle crank to pump water to hydroponics or aquaponics. It would certainly help save on energy demands by at least reducing demands of an electrical water pump. The link shows some information for those interested

Offered by Stan.

Troubled Times

Cistern

I was thinking about a large funnel shaped container of several feet wide to catch the rain and direct the water through a series of pipes indoors where the poluted water falls into a container serving as boiler. So first of all the funnel shaped container must be placed on a higher level than the eventual boiler in which the water will end up. The water running through the pipes can be blocked in case the boiler is filled up. When in the boiler a source of heat will change the water into steam. This steam will rise up and will be directed through again a series of pipes, ending up condensed back as clean water in a clean container. The water possibly won't be absolutely unpoluted, so letting the steam end up in another boiler before the water is used might be the best thing to do.

Offered by Michel.

At the turn of the century, it was a common practice to use a cistern to catch rainwater coming from the eves. My grandparent's home used a system where the rain coming off the roof, into the gutters, went into a cistern, a big tank, and then there was a hand pump in the kitchen to bring this rain water up into pails or buckets. This water was SOFT, meaning not full of well-water minerals which clog pumping, especially plumbing where water is heated and evaporates, leaving the minerals behind.

Offered by Nancy.

Troubled Times

Water Stores

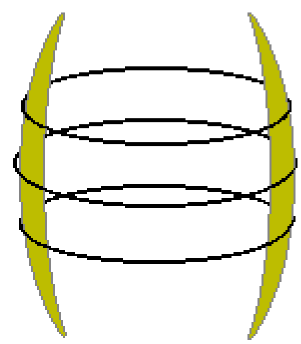
Wooden Barrels

As far as wood barrels go, there are quite a few that I found while cleaning the basement at the nonproft headquarters. It seems that the key lays in the bowed shape of the boards. When assembled, two metal rings are forced from each end toward the center. This squeezes the boards very tightly. When water is added, the boards are squeezed even more tightly as they absorb the moisture. Now, how were the boards bowed? I don't really know, but I expect by heating while the wood is still green, or maybe after soaking for several days, and then placing them in some sort of jig to hold them in shape until they take a set.

Offered by Ron.

If you ever find yourself in the Lexington area of Kentucky (interstate 64) check out the Pleasant Hill Shakertown Village, though there are many Shaker villages in Kentucky. The restored Shaker religious community has live exhibits of people making barrels and furniture, spinning yarn, and broom making to name a few. During the 1800's it was a thriving religious community that was self sufficient and sold many goods that it made around the country. The barrel making was particularly interesting as well as the tools they used.

Offered by Steve.



Doing this type of trade is called coopering. You might inquire at Willaimsburg, Va. They do this as a show for the old village.

Offered by Ivy.

I have watched a cooper at work when we visited a tourist village called Old Sydney town. The craft of cooperage is a highly skilled craft. The wood they use for the staves is air dried for at least 1 year and then kiln dried for around 3 weeks, the staves are then shaped with a long curved blade with handles at each end. When the staves have been shaped, narrow top and bottom, wider in the middle, and the edges beveled to fit together in a ring the staves are fitted into a metal hoop then a temporary hoop is placed further up the staves, the barrel is then steamed in a steam tunnel to soften for final shaping, the barrel is then dried in a kiln. This of course is an overview and does not address the complexities of the craft. They are not coated with anything as the liquid they hold swells the wood and makes them waterproof, there are other barrels made called loose casks for storing dry goods which are not waterproof.

Offered by Jan.

The Hub

Troubled Times

Water Stores

Pitch

My Great-Grandmother said they used to seal the interiors of old wood caskets used for water and other liquids with Pitch. She couldnt recall what Pitch is exactly, but evidently it worked well.

> Offered by Ivy.

In Australia most people own rainwater tanks and when they need repairing we coat the inside with pitch, we call it blackjack it is the residue from distilled coal tar, commonly called bitumen used for roads and tarmacs.

> Offered by Jan.

My understanding is that Pitch is made by cooking down the sap from pine trees, at least this is one method.

> Offered by Ron.

The Hub

Water Swelled

I helped a winemaker recently, during harvest season, getting the huge wooden barrels ready to take juice among other tasks. The wood fermenters took about a week of filling and bumping and tinkiering to swell their wood. Once the wood is moist they are self sustaining.

Offered by Aron.

Troubled Times

Constructed

I think one of the final stages in making wooden barrels is to soak the oak wood in water for a while and bend it to shape using the iron strap rings to hold it in place until dry. Probably tightening the strap (pounded toward center) several times per day until dry. The most critical dimensions would be the width of the wood around the top and bottom. This is so it ends up making a seal with the end piece yet be will be tight between the side boards. It could be that by initially making it so the end pieces are a little loose until it dries, then planing one of the boards down to just tighten the lid and bottom, is the way to go.

I have found the ratio of the max. width to min width for any given board to vary with board width. The thin boards of 1" width typically have about a range of from about 1.25" width at the thickest point in the center to 1" at the bottom or top (1.25 to 1 ratio). The 6" wide boards in the center are about 5.4" at the ends (1.11 to 1 ratio). I don't know why this is.

Offered by Mike.

Troubled Times

Checked

I am an Alaska State Trooper, and every year we bag some health nut that comes to the wilderness to get back to nature. The chief cause of their death is the water barrel they drink from. I've seen catch barrel setups made from roof down drain pipes, tin roof, modern shingle roof, and various steel and scrap metals. All of these junk metal setups end up putting rust, lead and mercury into the water barrel. While modern roof catches end up putting all sort of fire retardants and chemicals in it (not to mention *acid rain*). Another big mistake they often do is to use 55 gal. steel drums, which leaves rust and disease in the drinking water.

More times than not they use an open barrel (no lid). This permits leaves, fungus, molds, seeds, insect larvae, bird waste, and animals saliva to collect in the barrel. Though rarely visible to the naked eye. Then of course they fail to do the most basic of requirements, boil the water before drinking. Remember, most rain barrels were used for irrigation and wash water collection, not human consumption. Rain barrels are deadly poison - if not done properly! See a professional plumber to install the right kinds of metals and *always* boil standing water before drinking!

> Offered by Dewey.

What type of materials *do* they use in Alaska? We collect rain water off our roofs for drinking all over Australia (some places have nothing else). On outback properties there is *no* reticulated water. I'd agree the 55 gal. drum is a problem as they are mainly used for chemicals and such. The lid is correct to keep animals from using the water, (provide a separate source for them) the rest of this is rather dubious info unless there are poisonous plants nearby, as for insect larvae this indicates clean water and all else settles to the bottom and causes no problem. Boiling is only the answer for bacteria, etc., *not* heavy metals. The metal is not the thing to check, make sure you check out barrels that have contained anything other than food stuffs. We drink rain water direct from the tank without boiling all the time and I'm 58 years young.

> Offered by Jan.

Troubled Times

Water Stores Beavers

With our need for drinking water and water power we may need to know something about beavers. This animal may come in handy to build dams or may hinder. If you have one up stream, you need to beware of beaver fever. If you wish to trap them for food the how to is there also. If you have a dam your are relying on for water power they may interfere with water flow. There may come a time you will need to understand and manage these animals.

Offered by Mike.

The Hub

Troubled Times

Heat

Kerosene Heaters

Northern Pro carries good kerosene heaters and a real inexpensive wood stove. Their 800 number is 800-533-5545.

Offered by Mike.

The Hub

Troubled Times

Starting a Fire

From owner-primitive-skills-group@uqac.uquebec.ca
on behalf of Dr. A.F. Bourbeau

To increase the odds, try these important hints:

1. This one is by *far* the most important: in rain, there seems to be less oxygen to feed the fire, and most people will place the sticks further apart than usual so that more oxygen gets to the fire. This is wrong!! Instead, place the sticks at least as tight as usual, and *force* oxygen to reach the fire by fanning with your hat, a coat whipped around in a circle, a piece of bark, or whatever. I cannot insist enough on this first point- to start a fire in the rain, *add more wood and force the air through*, do *not* reduce the amount of wood placed on the fire.
2. Another trick: build the fire 3 feet above the ground, where there is more air, by starting it on a piece of bark placed on top of an old stump, for instance.
3. Cover the initial startup spot with some kind of roofing material. After the fire is started, the pieces of wood you place on top of the fire acts as roofing material for the fire underneath - If they are all placed in the same direction.
4. Do not expect to see flames until the fire is of the correct size. If you see flames, *you are wasting precious heat*, which you need to dry out the wood on top. Keep putting sticks on every flame that pokes through- and keep forcing air to circulate.
5. Cut your finest tinder at the very end, after all other bigger stuff as been gathered, for easier starting because the stuff doesn't get damp.
6. Get to the inside of the wood somehow- it's got to be split so the fire catches on the inner wood.
7. Poke some fir bubbles with small sticks for incredible fire starters.
8. Forget about using wood smaller in diameter than a finger - it will be soaked through if the rain has been hitting it for a while.
9. Look for wood which has not been rained on yet if possible (look under overhangs or under fallen timber.
10. Start your fire on bark or on wood so that the first coals formed will fall onto something dry so they keep generating heat.

Practice by putting wood in a lake overnight and starting your fires with that wood. Then practice in actual downpours - it's amazing how much the rain running down your raincoat sleeves put out that initial flame. And remember, 99% of the time, the fire goes out because there is not enough fuel, not because there is not enough air. Put more wood on the fire, and then more, and still more, and then even more - and keep it tightly scrunched together, side by side, not crisscrossed.

The Hub

Troubled Times

Natural Kindling

From the archives at primitive-skills-group@uqac.uquebec.ca

Wasp Nest

> I can't remember where I read it, but the best tinder for fire starting is **shredded wasp nest**.
> Ted Bailey
> tbailey@ic.net

Bark Tinder

> I am glad that you brought up the question of the **shredded bark tinder** that was mentioned in the article. I was reporting what John Rowlands said he used but in all my years of experimentation on the subject of catching sparks I have never had any succes with the dry, finely shredded bark. In addition, no one who is into primitive tech. that I have talked to has indicated success either. Ditto for mouse or birdnests. I have only had success with charred material. The only thing I have seen that is uncharred that will catch and nurture a spark is a type of fungus that is sometimes found in birches or cherry trees and it is amazing to see.
> Wyatt Earl
>
> I know that **cedar bark** works well, but I haven't been able to light it.
> David Wendell

Rotten Wood

> One ember enhancer I like is rotten, corky, punky wood. It will not catch up into flame, but given time that piece of rotten wood will become one big, glowing ember.
> Benjamin Pressley
> benjamin@perigee.net

Charred Pith

> I was wondering if anyone has tried using charred pith as a coal enhancer tinder. I have had good luck using the charred center pith of **mullein** in demonstrations with flint and steel. The actual charring process is a little more tricky than it is when dealing with cotton, but it seems to work nonetheless.
> Jon Harshbarger
> jharsh@dreamscape.com
>
> I have also charred and used the pith of mullein as well as **red sumac**. They do char and work very well. The are also difficult to keep together in a pile. I usually make a birdnest of fluffy tinder and poke a finger sized hole to hold it as tightly together as possible and it works very well.
> Benjamin Pressley
> benjamin@perigee.net

The Hub

Troubled Times

Heat

Fungus

From the archives at primitive-skills-group@uqac.uquebec.ca

> You might like to know that I have finally identified that **birch fungus** you are talking about. It is sometimes called **Chatoquin** or **Bearshit** but the scientific name is **Innonotus obliquus**. It is indeed a fungus (at first I thought it was a disease) but it is a white rot fungus rather than a brown rot like most rots we usually see. This white rot attacks the wood lignum and cellulose differently than brown rot and is responsible for forming a material which is similar in many ways to charred cloth. I am still looking into this and trying to find other fungi or material botanically related to Innonotus to try them out. For tinder, this stuff is indeed amazing. One very fine spark into it and you can't put it out! However, I've noticed that if it dries out too dry, it no longer works.
>
> Andre Bourbeau

> The imperfect form of the fungus occurs parasitically on trunks usually of **Betula** (birch) more rarely on **Alnus** (alder) and other hardwoods. The fruiting bodies of the imperfect form are conspicuous in that they are **black lumps** which are always found on the trunk 1-4 m above the ground. Only after the tree dies does the perfect stage develop under the bark and is often overlooked. Fruiting is annual throughout the year, found in Europe, North America and Asia. Ref. *Fungi of Switzerland*, Volume 2 (non gilled fungi), eds J Breitenbach & F Kranzlin, Verlag Mykologia, CH-6000 Lucerne 9, Switzerland.
>
> Paul F Hamlyn
> 100256.2256@CompuServe.COM

> Inonotus obliquus is a common fungus and there is a great deal of information published about it. You can find some in forest pathology books and some in books on systematics of polypores. I am surprised that it catches a spark so well. It is not the fungus known as "tinder fungus," which is **Fomes fomentarius**.
>
> Jim Worrall

> Inonotus obliquus was used frequently as a tinder and there are a number of "mushroom" identification books with information. Do you want references? There are also several other fungi that were used for tinder and appear to be superior to I. obliquus. **Fomes fomentarius** has been used in Europe as well as the US and Canada - and used by Native Americans. In the pacific northwest, Native Americans used other fungi such as **Phaeolus schweinitzii**.
>
> Robert A. Blanchette

> I have a Native friend in this area who lights all his ceremonial fires using flint and steel (although he is very secretive about his materials. I get the sense in talking to him that he uses some kind of flint/iron pyrite combo. I will hopefully have an opportunity to talk to him more about the details in the future and you can be sure I will post what I can here at that time). What I am sure about is what he uses for tinder and I have since found references to the same material in books by Mors Kochanski and others. He uses the spongy, brown part of the **true Tinder Fungus** which is the strange looking growths on the sides of live birch trees. He has been very firm in his insistance that it needs to come from a live birch tree. The fungus looks kind of like a "burned growth" and differs

significantly from **false tinder fungus** which has a more uniform and shelf like appearance. I know the "false tinder" fungus is not easy at all to crumble. It sort of has the consistancy of dry hardwood.

Mark Zanoni

I've made numeous fires from both the tinder fungus and the false tinder fungus mentioned in Mors Kochanski's book. You may have fun finding scientific name for the "true tinder fungus" as I not yet convinced that its a fungus at all. I believe it is more like a "burl" or "Conk" not unlike you would find on an aspen. The consistancy from the inner portion looks, feel, and crumbles exactly the way that **cork** does. Its great stuff and has many uses. for firestarting it makes a great long lasting ember. The false tinder fungus definitly will not crumble, in fact you have to slice thin pieces off the layer found just under the outer shell, and then process by boiling in a hard wood ash slurry, and drying. Both these work well with sparks from my axehead or knife.

Kelly Harlton
kharlton@telusplanet.net

A burl is part of the tree or shrub. I don't remember my botany all that well, but I think burl is all meristematic tissue, which means you can grow a new tree from it. A lot of woody plants that grow in areas of frequent fires sport underground burls that allow them to rise like the proverbial phoenix after a blaze. A "conk" is just a common name for any big ole **polypore fungus** stuck to the side of a tree. It's a lot harder than your average mushroom, but it's still a fungus.

John Wall

The Hub

Troubled Times

Heat

Cattail

From the archives at primitive-skills-group@uqac.uquebec.ca

I have found that the **dried top** of the cattail that has been broken up and fluffed up will catch a spark from flint and steel very easily. In fact, if you do not watch out, the explosion of the initial flame will burn your hands before you can get out of the way. I was using a simple flint striker that fit into the side of a knife handle that I had ordered from the *Sportsmans Guide Magazine*. I just raked the knife blade along the length of the flint piece (about 2.5in. long X 1/8in wide), and got a large swoosh of sparks that when done close to the little pile of **cattail fluff**, resulted in an explosion of flame. The fluff burns out rather quickly, but with some dry leaves or other tinder next to it, results in a nice warm camp fire.
John Wither

Some people will actually place cattail fluff beneath the notch and between the fireboard and ember transfer plate for the purpose of 'holding' an ember and allowing it to grow a little bigger. I, for one, do not like cattail fluff. I have had too many embers smother out doing this.
Benjamin Pressley
benjamin@perigee.net

I tried different tinders to no avail, until tonight. I remembered an old post about metal matches and cattail down. Which I use also for my metal match. But I couldn't do it with **flint and steel**. Just not a hot enough spark. However, tonight I got it, and will never lack for tinder again! Cattail does light with flint and steel, just need a little preparation. Char your **cattail** head in the fire for about 1 - 2 minutes, then bury it in the dirt or in a closed can. It then catches *much* faster than even charcloth, and burns with a hotter coal.
David Wendell

The Hub

Troubled Times

Heat

Hot Rocks

For those of you who have not tried this before here is a neat way to cook with an open fire: This method is used quite extensively by the Bushman in Africa. These Bushmen along the coast are called Strandloopers this is Dutch for Beachwalkers and they live entirely on indigenous plants, roots and animals caught in the wild. (Of course you shouldn’t be setting yourself up at a beach until after the shift as you could be in for some interesting surfing lessons.)

Use flat clean rocks, you can get them at rocky coasts all cleaned up by the raging sea. These volcanic type rocks are better as they do not crack. Place these in and around the open fire, close enough to get really hot. Then place meat, chicken, fish, even onions and bread on the rocks to cook. They retain heat for a long time. Another nice dish you can prepare is stir fry type mixes like tomatoes, onions and fish. Remember that if you do ever use sea water to cook with, it is extremely potent and can easily ruin a meal. You can also place the rock inside a thick cloth and this makes a great hot pack to comfort and warm a child or ailing person.

> Offered by Ray.

This really works! My son's sixth grade class went on a caveman overnighter where we had to build our own shelters and cook our own food from only the materials that were indigeneous to the area. (We brought our own food) The chicken turned out great!

> Offered by Louann.

The Hub

Charcoal

Charcoal is made by burning wood with very little oxygen. When I clean the ashes from my woodstove there are chunks of charcoal in with the ash. I sift the ash through a 1/2" mesh and save the larger chunks of charcoal. When I start a new fire I spread some of the charcoal in the bottom of my woodstove; when I light the paper and kindling the charcoal catches fire and glows. Charcoal is useful for grilling food, and I think also for creating high heat for use in metal working. I am not sure if softwoods will make charcoal or not; I use hardwood.

Offered by Wendy.

Troubled Times

Woods Differ

For anyone's information: the wood of the fig tree is almost hollow and is no good for a fire (burn a whole tree in an hour), as opposed to the olive, which is the very best for a fire because it burns for an inordinately long time and gives off a great smell as well. (Oak and maple are great for a fire as well, of course, better then pine and much less messy, but we don't have many of those here in Israel. Cypress is also very messy but OK. Cedar is the best 'normal' wood we have here, but it's not as good as oak, especially our southern 'wild' oak. Eucalyptus is the best 'healing' wood around here, as the smell of any part of it burning, especially the leaves and the bark, makes many ailments go away. Burns very fast, though. Just a few short words on wood for fires.

Offered by Sol.

Troubled Times

Heat Water Stove

I have come across a neat deal down in Mt. Airy, NC - Hicks Water Stoves. I saw one in operation near a property we were researching. This fellow has a 4000 sq. ft. home heated with baseboard radiators, piped in from a woodshed about 150 feet from the house. In the winter time, a couple of big logs (14-15in diameter) in the morning and evening keeps the house heated. You have to have a hardwood supply for this. This operates via an insulated rectangular solid with a firebox and horizontal flue tubes going through the water chamber to a chimney vertical with clean outs. It keeps about 700 gal of water at 180 degrees. There are different sizes available. The heat exchanger can give hot water for household as well.

Offered by Jack.

The Hub

Troubled Times

Animal Heat

After the pole shift, fuel may be in short supply. Many cultures have learned to use animal heat for warmth during bitter winter months. For example, large Swiss mountain farm houses have accommodations for humans on the upper floors and for livestock on the lower floor. They are usually built into a hillside so that access can be had to either floor from the "ground" level. There are some ventilation holes in place to allow the warmer air to circulate up into the human quarters. This combination saves on heat and makes tending the stock easier during those rough winters because the farmer doesn't even have to leave the house to take care of the animals. This is a regular practice in the Himalayan mountains, specially in Tibet.

The Hub

Troubled Times

Heat

Manure

A long time ago I took an alternative energy sources course (early 1980's), and I have pulled this tidbit from my memory. Manure Pit hot water heater:

1. dig a pit, 20' x 40' and 10' deep.
2. Run water pipes throughout the pit in a snake fashion, (we use 2” pvc)
3. fill bottom with manure from cows or horses to a depth of 3'
4. fill 1' layer of straw
5. another 3' layer of manure
6. another 1’ layer of straw
7. fill 3' of top soil to make a mound, which will settle.
8. leave an in and out spigot, the in spigot should lead directly to the bottom, then the pipe winds upward until it gets to the "out" spigot, this will allow circulation (cold water drops, pushes hot water up into the house).

Hook up to the hot water baseboard heating in your dome, and you get water temps from 120 - 140 degrees F. sufficient to heat a small home. One can also hook up a secondary heater in the original design to heat water for bathing. As convection circulation requires a closed system, a circulating pump would probably be needed to produce pressurized hot water for showers, cooking, etc.

Offered by Ron.

The Hub

Troubled Times

Garbage

A closed landfill nearby could supply geothermal energy. Electricity could be generated at the site and wire run to your home. Some of the hot garbage could be brought closer to you, put in a pit to cover some pipes so that water can be pumped through to provide hot water for heating and bathing.

Offered by Mike.

Compost

It has been about 20 years, but a guy in France was heating his house and running his car using a massive compost heap with plastic pipe coiled up in it (20 ft tall) and collecting the gas. By flowing water through the pipe he was able to heat his house nicely. In *Mother Earth News* some time in 1978 I think in the same issue as stacked wood housing. Internal temp of a compost pile can reach 158 F and kill action so the pipes serve two functions. Bio Gas and Compost goes hand in hand. The product is also a soil builder deluxe, study one and you understand the other.

Offered by Glen.

Troubled Times

Heat Unstable Geo

I would definitely not bet on any geothermal heat source before or after the pole shift. Geothermal areas means you're in a geological unstable area where the earth's crust is thinner than normal, probably on a rift between two tectonic plates like Iceland between America and Eurasia. While volcano eruptions are neat to watch on TV, I don't think it will be wise to be anywhere near when they blow.

This week on Iceland my 3 youngest daughters have been bathing in a pre-heated creek; seen hot springs; geysers (one active, one no longer active); boiling mud; red, yellow, blue and green soil and rocks; a 20 meters wide canyon in the rocks created by an earthquake long ago; and swimming in the residue water from a geothermal power plant in the Blue Lagoon. On the top of the volcano in the Westman Island Heimey that erupted in 1973, it is still boiling hot. A geothermal area is a fascinating place to visit, but no place for pole shift survival!

Offered by Jan.

We have a Hot springs about 50 miles or so from us. It's a tourist trap. This hot springs is a result of a "monolith". Just like a monolithic dome would look , huge and buried under ground. It's a hot spot. A remnant of an old "bubble" so to speak. They will not be happy campers during the pole shift. In fact, they will not be camping at all.

Offered by Clipper.

The Hub

Troubled Times

Heat

Hot Water

Make a heating coil: 1/2" copper or stainless steel tubing wound into an open flat spiral of approximately 3 turns with an over all diameter of about 12" with several ft of straight pipe on each end. Leave at least a 1" air space between each turn. Use car 1/2" heater hoses and connect one end to the bottom of a thermally insulated hot water holding tank. Could use an old gas house water heater. The other end of the heating coil is connected using the 1/2" heater hose near the top of the holding tank (to be under water). The bottom of the tank needs to be placed higher than the heating coil so that water is always forced into the coil as it boils.

Place the heating coil under or near any fire or hot item. If you cook with electricity this coil could be permanently attached to the back side of the bottom and side reflecting plates. If you build a fire this could be placed in the bottom of the fire or under it. The point is, to capture as much of the waist energy escaping to the bottom and sides of any cooking operation as you can. With a small portable container this process can be used to provide hot water when camping-traveling between settlements. Note: Bigger and smaller tubing can be used as appropriate. For example the gas tank out of a car and some of the steel and rubber gasoline lines could be used in a pinch to produce a small version. Warning: Make sure all the gasoline has dried out before using these items near open flames.

Another way: If you have a wood or oil burning space heater, wrap your tubing around the inside, or outside of a hot gases vent pipe, to capture the heat that would normally escape the room.

Offered by Mike.

The Hub

Troubled Times

Heat

Tube Coil

I live in southern Queensland in Australia, west of Brisbane. I have no grid power, and very few resources (yet). I'm building a pole framed mud brick/rammed earth home. For lights, we are using 12V flourescent car trouble lamps, which we connect to our vehicle's battery every night. I've just got an old 4HP diesel engine operational. I intend to use this to run a 240V alternator (for small power tools), as well as a 12V alternator (to recharge batteries). Now that I have 240V power, I can go ahead and construct my wind powered generator (aka Hugh Piggott), as well as some solar cells (aka Creative Research and Science). Water for drinking is collected from a couple of roofs and stored in tanks. Water for washing, bathing is taken from dams. With our low rainfall, I'm looking for information on how to condense water. Several commercial systems exist but are way beyond my financial means.

To heat my water, I use a coil from an old kerosene refrigerator, with connections to an (ex-electric) mains hot water heater. The pipes to/from the coil to the hot water system must be a minimum of 3/4 " (1" is better) for the water to thermo-syphon. The 3/4" suggested is too small, and the coil will generate steam, which can be very dangerous and cause serious injuries. The bottom of the hot water storage tank must be at least 12" above the coil. The hot water pipe from the coil to the tank must have a constant slope (not up and down) or the thermo-syphon will not correctly operate leading to steam and high pressures being developed.

Offered by Rob.

The Hub

Troubled Times

Heat

Caution

I had a friend who did this for camping; using a copper coil in the fire to heat water in a big barrel. If you do this be careful about building the joints connecting coil to the barrel He said that he had high temperature steam on the output of the coil that could cook the meat off your bones if the joints failed.

Offered by Gus.

The Hub

Troubled Times

Heat Large Quantities

My question is - does anyone have any ideas on how to heat large amounts of water? We are constructing an 25,000 cu. ft. underground building to raise fish and hydroponics (aquaponics.) We'll be using LED lights for the plants and worms for the fish (and oursleves.) The ground temperature is about 50 degrees and we need to raise the water temperature to be 70 degrees. We have wind mills, a fast flowing river, and lots of wood for power sources. Any ideas?

> Offered by Rita.

Just a brainstorm idea. Circulate the water through a radiator. Force hot air (from a heater?) through the fins of the radiator to raise the temp. This can then by adjusted with thermostatic controls.

> Offered by Roger.

There are many wood fired water boilers that are designed to be operated outdoors away from the home. Make sure you get a high efficiency one that will control the water temperature automatically. Make sure it also produces a low amount of smoke, no sense advertising your presence to others miles away. This is actually very important. There are also thermal conversion devices that will produce electric power directly from heats as well. You can buy a boiler and a steam engine to run from your wood heat. The engine would power the lights. Just a thought. Hearth is a link but buy a few magazines that feature doing it off the grid etc. They had ads for these things.

> Offered by Dave.

The Hub

Troubled Times

Heat Peltier Junction

There are small electrical devices called Peltier Junctions which are solid-state heat pumps. A 12 volt one cost me about $35 a couple of years ago, but I never did a whole lot with it. You can build a cooler out of one of these that will probably freeze ice if it is well-insulated. Likewise you could probably build a hot plate to boil water on. Of course you would need electricity but the benefit here is size. The 12v model is only a little over an inch square, and an array of about 4 could probably be the basis for a small refrigerator. They are flat (about 1/8" thick) with ceramic faces and connection wires. The polarity of the voltage determines the direction of the heat flow in the device. You have to use heat sinks so it won't burn up for most uses, I think.

If someone has a reliable power source, someone might be able to heat / cook without a fire. Because of the nature of the device, it might be possible to make a dual refrigerator / oven - a small, dual-compartment metal box - where Peltiers are mounted in the middle and thus one compartment would get cold while the other compartment would get hot. Only drawback is the power supply must be continuous, but perhaps not especially powerful. (12v, 1/2 amp maybe)

```
c o l d
-- [+]

-- [-] 12v
h o t
```

Or maybe hot / cold, doesn't really matter =)

Offered by Joe.

The Hub

Troubled Times

Limited Use

Peltier Junctions work by the Peltier effect (hence their name) which involves heating or cooling of the junction of two thermoelectric materials by passing a current through the junction. Semiconductor thermoelectric materials have greatly increased the effectiveness of thermo-junction for cooling. The Peltier effect is also the inverse of the Seebeck effect in which a current is produced in a closed circuit of two dissimilar metals if the junction is maintained at different temperatures, as in thermocouples for measuring temperature. The biggest problem is that they are very inefficient in energy conversion. There are a few other companies out there that also make coolers based on this principle, but the ones listed should give you a good starting point.

Offered by Steve.

There is a professor at Kansas State University that uses Peltier junctions to stabilize the temperatures of his laser electronics. He says that they are very efficient in small applications (low voltage requirements, reasonable current requirements) but wouldn't be practical in a large application such as for cooking or keeping a storage box cold (refrigerator) due to increased current and/or voltage requirements.

Offered by Roger.

Troubled Times

Experiment

If you want to experiment with peltier junctions, check out:

Electronic Kits have an experimental kit for $59.95 plus shipping.
Hi-Z Technologies also sells thermo couples.
Jade Mountain is in the process of selling a thermoelectric generator with no moving parts.

A couple other sites are Melcor and Tellurex.

Offered by Steve.

Troubled Times

Heat

Gel Fuel

The latest are portable fireplaces that use gel fuel. The gel fuel is alcohol based and doesn't emit any smoke, odor, or toxic fumes so venting is no longer required. So, while waiting for the apacolypse, you can have a bedroom fireplace. There isn't enough heat to be of any real use if you were cold, but it is a nice looking fireplace. Contact:

> **Jensen Metal Products**
> Racine, WI
> 800-654-1704

Suggested by John.

Jensen Co. Store of Racine, Wis. - Jensen Jel Fuel.

> *To order a catalogue from the family-owned business of more than 70 years, call (800) 654-1704. A canful will burn two to three hours. One may put a lid on the can, then relight at any time. Jensen Jel costs $75 for a case of 24 (13-ounce) cans, including shipping. Orders are handled within 24 hours. Jensen says the canned fuel is non-toxic, non-petroleum grain alcohol that burns clean, is completely free of smoke, soot and fumes. It does emit some water vapor, creating humidity in the house -- not a bad thing during wintertime when central heating sucks the moisture out of furniture and the air.*

Suggested by Pat.

This vendor will be more than happy to send you a catalog.

> Made In USA **Alco-Brite**
> Gelled Alcohol Fuel
> Fact Sheet Environmentally Compatible
> Safely used for Cooking & Heating Indoors and Outdoors
> Emits Harmless Carbon Dioxide & Water Vapor

Suggested by Pat.

We have a fake fireplace that can use canned fuel. The manufacturer is:

> **Colgate-Palmolive**
> Institutional Products Div.
> Tenifly, NJ 07670

Offered by Gini.

The Hub

Troubled Times

Re-Heater Bag

This is an instant, portable re-usable heat pack. Has a liquid (looks like water) in a sealed clear flexible plastic PVC bag of various sizes. Looks like a typical jell hot-cold pack. However, this unit is not-typical, and as far as I can tell not sold in normal stores. The unit gets hot (130 degree Fahrenheit) when you push a button floating in the liquid. The button you push is a small (.7" diameter) concave stainless steel washer that heats up the metal as you push it. Flexing the metal produces heat. This causes a chain reaction in the liquid to turn it into a solid giving up much heat for an 1-2 hours. The liquid used is a non-toxic salt made when you mix water, vinegar, and backing soda together.

Once the unit has given up it's heat and turned to a solid it can be regenerated by putting this pack in boiling water for 20 min. This turns it back into a liquid. Then, cooling it below it's solidification point of 130 degree Fahrenheit, it still stays a liquid till the button is again pushed. The possible use is portable personal heat (traveling or not) for those cold nights after the pole shift. Can be recharged while or after cooking the daily food or from any other heat source.

There is a possibility this unit could be made. It uses common materials. The ones I bought looks like a tiny water bed 4.5" by 3.25" and weighs about 6 oz. Cost is about $5-6/each depending on the quantity bought. Price is a bit high. The literature says on it sold by

> **John W. Smith**
> 3980 Everest Ave. Riverside, Ca 92503
> (909) 687 2623

Offered by Mike.

Troubled Times

Heat

Electric Vest

Has anyone seen for sale a battery powered jacket or vest to keep warm by. This would be preferable to heating a large living area. Would save lots of energy to only heat cold bodies as needed. A 12 volt DC vest could possibly be made out of an old electric blanket by using enough of the stitched in wire to be about 1/10 the overall length needed for 120 V AC.

Offered by Mike.

Any motorcycle shop has catalogs where you can purchase one of those vest. I have ridden with people who have used those vest and they swear by them. The vest plugs into a connection of the battery, the vest has a climate/temperature control.

Offered by Lou.

The Hub

Troubled Times

Reflection

There are a couple of things people can do to make life a bit easier in the cold and in the dark. If there comes a time that your power suddenly goes down and you are left with no heat and/or no light, these suggestions may help you.

When it is very cold, and you do not own a *space blanket* or a sub-zero sleeping bag, you can use heavy-gauge aluminum foil, which you have sandwiched between two flannel or cotton sheets. You secure the foil in place with quick stitching and wrap it around yourself or the others in your family. You may want to make up a couple of these before the crisis hits. If not, they can be assembled in a few minutes on the spot. This wrap will reflect body heat back to the person and keep you quite warm in a cold situation. Another way to increase the efficiency of these blankets is to put a rubber sheet over the top when you lay down. This will amplify the amount of body heat that is retained and will also block the cold air and/or wind from penetrating through the home-made blanket, thus keeping you warmer still.

As for lighting, think reflection. If you only have one or two candles left and you want to produce as much light as you can, you can use aluminum foil, once again. Staple the aluminum foil to a wall behind the candle and to the wall opposite the candle. This will create a series of reflections, which will increase your lighting. Mirrors will work well for this, too, but I don't think most people have a lot of mirrors laying around. Using the aluminum foil will also help with your heat retention, so in this manner, it serves a double purpose.

Offered by Shekhina.

Space Blankets are one of the marvels of technology. Whenever we discuss any survival subject, certain assumptions are usually made about what you have available to you at the moment, and then apply what skill you have to using anything that is handy. So I'm making an assumption that if you happened to have a space blanket on you, most likely you would also have either some matches or a lighter of some type as well. The space blanket is plastic that has a layer of reflective foil coating, this coating reflects up to 80% of a persons body heat, so the obvious use is to simply wrap yourself up in it like a blanket. But the comment I wanted to make is that what we are trying to prevent is hypothermia, (a lowering of the body’s temperature). It doesn't have to be frigid conditions to die of hypothermia, of course the danger increases as the temps go down.

These space blankets make great shelter material as they are waterproof, you could make a decent tent out of one and combined with a fire placed properly, could provide more overall protection. I use them as fire reflectors. If you had a couple of them, one can be set up behind your fire and used to bounce the heat energy back towards the resting survivor in her shelter. Aluminum foil can also be used effectively for this same purpose by combining a natural feature of a rock or hillside and placing foil strategically close to the fire. Say you were at home with the power out? If you had a fireplace, a space blanket may be used in the same way, string it out between you and the heat source, reducing the amount of space to be heated and reusing the heat energy by reflecting it back to you. Caution, they are flammable, so be careful not to place them too close to your fire and lose the whole rig to a hot coal or spark. I love space blankets, I always keep them stashed away in my glovebox, airplane, boat, or what have you. They are cheap and small enough folded that there is no reason not to include them in your pack.

Offered by Matt.

Troubled Times

Heat

Deflection

If you are in a cold climate and you have no power, you can select one room of you home and staple cardboard to the walls to help deflect the cold air and wind. For small children, it is beneficial to put cardboard under the crib mattress and outside the rail sides of the crib. If you do this and then make the child an aluminum blanket and cover him with a rubber sheet, the child will stay toasty warm.

Offered by Shekhina.

The Hub

Troubled Times

Thermal Feedback

A portable cooking system that uses 75% less fuel than kettle cooking systems through thermal feedback. Native Americans used it to both conserve fuel and increase the fire's heat.

Offered by John.

Troubled Times

History

Excrement Happens
by Rachel, April 1, 1999

Humans began to lead a settled life, growing crops to supplement hunting and gathering, only about 10,000 years ago. For all time before that, humans "deposited their excreta - urine and feces - on the ground, here and there, in the manner of all other land creatures." The soil and its communities (including plants, small animals and microorganisms) captured almost all of the nutrients in animal excrement and recycled them into new components for soil. In this way, the nutrients were endlessly recycled within the soil ecosystem and largely kept out of surface water. As a result, what we call "pure water" is low in nutrients, particularly the major nutrients nitrogen and phosphorus. Because these conditions have existed for a very long time, life in lakes, rivers, and oceans is accustomed to the relative absence of these nutrients. Over the past couple of billion years, life has flourished in this low-nutrient environment, growing complex and interdependent in the process - an aquatic condition we call "clean" and "healthy."

When a body of water is suddenly inundated with nutrients - especially nitrogen and phosphorus - things change drastically. One or a few organisms flourish and begin to crowd out the others. We can all recall seeing a body of water that is pea-soup green from overgrowth of algae. Such a water body is clearly sick, choked, its diversity vastly diminished. Today, much of the surface water of the planet is in a state of ill health because of misplaced nutrients. And a main contributing culprit is misplaced human excreta. Long ago, human civilizations split into two camps regarding the management of excreta. Many Asian societies recognized the nutrient value of "night soil" (as it became known). For several thousand years, and up until very recently, Asian agriculture flourished by recycling human wastes into crop land. The opposing camp, particularly in Europe, had ambiguous feelings about human waste - was it valuable fertilizer or was it a nasty and embarrassing problem to get rid of?

....

For many years, coastal cities dumped sewage sludge into the oceans, where it created large "dead zones" that could not support marine life. Other communities dumped their sludge into landfills, where it could pollute their groundwater. Still others incinerated their sludge, thus creating serious air pollution problems, then landfilled the remaining ash or simply heaped the ash on the ground for the wind to disperse. In 1988 Congress outlawed the ocean dumping of sewage sludge. At this point, many communities faced a real waste crisis. There was no safe (or even sensible) place to put the mountains of toxic sludge that are generated every day by centralized sewage treatment systems. It was at this point in history that U.S. Environmental Protection Agency (EPA) - feeling tremendous pressure to "solve" the sludge disposal problem - discovered that sewage sludge is really "night soil" - the nutrient-rich product that has fertilized crops in Asia for several thousand years. EPA decided that the expedient thing to do with sewage sludge was to plow it into the land. Shortly after 1992, when the ban on ocean dumping went into effect, EPA renamed toxic sludge "beneficial biosolids," and began aggressively campaigning to sell it to the American people as fertilizer.

The Hub

Troubled Times

Europe

Excrement Happens
by Rachel, April 1, 1999

In Europe, a pattern evolved: The first stage was urinating and defecating on the ground near dwellings. As population density increased, this became intolerable and the community pit evolved. For privacy, this evolved into the pit privy or "outhouse" - a privacy structure atop a hole in the ground. Despite what many people may think, the pit privy is not environmentally sound - it deprives the soil of the nutrients in excrement, and by concentrating wastes it promotes pollution of groundwater by those same nutrients. Before the advent of piped water in the late 18th century, European towns stored excreta in cesspools (lined pits with some drainage of liquids) or in vault privies (tight tanks without any drainage). The "night soil" was removed by "scavengers" and was either taken to farms, or dumped into pits in the ground or into rivers. In general, Europeans never developed a clear and consistent perception of the nutrient value of excrement, as Asians had done.

In ancient Rome, the wealthy elite had indoor toilets and running water to remove excrement via sewers. Later, European cities developed crude sewer systems - usually open gutters but sometimes covered trenches along the center or sides of streets - though they had no running water until the 18th or even 19th centuries. The putrefying matter in these stagnant ditches did not move until it rained - thus the name "storm sewers" - and many cities prohibited the dumping of human wastes into such sewers. With the advent of piped water, things changed dramatically. In this country, the first waterworks was installed in Philadelphia in 1802 and by 1860 136 cities were enjoying piped water systems. By 1880, the number was up to 598. With piped water, per-capita water use increased at least 10-fold, from 3-5 gallons per person per day to 30-50 gallons per person per day or even more.

Water piped into homes had to be piped out again. This caused cesspools to overflow, thus increasing the problems of odors and of water-borne diseases. To solve these problems, cesspools were connected to the city's crude sewer systems which ran along the streets. The result was epidemics of cholera. In Paris in 1832, 20,000 people died of cholera. Around the world, the combination of piped water and open sewers has consistently led to outbreaks of cholera. To solve this problem, engineers designed closed sewer systems, pipes using water as the vehicle for carrying away excrement. This solution engendered a debate among engineers: some wanted to return sewage toagricultural land, others argued that "water purifies itself" and wanted to pipe sewage straight into lakes, rivers, and oceans. By 1910, the debate was over and sewage was being dumped into water bodies on a grand scale.

Troubled Times

Disease

Excrement Happens
by Rachel, April 1, 1999

In the cities, cholera epidemics abated. However, cities drawing their drinking water downstream from sewage discharges began having outbreaks of typhoid. This engendered another debate: whether to treat sewage before dumping it into water bodies used for drinking, or whether to filter drinking water. Public health officials favored treating sewage before dumping it; sanitary engineers favored dumping sewage raw and filtering water before drinking. The engineers prevailed. As cities began to filter and disinfect their drinking water, typhoid abated.

Throughout the 20th century, the U.S. and Europe industrialized rapidly. Industry developed a huge demand for low-cost waste disposal, and sewers were the cheapest place to dump because the public was paying. As the pressure for greater waste disposal capacity increased, industrialized nations allocated vast sums of money to construct centralized sewer systems to serve the combined needs of homes and factories. As a result, the nutrients in excrement became mixed with industrial wastes, many of them toxic. So by the 1950s, essentially every body of water receiving piped wastes was badly polluted with a combination of excessive nutrients and toxicants. This led to a demand to treat wastes before dumping them into water. Thus began the "treatment" phase of the "get rid of it" approach to human waste.

As centralized sewer systems evolved, first came "primary treatment." This consists of mechanically screening out the dead cats and other "floatables." All other nutrients and toxic chemicals remain in the waste water that is discharged to a river or ocean. Next came "secondary treatment" which speeds up the biological decomposition of wastes by forcing oxygen into them, by promoting bacterial growth, and by other means. This is an energy-intensive process and therefore expensive. Unfortunately, it, too, leaves many of the nutrients and toxic chemicals in the discharge water. [The Congressional Research Service recently estimated that the federal government spent $69.5 billion on centralized sewage treatment plants, 1973-1999. Despite this huge expenditure, the Congressional Research Service said in 1999, "States report that municipal discharges are the second leading source of water quality impairment in all of the nation's waters (rivers and streams, lakes, and estuaries and coastal waters).

Troubled Times

Fancy Outhouse

This is really quite a safe way of handling waste despite its unsavory reputation. It will last about 5 years for a family of five in full time use. A small handful of lime dumped into the cavity will do wonders to help the enzyme action. You just need to put it some distance from your well (if you have one), and place it downhill from your spring. When it gets filled up, build a new one. They are really quite easy to build, provided you stockpile the materials, or cut them yourself later.

You need a 4' x 4' x 5' deep pit. A wooden box (pressure treated if possible) must be constructed in the pit, leaving an inch between the slats for drainage. You make a reinforced 7' x 7' concrete slab with integral rings on the top and the sides so you can move it later. You build an outhouse building over it, with a toilet box, and a vent or ventilation slates in the sides of the building. When it fills up you drag the whole structure to a new spot and cover the hole over with fill that you took out to build it in the first place.

The Hub

Troubled Times

Sewage

Plain Outhouse

While my wife, my two kids and I were building our house, we had an out house out back that we used. It was simply a hole in the ground with a shack on top. No concrete, no fancy pressure treated wood. We used it for seven years and never once moved it. We used a bucket in the house first (this is Alaska) and dumped it every day. Our out house hole is about four feet deep or there abouts. We have permafrost here and that was as deep as the back hoe could get. Hard to believe that the ground can be so hard and frozen that the back hoe stands up when it has dug as far as it can. Our out house is still there to this day and it kept us going until we moved to town.

We did use lime to kill the smell. It changes the pH in there or something and sweetens the smell. You can buy septic tank aids that are used to help the bacteria grow (in the hole) and it helps things work faster. There is a product out there called **septic tank aids**. This is like a tablet that you can throw in the hole once in a while to help speed up the process of decomposition. We used one hole for eight years by using these tablets. Hardware stores and maybe stores like **K Mart** probably carry these. We got ours from our local **Amway** distributor. Adding a piece of plastic pipe about 4 or 6 inches in diameter on the inside from inside the seat part and up through the roof will also help ventilate off the methane gases helping with keeping the smell down.

Just make sure the shack is big enough to cover the hole. If the hole is a little big, run some planks across the hole to support the outhouse. We always seem to make the hole too wide and it can get very annoying with the smell and trying to make sure the house doesn't fall in the hole or that there is no open areas around the outside of the house. Our kids are big now, but we used to worry about them falling in. That would be a real stinky mess wouldn't it?

Offered by Clipper.

The Hub

Troubled Times

Sewage

Garden Outhouse

Ashes from the wood stove is a good source of lime to sprinkle into the hole of the outhouse. Also to keep up the bacterial action, add the occasional left over vegetable wastes, especially cooked cabbage but *no meats*. Treat it like a compost pile. With a household of six, I never had a smelly outhouse.

During the warmer months, we dug shallow holes about 3 feet deep and layered the human waste often with the ashes, food scraps and chopped moldy hay from the barn. When the hole was about a foot from the top, we dug a hole next to it, piling the dirt from the second hole over the first one, and so on down the line. Moving the light weight shack over the new hole. The last hole before the ground froze in winter was dug deeper. (It had to last until the ground thawed the following Spring). The next year I had several piles on which I planted my squashes. The "Rich" subsoil grew fantastic squash with clear plastic tents over the top. An almost unheard of accomplishment at an Elevation of 5500 ft. above sea level and a *real* short growing season.

Offered by Cat.

The Hub

Troubled Times

Composting Toilet

Properly run these sanitation devices produce very little inappropriate smell. They do require lots of oxygen and composting temperatures of 90-140 degrees Fahrenheit. In colder climates the oxygen tends to reduce the temperature unless there is some way to use warm or hot air to aerate the fecal material. Additionally, there must be a way to keep the material mixed up. A leech field, or small septic tank or privy must be used in addition to handle gray water (bathtub, washer, sink) and even a certain amount of urine. There are many varieties of composting toilets. If you have some electricity they can be very useful. You'll need about 20-40 watts of steady power to run them.

Over a period of time a composting toilet takes human liquid and solid waste and transforms it into sterile usable humus for the garden. The most famous of these is a **Clivis Mulstrum**, which is made in Australia. This is a big fiberglass tank with different spots. They usually don't work exactly as planned - they need extra work in stirring the tank, and almost all need to keep the tank temperatures up in the very warm range or the bacteria will tend to *die*! Tank Temperatures are kept up with lots of polyurethane insulation and/or a small heater such as a light bulb. Many have a bypass fan that you turn on 20 seconds before you use it so the odors contained within don't blow into your room.

Dump a little bit of lime in after each use. Lime is very cheap, and easily stored. What's more it will be something that is easily procured in many localities. This is one of the many thing that you need to look for before choosing an Aftertime locality. One can even build a composting toilet out of reinforced concrete. However a poorly designed model will cause the compost not to slide properly and solidify in the tank and have to be chipped out with a chisel and hammer. Because of this possibility, hand-made models must have various doors to get into them.

The Hub

Troubled Times

Cottage Toilets

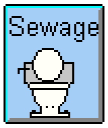
For a free 12 page catalog of composting toilets including waterless, 1 pint flush and non-electric, call

> **Cottage Toilets** by SunMar
> 800-461-2461

Offered by John.

The Hub

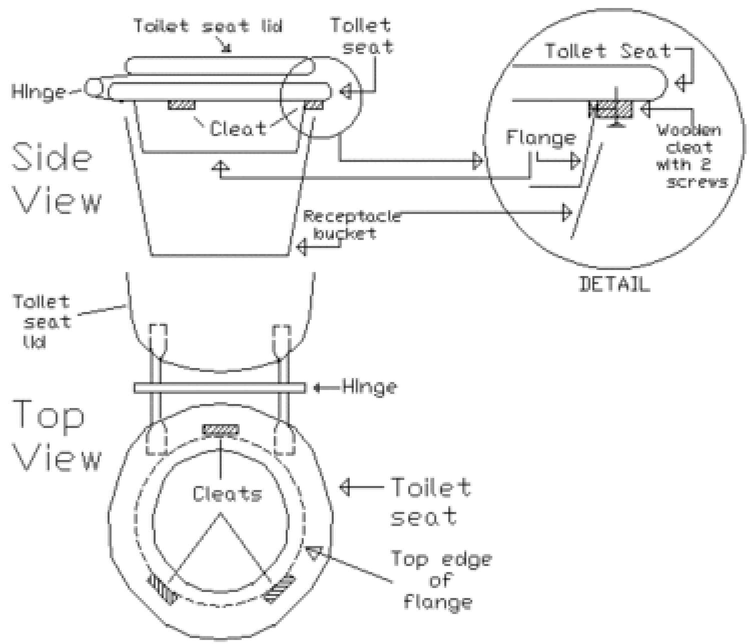
Troubled Times



Sawdust Toilet

Source: Appropedia Org

My version of a "sawdust toilet" (as described in the Humanure Handbook) consists of a receptacle bucket, a removable toilet seat that slips into the top, and a bucket of sawdust for covering after each use. When the toilet is full the seat is switched to the empty sawdust bucket. The toilet is emptied, cleaned and sanitized and then becomes the sawdust bucket after filling with clean sawdust. The whole toilet system, including outdoor compost chamber, can be constructed for less than $10. This simple, inexpensive, and hygienic toilet -- affordable to construct and maintain by just about anyone on the planet -- is a perfect example of an appropriate and sustainable technology.



- Using a wood saw, cut the top 4 to 6 inches off one of the buckets. This will serve as a flange to which a toilet seat is attached, allowing it to slip inside a second bucket. The bottom part of the cut bucket can be recycled, for example as a planter. How it goes together
- Attach this flange to the bottom of a toilet seat using two screws at each of three wood cleats. One screw attaches the cleat to the toilet seat; the second attaches the bucket flange to the cleat. The four small brown objects in the photo, the original toilet seat spacers, are removed and discarded. The completed receptacle with flanged seat in place on a receptacle bucket is shown at the top of this page.
- A second bucket contains sawdust, chipped wood, chopped straw, cereal hulls, or other absorbent carbon-rich organic matter. Covering with several cups or handfuls of this matter after each use effectively prevents odors.
- When the receptacle bucket is full transfer the flanged toilet seat to the now empty sawdust bucket which then becomes the receptacle. Covering with organic material
- Empty the toilet contents into a composting chamber and cover with a fresh layer of sawdust to prevent odors and present an aesthetic appearance. Clean the empty receptacle and sanitize and freshen in sunlight. This bucket, after filling with clean material, then becomes the sawdust bucket, and the cycle starts over. This step is the only time when odors are present, and only momentarily. Although not necessary, some individuals collect urine separately in a sealable container (such as an inexpensive but sturdy plastic bottle) because of its high value as a nitrogen source. It can be diluted by 5 parts water and put directly on plants.

The Hub

Troubled Times

Sewage

Porta-Potty

We are renting a Porta-Potty while we are re-leveling our house and replacing our water tank. Our potty costs us $65 per month and $35 every time they come to pump it. Soon, we hope to hear that wonderful sound of the toilet flushing again but until we do, the Porta-Potty is just like up town.

Offered by Clipper.

The Hub

Troubled Times

Ultraviolet

The solids in stools if removed of parasites would be valuable as nourishment for growing plants. There are many methods to check out. All raw stools from humans or other animals should be respected as potentially dangerous. Children should be taught this early on. If one gets more than a given quantity (say 10-100 depending on state of immune system) of alive parasites or eggs into the body then the parasite can take hold and establish themselves in the body. Then, immediate sickness and/or chronic long term degeneration of some type can start.

Both the water separated from stools and the urine could be flowed through Pyrex tubing wrapped around a small wattage germicidal Ultraviolet Lamp to kill any remanding pathogens. These small florescent bulbs last a year of continuos use or 2 years of 12 hr use. This type of lamp could also be used to keep the recirculating hydroponic nutrients clear of parasites (mold Spores, bacteria, etc.) for the hydroponic growing process. This same type of lamp is used now in a water filter system that can be used in remote areas and underdeveloped countries. It also filters lead.

Offered by Mike.

Troubled Times

Bare/Rife

A possible solution to the recycle problem using human waist is to use the Bare/Rife frequency device to cleanse and purify, then verify samples with the darkfield microscope with video. I plan on obtaining these two items shortly for projects like this and live blood analysis. The cleansing process of materials is to simply have them in the proximity of the B/R device for 10 minutes. No touching to contaminate other things. Also good to go for controlling bugs and mold in grains and many other things. Many frequencies are already defined for other solutions.

Offered by Craig.

Troubled Times

Sewage

Lime

Probably the best place to get lime in almost any local setting for now is your local cement and concrete supply. Look in your phone book for concrete. They could probably deliver it by the truck load, palleted and in bags. Feed stores and some garden supply houses carry lime also. Make sure you keep it in a dry place or it will get hard as a rock. If it does, chip it off with a hammer and use the chunks anyway, it will still work. Outhouses aren't really as smelly as one might think. A little lime goes a long way. Your neighbors won't even notice as everything is contained in the pit and is covered by the out house.

Offered by Clipper.

The Hub

Troubled Times

Furnish Inflatable

Damark (800-729-9000) sells air mattresses, chairs and ottomans. For pole shift furniture, all you have to do is blow them up and your ready to go. Prices are around $39 and store to less than 1 foot square when deflated.

Offered by Steve.

Could also be useful just before the pole shift. This air filled furniture bouncing around the room wouldn't hurt anyone. If for example a normal wood chair broke loose from its tied down position, it could fly around and injure one or more bodies during the strong jolts of the pole shift. These thin plastic air filled items may not last long after the pole shift due to possible punctures, but the plastic material could be quite useful in waterproofing items taken into the wet weather. Air mattresses could probably be kept in operation a bit longer with a small stock of patching materials, but these things have a limited lifetime. I think a normal mattress would last longer.

Offered by Mike.

The Hub

Troubled Times

Furnish Plastic

I think for long-term furniture after the PS that solid plastic chairs and plastic furniture as currently sold for outdoor furniture may not be attractive but is vary practical and long lasting. Is not harmed if it gets wet. It is mildew resistant, strong light and flexible. Stacks well for storage. The plastic as a raw material is reusable. You can melt or bend it to make something else. After the pole shift we all will be thinking reuse for everything.

Offered by Mike.

The Hub

Troubled Times

IKEA

Smorgasbord, the Swedish Industry and Trade web site, reports on **IKEA**.

> **IKEA** is a global furniture company with stores in Eastern and Western Europe, North America, and Asia. Its unique concept is that the furniture is sold in kits that are assembled by the customer at home. The flat packages are easy to store and transport and the assembly can be done by unskilled persons.

Troubled Times

Furnish

Mattress

Since there is going to be a lot of humidity in the air I was thinking of buying mattresses used at sea (on boats). They have closed foam cells and therefore are waterproof. In addition in the winter your sleeping bag will not freeze to the bed. They provide excellent insulation.

Offered by Chris.

The Hub

Troubled Times

Furnish

Hammock

Everywhere, people of all ages spend roughly a third of their time resting or sleeping. After physical disaster, for our very survival, this ratio will need to be reinstated. The conventional mattress bed is heavy, cumbersome, rather expensive, difficult to protect when moving, easily ruined by moisture and mold, and difficult to dry and clean. Conversely, the hammock is lightweight, handy and easy to stow, cheap, washable, virtually indestructible, easily dried and also easily tailored to an individual's height. For these and other reasons, the indigenous people of the Amazon basin and of Central America have used hammocks for centuries.

People in the US are relatively unaccustomed to the hammock. The only thing most of us know is the yard hammock, which is often climbed into lengthwise which curves the spine and is less than comfortable. Native hammock users know that the trick is to sleep at an angle to the suspension line as one reclines flatter as one approaches the perpendicular to the hammock line.

The hammock is the epitome of simplicity: a rectangle of cloth (heavyweight denim is good) 60" wide and 3 or 4 yards long depending on one's height. Spreader bars at the ends are not necessary- just a hem through which a rope is threaded for hanging the hammock between supports about 13' apart. Suspension of the hammock by two hooks or by a tubular frame keeps one off the cold, damp, or wet ground, or even above running water. It can be covered with a waterproof and/or reflective cover or with netting for insect protection, all easily stowed and carried, and adaptable to a variety of climates.

Offered by Phil.

The Hub

Troubled Times

Furnish Bamboo

Bamboo pins are used to make furniture, a table or seat. Thus, no rope or wire is needed on these. The pin is made by slicing a section of the stem into sticks (square profile is okay), to make a pin. Insert into precisely drilled holes (accurate position). Here one needs tools to drill. Construction with wires (or rope) can come loose after a considerable time of use. Pin construction seems would last longer.

Offered by Kerne.

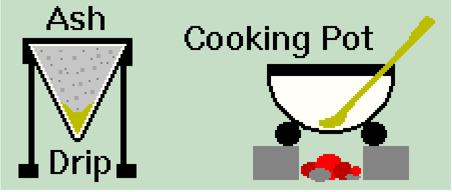
The Hub

Troubled Times

Making Soap

There is no mystery to making soap - it's simply lye and grease or oil, mixed and cooked with a little water added until it thickens to where it holds its shape for a moment when dripped back onto the mixture with a wooden spoon.

- If made from a commercial lye such as a drain cleaner, the proportions are 9 parts grease and/or oil, 1 part lye, and 3 parts water. If made from lye water made from ashes, the proportions depend on the strength of the lye water, so one goes by the consistency of the mix to determine when enough lye water has been added.
- Making lye water from ashes is similar to making drip coffee. Place paper or corn shucks to act as a filter along the bottom of a V or funnel shaped container and simply pour water in the top until it drips out the bottom into a pail. The *Foxfire Book* series, which is in the Troubled Times Book List and is highly recommended, contains diagrams and instructions on how to do this.
- "And then we'd carry th' water - nobody ever had running water in those days - we'd carry th' water and throw over th' ashes and drip th' lye. Then we'd put th' grease and lye in a pot and boil it down 'til it got hard; and then we'd use that for soap." *Foxfire Book*, page 157, Mrs. Carrie Dillard Garrison
- The mixture, which is stirred continuously, should turn white or whitish and thicken. The mixture should be stirred while lye or water is being added. When using lye water made from ashes, the soap mixture must boil longer before the water is reduced to where the mixture will make solid, rather than soft soap.
- If one desires a scented soap, spices or flowers can be soaked in water for a time prior to soap making, and that water added to the mixture while it is being cooked. Or spices or scented leaves can be added to the soap mixture just before pouring, and pulled out during the curing process before the soap completely hardens.
- Pour the mixture into a pan lined with cloth and let it sit for a couple days. This curing is an important step, as uncured soap can contain free lye in places that will irritate the skin. The cured soap may be covered with a white powder, which should be brushed off as it likewise may irritate the skin. When hardened the soap can be cut into bars or blocks and stored indefinitely.



Authored by Nancy.

The Hub

Troubled Times

Basic Steps

I remember a story I heard in grade school. It was a Medieval town, and a man was poring melted fat into a bin of straw and ashes. This was the first soap. No chemicals, just leftovers!

> Offered by Aron.

Soap Making Takes Three Basic Steps

1. Making of the wood ash lye.
2. Rendering or cleaning the fats.
3. Mixing the fats and lye solution together and boiling the mixture to make the soap.

The Hub

Troubled Times

Ashes

How are lye or Sodium Hydroxide made, or even Potassium Hydroxide. It's one of the key elements in soap manufacturing, but a natural resource supply would be preferable after the shift.

Sodium Hydroxide/Caustic soda/NaOH
derived from electrolysing table salt.

Potassium Hydroxide/Caustic potash/KOH
derived from leaching hardwood ashes.
(The white ash does indeed leach stronger potash.)

Leaching is simply the process of straining water through the ash to obtain a strong caustic liquid. Rainwater is preferable and filtering of any remaining ash will be required to clear the solution. (Note Lye is, as mentioned, very caustic and damaging to both eyes and unprotected skin. Provisions should be made to provide some sort of protection while using it. Contact with should be treated immediately by rinsing the effected area with cold, clean water thoroughly before treatment.)

Most of the available recipes mention sodium hydroxide as the source of lye, as this is more readily available commercially. There seem to be very few using the potassium hydroxide so some experimentation will be required to allow for the conversion of your own mixes. Although sodium hydroxide can be produced if you have some kind of power source and the necessary materials to make electrodes. (Note potassium hydroxide can also be used as an electrolyte for batteries.)

Offered by Brian.

If the ash is black, obviously it is more charcoal than ash, which is not desirable for lye making.

Offered by Steve.

Troubled Times

Yucca

Source: Soap Messages

Yucca "sudes" are very interesting. The Navaho use them to wash the hair off the dead to prepare them for burrial. I have tried to wash cloths in yucca on a camping trip (didn't bring enough soap) and while they got the shirt "clean" they left a slippery residue that took several machanical washing with comerical detergent to wash out. I added some soap wort to my last batch of soap. I'll test it as soon as it cures and post the result. Its supposed to increase the lather you get from home made soap. I have only, with some trepidation, started growing soapwort (Saponaria). Its an out-of-control weed in Boulder CO, where I was on sabbatical, I hope it won't do that well here in Lincoln NE. (Of course, in Boulder the landowners would've let me gather it.) We tried Yucca casually in an ecology class I taught some years ago. We peeled the "rind" off the tap root of a dead plant. The heart of the root made a lather but we didn't do much testing. The lather was sufficiently less than we're used to in shampoos that we weren't much impressed, but it was clearly "soapy". Chipping at your "soap" with a knife to get lather was also a strange experience: we figured a fresh cut would release the saponins. That was Yucca glauca in western Nebraska. By the time you get to Phoenix there are a lot of other species.

Kathleen Keeler

Troubled Times

Elaine White

Soap Recipes by Elaine C. White

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Troubled Times

Lye

The following may frighten you, but I promise that thousands of people make soap everyday without mishap. You need to know all the dangers present in order to avoid trouble. If you can get past the following warnings - you are destined to make soap! Thousands of people make soap without mishap. In order to do so, you must be aware of all safety hazards. Children, pets and feeble-minded people should not be in the soapmaking area or have access to stored soapmaking ingredients, especially lye and essentials.

Look where drain cleaners are sold and buy 100% lye (Red Devil is one brand). Don't bother looking at liquid drain cleaners and don't try Draino (it contains metal). If you aren't sure the product is 100% lye, then order lye from a soapmaking or chemical supplier. Of all soapmaking supplies, it seems that lye is the most unfamiliar to new soapmakers and they don't know where to buy it. New soapmakers are also afraid they will buy the wrong kind of lye. I highly recommend the following company for lye, accurate scales and pH test strips. ChemLab ships within the United States. Ask for lye as "sodium hydroxide technical grade" granular or flake form.

> **Chem Lab Supplies**
> 1060 Ortega Way, Unit C
> Placentia CA 92670
> Telephone 714-630-7902
> Fax 714-630-3553

Most good soap recipes list lye by weight for accuracy. Lye in granular form (drain cleaner) measures differently than lye in flake form (the form of lye from laboratory chemical suppliers, pool chemical suppliers, etc.). Scales are a necessary part of successful soapmaking and allows you to use any type of lye. Lye can be nasty if handled improperly. Lye (sodium hydroxide) is also known as caustic soda.

Keep lye tightly capped. Upon opening a container of lye, the lye crystals absorb water from the air, which can weaken the strength of the lye and cause it to form a solid lump. When not in use, keep lye closely capped. Lye reacts with some metals: aluminum, zinc, and tin. Safe containers include heatproof stoneware, glass, enamel, stainless steel and plastic. Lye can remove paint. If lye, lye/water or freshly-made soap splatters onto a painted surface, wipe it off immediately. Wash the area with water and detergent; wash it with clear water, then wipe it dry. Use old rags, because lye weakens cloth fiber.

Lye, lye/water and freshly-made soap can burn and irritate skin. You'll notice itching before burning. Lye/water on skin is first noticed by a slippery feeling. Rinse your hands with vinegar and immediately rinse them with running water. Since lye can burn skin, you can imagine what it does to eyes! Always wear eye protection! Wear sunglasses if you have to! Lye can be fatal if swallowed. If you have small children, keep lye (and essential oils) in a locked cabinet. Lye/water sitting at the edge of a counter can easily be reached by children and even swallowed. Drinking lye/water is like drinking liquid fire. If someone ingests lye/water, do not induce vomiting or otherwise try to treat them. Take them to an emergency room immediately.

Fumes are produced from lye/water. Some people are extremely sensitive to fumes that come from the lye/water. Fumes also come from the stirring container. Fumes from small batches (1 pound) usually isn't enough to cause a problem. Be aware than larger amounts of lye (larger batches of soap) create more fumes. With prolonged contact, fumes can burn the eyes and skin of sensitive people. If you make soap in large amounts and afterward feel as if your face is "sun burned," chances are it was caused by fumes.

By Elaine C. White

Troubled Times

Equipment

- one 4-to-6 cup mixing container made of lye-resistant material (I use a stainless steel mixing bowl)
- one heatproof container that holds at least 2 cups (I use a Pyrex measuring cup)
- stainless steel, plastic, wooden spoon or a rubber spatula
- two thermometers made of glass or stainless steel (candy and meat thermometers work well)
- eye protection (wear sunglasses if you have to!)
- rubber gloves (optional)
- accurate scale to weight the fats and lye
- soap molds (any flexible plastic container works well)
- a clock with a second hand or other type timer
- wire whisk (optional)
- pot holders or oven mitts
- measuring spoons

By Elaine C. White

Troubled Times

10-Step Procedure

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1. Heat the fat. Put the fats in a lye-resistant container and place a glass or stainless steel thermometer into the fats. Be sure the thermometer doesn't touch the bottom of the container and give a false reading. Heat the fats and optional ingredients to the temperature specified in the recipe.

2. Put on eye protection and rubber gloves.

3. Use a heat-proof container to measure the amount of cold water (70 to 75 degrees F) specified in the recipe. Cold water is important. If you add lye to hot or boiling water, the water could "boil-up" out of the container. If you add lye to really cold water, the lye/water might not reach the high temperatures required to make some recipes. Stir the water and slowly add the lye. The water will get hot and turn cloudy. Continue to stir until the lye dissolves. Don't breathe or intentionally smell the fumes coming from the cup because they are quite "chokey." If you wait too long to stir the water, the lye could harden in the bottom of the container. This is not a problem. You can still stir it, but it will be more difficult. Add a glass or stainless steel thermometer to the lye/water and wait until it reaches the temperature specified in the recipe.

4. When both the fat and the lye/water reach the temperature specified in the recipe, add the lye/water to the fat. It's sometimes a balancing act to get the fat mixture and the lye/water mixture to specific temperatures at the same time. Never place lye/water in a microwave (the cup could break). It takes lye/water longer to cool than it takes fat to heat. Most soapmakers wait for the lye/water to cool to about five degrees above the desired temperature, then heat the fat. When both the lye/water and the fat are within five degrees of the temperatures specified in the recipe. Use a pot holder and move the bowl to a sink (to contain splatters). Slowly pour the lye/water into the fats while stirring. Temperatures for small one-pound batches of soap poured into individual molds aren't critical. As long as the lye/water and fats are between 120 and 140 degrees F you will have good success. Larger batches or batches poured into a single mold, require lower temperatures.

5. Stir the soap until it "traces." When lye, water and fat first combine, the mixture is thin and watery. Gradually, as the lye and fat react chemically to form soap, the mixture thickens and turns opaque. "Tracing" is a term to describe the consistency (thickness) of soap when it's ready to pour into molds. Tracing is easy to recognize, yet it causes new soapmakers a lot of worry. Relax and know that the soap will trace eventually. Just stir the soap constantly for the first 15 minutes or so, then stir the soap every fifteen minutes until it thickens and traces, no matter how long it takes. To test for tracing:

   a. Drip some soap onto the surface of the soap in the stirring bowl. It should leave a "trace" or small mound.
   b. Draw a line in the soap with a spoon or rubber spatula. If a "trace" of the line remains for a few seconds, the soap has traced.

6. After the soap traces, add up to one tablespoon essential oil (if desired) and stir a few minutes longer to

incorporate the oil. About the only soap that remains totally scent-free is the Pure Soap Recipe that follows. Other fats result in soap that has a "fatty lye" smell. Essentials oils are necessary for a pleasant-smelling product.

7.

Pour the soap into molds and wait for it to harden. The recipes states this length of time as "time in mold."

8.

Unmold the soap. Soap is still harsh when it's time to remove it from the molds. Put on rubber gloves and press the back of each mold compartment to release the soap. It's a lot like removing ice cubes from a tray. Sometimes the soap doesn't release easily from the mold. To overcome this problem, leave the soap in a freezer for a few hours. Freezing soap causes it to contract slightly, become hard and release from the plastic mold.

9.

Wait the time specified in a recipe for the soap to age (usually 3 weeks). During the aging time the pH of the soap decreased (the soap becomes mild) and the bars harden. It's a good idea to write the following information on a piece of paper and place it with the soap: the date you made the soap, the date the aging time is over, and recipe.

10.

Step 10 is enjoy your soap! As soap ages, a fine, white powder may appear on the surface. This is soda ash (sodium carbonate) formed by a reaction of lye with carbon dioxide in air. This white powder is mostly on the surface exposed to air while the soap was in the molds. Soap that contains wax develops little or no soda ash. There are three ways to deal with soda ash:

a. Try to prevent it. Immediately after pouring soap into molds, cover the soap with plastic wrap or waxed paper. Press the wrap or paper onto the surface of the soap to prevent air contact.

b. Cut it away. Overfill the molds slightly. Later, when the soap hardens, take a knife and cut the soap level with the mold. This also cuts away the soda ash.

c. Wash it away. Wait until the soap ages and hardens. Wash the powder away by rubbing the soap with your hands under running water or by rubbing the soap over a wet dishcloth. Set the soap aside to dry - then enjoy your soap!

By Elaine C. White

The Hub

Troubled Times

Recipes

Ounces (oz) are determined by weight unless otherwise stated.

Soap I - Pure Soap

This is the only recipe I've discovered that remains scent-free without adding fragrance to the recipe. This soap is a bit too harsh for bath soap, but great for cleaning, washing dishes, delicate laundry, etc. Great lather and no fragrance.

16 oz coconut oil
2.8 oz lye
1 cup water (8 fluid ounces)
Fat and lye/water temperature about 120 degrees F
Estimated tracing time: 1 1/2 hours
Time in molds: 48 hours
Age: 3 weeks

Soap II -- Pure Soap Mink Oil Shampoo

16 oz weight coconut oil
1/2 cup mink oil or (4 T. Castor oil)
2.9 oz lye
1 cup water (8 fluid oz.)

Oil room temperature. Mix and use lye when the water turns clear. Put all ingredients in the blender. Follow the instructions for "Blender Soap" Don't let this soap trace. Process until the mixture is smooth (no oil streaks) and pour it into molds.

Leave in molds 2 days
Freeze soap 3 hours to release it from the molds.
Age 3 weeks.

Soap III

6 oz coconut oil
6 oz olive oil
5 oz vegetable shortening
2.6 oz lye
1 cup water (8 fluid ounces)
Fat and lye/water temperature about 120 degrees F
Time in molds: 48 hours
Age: 4 weeks

Soap IV

9 oz vegetable shortening
4 oz coconut oil
3 oz lard
2.4 oz lye

3/4 cup water (6 fluid ounces)
Fat and lye/water temperature about 120 degrees F
Time in molds: 24 hours
Age: 3 weeks

Soap V

A traditional and blender soap combination. The fats are expensive, but milk allows for about 12 bars, vs. only 6 bars of the same recipe without milk. Pretty sneaky, hugh?

8 oz weight cocoa butter
5 oz weight palm oil
3 oz weight castor oil
2.2 oz weight lye (sodium hydroxide)
1 cup cold milk (I used 2% right from the frig)
1 cup water
1 tablespoon essential oil (I added 2 chamomile tea bags and 2 jasmine
tea bags, dry)
Fats: 100 degree range
Lye/water/milk combination: 125 degree range

Dissolve the lye in the water. Add all ingredients to the blender. Process about 30 seconds, or until the mixture looks smooth and a uniform color. It will not trace. Pour it into the molds (it won't separate, trust me)

Soap VI & VII

16 oz lard or beef tallow
2.2 oz lye
3/4 cup water (6 fluid ounces)
Estimated tracing 45 minutes
Fat and lye/water temperature about 120 degrees F
Time in molds: 24 hours
Age: 3 weeks

Soap VIII -- Beeswax Castile

16 oz weight olive oil
1 oz beeswax
1 oz palm oil
2.1 oz lye
1 cup water (8 fluid ounces)
(melt the beeswax with the fats)
Fat and lye/water temperature about 150 degrees F
Tracing time: about 12 minutes FAST! (This is not a good blender soap candidate!)
Time in molds: 48 hours
Place the soap in a freezer for 3 hours, then remove it from the molds
Age: 6 to 8 weeks for the bars to harden

Soap X -- Beeswax Soap

(Follow directions at "Soap VIII". This is not a good blender soap candidate.)
16 oz weight olive oil
1 oz weight beeswax
2.2 oz weight lye
1 cup water (8 fluid ounces)

Soap XI -- Goat Milk Soap

(by measurements, not weight)

1 cup lard, melted
1 cup coconut oil, melted
1 cup goat (or other) milk
1/4 cup Red Devil lye granules (not flakes or crystals from other sources)
1/4 cup water
Dissolve the lye in the water.
Ingredients near 110 to 120 degrees F.
Add the lye/water to the fat. Stir in the milk.
Tracing time about 1 hour 15 minutes.
Leave in molds 2 days
Place in freezer 3 hours
Remove soap from molds, age 3 weeks.

By Elaine C. White

Troubled Times

Product Basics

What about bleach (purifying water) and vinegar? Wouldn't these be good things to stock up on?

Offered by Alberts.

My Food Storage Planner Software recommends 5 gal. of bleach, 2 gal. vinegar, 2 gal. ammonia, 2 Cans Baking Powder for 2 people for 1 year. I knew bleach was good for disinfecting and purifying water but I am not sure what vinegar, ammonia and Baking Powder will exactly be needed for.

Offered by Debra.

Bleach, vinegar are excellent things to have on hand. I keep nine pounds of baking soda in my supplies; it can be used like salt. Alcohol is nice to have on hand also. Vinegar and ammonia are excellent cleansers, while vinegar has several medical uses. Baking soda can be used for all sort of things; a leavening agent in baking, a cleanser, tooth brushing powder and a deodorizer.

Offered by Mike G.

Vinegar can lower the pH in your hydroponic garden - acid basically. Baking soda is a very cheap way to raise the pH in your hydroponic garden. A little goes a lot farther than you'd think.

Offered by John.

The Hub

Troubled Times

Vinegar

All The Many Uses for Vinegar

Heinz Vinegar Kill bacteria in meats: Marinating meat in Heinz Vinegar kills bacteria and tenderizes the meat. Use one-quarter cup vinegar for a two to three pound roast, marinate overnight, then cook without draining or rinsing the meat. Add herbs to the vinegar when marinating as desired.

Dissolve warts: Mix one part Heinz Apple Cider Vinegar to one part glycerin into a lotion and apply daily to warts until they dissolve.

Stains: Remove stubborn stains from furniture upholstery and clothes. Apply Heinz White Vinegar directly to the stain, then wash as directed by the manufacturer's instructions.

Grow beautiful azaleas: Occasionally water plants with a mixture of two tablespoons Heinz White Vinegar to one quart water. Azaleas love acidic soil.

Relieve arthritis: Before each meal, drink a glass of water containing two teaspoons Heinz Apple Cider Vinegar. Give this folk remedy at least three weeks to start working.

Kill unwanted grass: Pour Heinz White Vinegar in crevices and between bricks.

Remove corns: Take a poultice of one crumbled piece of bread soaked in one-quarter cup Heinz Vinegar. Let poultice sit for one-half hour, then apply to the corn and tape in place overnight. If corn does not peel off by morning, reapply the poultice for several consecutive nights.

Washing machine: Clean the hoses and unclog soap scum from a washing machine. Once a month pour one cup of Heinz White Vinegar into the washing machine and run the machine through a normal cycle, without clothes.

Cure an upset stomach: Drink two teaspoons Heinz Apple Cider Vinegar in one cup water to soothe an upset stomach.

Kill germs on bathroom fixtures: Use one part Heinz Vinegar to one part water in a spray bottle. Spray the bathroom fixtures and floor, then wipe clean. Clean soap scum, mildew, and grime from bathtub, tile, and shower curtains. Simply wipe the surface with Heinz Vinegar and rinse with water.

Deodorize the air: Heinz Vinegar is a natural air freshener when sprayed in a room.

Relieve itching: Use a cotton ball to dab mosquito and other bug bites with Heinz Vinegar straight from the bottle.

Lime deposits: Clean lime deposits and calcium sludge from an automatic drip coffee maker. Once a month fill the reservoir with Heinz White Vinegar and run through the brew cycle. Rinse thoroughly with two cycles of cold water.

Relieve a sore throat: Put two teaspoons of Heinz Vinegar in your humidifier.

Soothe sunburn pain: Apply undiluted Heinz Vinegar to the burn.

Clean food-stained pots and pans: Fill the pots and pans with Heinz White Vinegar and let stand for thirty minutes. Then rinse in hot, soapy water.

Clean rust from tools, bolts, and spigots: Soak the rusted tool, bolt, or spigot in undiluted Heinz White Vinegar overnight.

Turn a chicken bone into rubber: Soak a chicken bone in a glass of Heinz Vinegar for three days. It will bend like rubber.

Prevent bright colored clothes from fading: Before putting the article in the washing machine, soak it in Heinz White Vinegar for ten minutes.

Keep a garbage disposal clean and smelling fresh: Mix one cup of Heinz Vinegar in enough water to fill an ice cube tray, freeze the mixture, grind the cubes through the disposal, and flush

Clean a toilet bowl: Pour in one cup of Heinz White Vinegar, let it stand for five minutes, and flush.

Prevent yeast infections: Douche with one tablespoon Heinz White Vinegar to one quart warm water to adjust the pH balance in the vagina.

Clean dentures: Soak dentures overnight in Heinz White Vinegar, then brush away tartar with a toothbrush.

Remove perspiration stains from clothes: Apply one part Heinz White Vinegar to four parts water, then rinse.

Cigarette smoke? Deodorize a room filled with cigarette smoke or paint fumes. Place a small bowl of Heinz White Vinegar in the room.

Cure the hiccups: Mix one teaspoon Heinz Apple Cider Vinegar in one cup of warm water, and drink.

Eliminate odors from used jars: Rinse peanut butter and mayonnaise jars with Heinz White Vinegar.

Condition dry hair: Shampoo, then rinse hair with a mixture of one cup Heinz Apple Cider Vinegar and two cups water. Vinegar adds highlights to brunette hair, restores the acid mantel, and removes soap film and sebum oil.

Clean mineral deposits from a steam iron: Fill the water tank with Heinz White Vinegar. Turn the iron to the steam setting and steam-iron a soft utility rag to clean the steam ports. Repeat the process with water, then thoroughly rinse out the inside of your iron.

Remove light scorch marks from fabrics: Rub lightly with Heinz White Vinegar, then wipe with a clean cloth.

Repel ants: Use a spray bottle or mister filled with a solution of equal parts Heinz Vinegar and water around door jambs, window sills, water pipes, and foundation cracks.

Keep drains open: Pour one-half box of old baking soda down the drain followed by one cup Heinz White Vinegar. When the bubbling stops, run the hot water.

Prolong and brighten propane lanterns: Soak new wicks for several hours in Heinz White Vinegar and let them dry before inserting. Propane lanterns will burn longer and brighter on the same amount of fuel.

Remove decals or bumper stickers: Soak a cloth in Heinz Vinegar and cover the decal or bumper sticker for several minutes until the vinegar soaks in. The decals and bumper stickers should peel off easily.

Deodorize a wool sweater: Wash sweater, then rinse in equal parts Heinz Vinegar and water to remove odor.

Prevent lint from clinging to clothes: Add one cup Heinz Vinegar to each wash load.

Prevent ice: Prevent ice from forming on a car windshield overnight. Coat the window with a solution of three parts Heinz White or Apple Cider Vinegar to one part water.

Prolong the life of flowers in a vase: Add two tablespoons of Heinz White Vinegar plus three tablespoons of sugar per quart of warm water. Stems should be in three to four inches of water.

Prevent cracked hard-boiled eggs: Add two tablespoons of Heinz White Vinegar per quart of water before boiling to prevent the eggs from cracking. The egg shells will also peel off faster and easier.

Clean windows: Use undiluted Heinz Vinegar in a spray bottle. Dry with a soft cloth.

Eliminate unpleasant cooking odors in the kitchen: Boil one tablespoon of Heinz White Vinegar with one cup of water.

Remove wallpaper: Mix equal parts Heinz Vinegar and hot water. Use a paint roller to wet the paper thoroughly with the mixture. Repeat. Paper should peal off in sheets.

Eliminate animal urine stains from carpet: Blot up urine, flush several times with lukewarm water, then apply a mixture of equal parts Heinz White Vinegar and cool water. Blot up, rinse, and let dry.

Relieve a cold: Mix one-quarter cup Heinz Apple Cider Vinegar with one-quarter cup honey. Take one tablespoon six to eight times daily.

Deodorize a stale lunch box: Soak a paper napkin in Heinz Vinegar and leave it inside the closed lunch box overnight.

Prevent soapy film on glassware: Place a cup of Heinz White Vinegar on the bottom rack of your dishwasher, run for five minutes, then run though the full cycle. A cup of white vinegar run through the entire cycle once a month will also reduce soap scum on the inner workings.

Unclog a shower head: Unscrew the shower head, remove the rubber washer, place the head in a pot filled with equal parts Heinz Vinegar and water, bring to a boil, then simmer for five minutes.

Relieve a cough: Mix one-half cup Heinz Apple Cider Vinegar, one-half cup water, one teaspoon cayenne pepper, and four teaspoons honey. Take one tablespoon when cough acts up. Take another tablespoon at bedtime.

Retard patching plaster from drying: Add one tablespoon white vinegar to the water when mixing plaster to slow the drying time.

The
Hub

Troubled Times

Difficult

Well, the small research I was able to conduct leads me to think that manufacturing baking soda is a great deal more complicated then making vinegar. One would almost need a chemistry degree to understand most of this stuff, though experience probably helps. Here's an Old Article which explains the difficulty:

> *Pyongyang, March 19 (KCNA) - Korean scientists and technicians created a new effective method of producing baking soda with less labor. They succeeded in making the baking soda production easy through the use of dust from cement kilns as the country is suffering from the shortage of electricity and most of chemical factories are not in proper operation due to economic difficulties in recent years. Previously, the production of baking soda depended on the ammonia industry. Potassium carbonate is collected from the dust of kilns and put in water before salt treatment and blowing of low-pressure carbonic acid gas into it. Then, its reaction produces crystals of soda. When they are filtered, medicinal and edible soda is obtainable. Crystals of potassium chloride can also be made when the filtered liquid is concentrated and cooled. In this way, potassium chloride urgently needed for medical science is produced. This method is attracting attention of experts for its positive role in preventing environmental pollution.*

All that seems way too heavy for the "primitive user". Meanwhile I found out that baking soda manufacture was probably one of the earliest Chemical Industries. And also it appears that mixing baking soda, which is a chemical base, with vinegar, which is an acid, causes a gas to be released which can blow up a sealed bottle. So whatever you do - be careful, if you're not into Molotov cocktails.

Offered by Sol.

Troubled Times

Acid Foods

Vinegar was such an important staple in colonial homes that they devised many ways to make it.

Apple Cider Vinegar
: Put cut up apples in a stone crock and cover with warm water. Tie cheese cloth over the top and set in a warm place (4 to 6 months). Strain off the vinegar. Let sweet apple cider stand open in a jug for 4 to 6 weeks and it will become vinegar. Place apple and peach peelings and a handful of grape skins in a wide mouth jar and cover with cold water. Set in a warm place and add a couple of fresh apple cores every few days. When a scum forms on top, stop adding fresh fruit and let it thicken. When the vinegar is good and strong, strain through cheese cloth.

Raspberry Vinegar
: Pour 2 quarts of water over 1 quart of freshly washed red or black raspberries. Cover light and let stand overnight. Strain off the liquid and discard the berries. Now prepare 1 quart more of fresh raspberries and pour the same liquid over them. Let this sit overnight. Do this for a total of 5 times. Then add 1 lb. of sugar to the liquid and stir until it dissolves. Set the mixture aside, uncovered for a couple of months. Strain before using.

Raisin Vinegar
: Put 2 lb. of raisins in a gallon of water and sit it in a warm place. In two months it will become white wine vinegar. Strain the vinegar off and bottle. Make more by adding another lb. of raisins to the dregs and going through the process again.

Winter Vinegar
: Made by letting wine stand open to the air for about a month.

Offered by Toni.

Troubled Times

Easy

Here's what I found that one needs to make vinegar at home. This is from the *Vinegar Man* site, and it's the simplest explanation I could find on the Web. The only problem here is obtaining the initial "starter culture" or "mother", without which subsequent vinegar making is difficult if not impossible. From what I could ascertain - the "starter culture" is usually some already existing vinegar!

> *To make vinegar the simplest way, you need to find yourself:*
>
> > ***a.*** *A container with a spout .(e.g. a sun tea jar) The spout is not mandatory but it sure makes things easier. The container should also have a wide mouth to let in air as well as a way to keep out flies. (Air is very important!) You will be visited by vinegar flies! They are my assistants. The container should be glass or stainless steel for best results. Aluminum and iron are definitely out. Some plastics can work, some are dangerous because they react with vinegar. So, for now, I would skip plastics.*
> >
> > ***b.*** *Some fresh fruit juice. (Even the frozen variety will do. But I would stay away from the bottled ones because they add chemicals to keep the juice from turning to vinegar. (See how easy it is to make vinegar.)*
> >
> > ***c.*** *A starter culture. Notice I said "starter culture". Don't make a big deal about getting a "mother", it will probably ruin otherwise good vinegar. What you need are the bacteria which make vinegar. Check the home brew stores or pick up a bottle of unpasturized, unfiltered vinegar. I have had great success with Braggs Apple cider vinegar. The vinegar in the culture keeps out the other molds and bacteria until the vinegar bacteria have had a chance to take firm control of the juice.*
> >
> > ***d.*** *A dark place. You could also paint your jar or cover it . The object is to keep out the light. Light will slow the vinegar production or even kill your culture.*
> >
> > ***e.*** *A warm place. The precise temperature is not so critical but it does make a difference on how fast your vinegar is made. If you feel comfortable at that temperature, most likely the vinegar bacteria will be happy also.*

Here's how you make vinegar from Wine.

> *Making vinegar from red wine:*
>
> > ***Question:*** *How do you make vinegar from bottled red wine?*
> > ***Answer:*** *Leave it uncorked at room temperature for a while. Air oxidation of the alcohol (ethanol) in the wine will form acetic acid AKA vinegar. Be careful with your taste test, though. There isn't a whole lot of quality control involved here!*

Lastly, I found a Treatise on “how to make vinegar at home using readily available ingredients and supplies."

> Offered by Sol.

Apple Cider Vinegar would be the best, for it has many uses, both medicinal and cleaning. Its made from hard cider or apple wine. The easiest method for making you own is to start with a clean and sterilized glass jar or bowl. Never use aluminum, glazed pottery or stainless steel because it creates a reaction. Fill half full with dried herbs (garlic for example) top the jar off with champagne, white wine, red wine, or cider vinegar. Seal and store in a cool dark place for a month. Shake periodically. Strain and bottle. This may stored up to 6 months. I have found that just about any gallon jar works, (pickle jars, milk jugs). There are manufactures that capitalized on the idea to make a buck.

Offered by Mary Ann.

What is a sun tea jar? A sun tea jar is a glass one gallon jar. That’s' about it. You add water and about ten tea bags, screw the lid on and set it out in the sun until it makes tea. Some jugs have a little spout at the bottom you can get tea from if you place it in the fridge for example.

Offered by Clipper.

Honey vinegar: pour one gallon of boiling water over 4-1/2 pounds of honey in a clean crock. Stir to dissolve. Make a paste of one cake or package of yeast and a small amount of warm water. Spread this on a slice of toast, and float the toast on the liquid. Cover with cloth and let stand 16 days. Skim it, strain it, and let it stand another 4-6 weeks until it tastes like vinegar. Then bottle. http://www.naturemoms.com/homemade-vinegar.html

Offered by Carla

The Hub

Troubled Times

Borax

The simplest explanation of what Borax is and how it's obtained I found on Discovery. Here's a short quote from them:

> *Most of the world's supply of borax comes from Death Valley in southern California. Borax is also taken from open-pit mines in the nearby Mojave Desert, where miners strip away the covering ground to expose the borax bed. Workers use explosives to blast loose the solid borax. The large chunks of borax are crushed and dissolved. This solution goes through many purification steps until borax crystals are obtained. Borax is also obtained from "dry" or "bitter" lakes. The brine, which contains many salts other than borax, is pumped from the lake into containers. The solution is allowed to stand in vats to separate the borax from the heavier salts, which sink to the bottom. The remaining brine crystallizes, and the borax is refined.*

Offered by Sol.

Troubled Times

Product

Cleaning Solutions

Vinegar and lemon juice are very effective cleaning solutions.

Offered by Lyn.

Ammonia is a by-product of urine, and it is an excellent cleaner. Biodegradable too!

Offered by Nancy.

The Hub

Troubled Times

Product

Techniques

From Tennessee Valley Authority Regional Waste Management

For common household tasks, try these nontoxic strategies using the above ingredients:

Freshen air by opening windows and doors for a short period; distribute partially filled dishes of vinegar around the kitchen to combat unpleasant cooking odors; boil cinnamon and cloves in a pan of water to scent the air; sprinkle 1/2 cup borax in the bottom of garbage pails or diaper pails to inhibit mold and bacteria growth that can cause odors; rub vinegar on hands before and after slicing onions to remove the smell; use bowls of potpourri to give inside air a pleasant scent.

All-purpose cleaner can be made from a vinegar-and-salt mixture or from 4 tablespoons baking soda dissolved in 1 quart warm water.

Disinfectant means anything that will reduce the number of harmful bacteria on a surface. Practically no surface treatment will completely eliminate bacteria. Try regular cleaning with soap and hot water. Or mix 1/2 cup borax into 1 gallon of hot water to disinfect and deodorize. Isopropyl alcohol is an excellent disinfectant, but use gloves and keep it away from children.

Drain cleaner. Try a plunger first, though not after using any commercial drain opener. To open clogs, pour 1/2 cup baking soda down drain, add 1/2 cup white vinegar, and cover the drain. The resulting chemical reaction can break fatty acids down into the soap and glycerine, allowing the clog to wash down the drain. Again, do not use this method after trying a commercial drain opener - the vinegar can react with the drain opener to create dangerous fumes.

Floor cleaner and polish can be as simple as a few drops of vinegar in the cleaning water to remove soap traces. For vinyl or linoleum, add a capful of baby oil to the water to preserve and polish. For wood floors, apply a thin coat of 1:1 oil and vinegar and rub in well. For painted wooden floors, mix 1 teaspoon washing soda into 1 gallon hot water. For brick and stone tiles, use 1 cup white vinegar in 1 gallon water and rinse with clear water.

Metal cleaners and polishes are different for each metal -- just as in commercial cleaners. Clean aluminum with a solution of cream of tartar and water. Brass may be polished with a soft cloth dipped in lemon-and baking-soda solution, or vinegar- and-salt solution. Polish chrome with baby oil, vinegar, or aluminum foil shiny slide out. Clean tarnished copper by boiling the article in a pot of water with 1 tablespoon salt and 1 cup white vinegar, or try differing mixtures of salt, vinegar, baking soda, lemon juice, andcre am of tartar. Clean gold with toothpaste, pewter with a paste of salt, vinegar, and flour. Silver can be polished by boiling it in a pan lined with aluminum foil and filled with water to which a teaspoon each of baking soda and salt have been added. Stainless steel can be cleaned with undiluted white vinegar.

Oven cleaner. Sprinkle baking soda on moist surface and scrub with steel wool. Or use Arm

& Hammer Oven Cleaner, declared nontoxic by Consumers Union.

Scouring powder can be made from baking soda or dry table salt. Or try Bon-Ami Cleaning Powder or Bon-Ami Polishing Cleaner.

Tub and tile cleaner can be as easy as rubbing in baking soda with a damp sponge and rinsing, or wiping with vinegar first and following with baking soda as a scouring powder.

Window and glass cleaner is easy with these tips: to avoid streaks, don't wash windows when the sun is shining. Use a vinegar-and-water solution, cornstarch-vinegar-and-water solution, or lemon-juice-and-water. Wipe with newspaper unless you are sensitive to the inks in newsprint.

The Hub

Troubled Times

Substitutes

From Tennessee Valley Authority Regional Waste Management

Safe Substitues for Household Toxics

Until World War II and the zenith of the Chemical Age that followed war-related research, householders used a limited number of simple substances to keep most objects in the house clean, order-free, and pest-free. Soap, vinegar, baking soda, washing soda, ammonia, borax, alcohol, cornstarch, and certain food ingredients were used to lift out spots and stains, deodorize, polish wood or metal, disinfect, scrub, repel pests, clean pets, wash and starch clothes, and to perform countless other household tasks. Simple cosmetic preparations kept hair lustrous and skin supplied with the aid of ingredients such as eggs, oil, clay, vinegar, and herbs. ...

Safe Substitutes in the Kitchen and Bath

One shelf of simple and relatively safe ingredients can be used to perform most home cleaning chores. All that's needed is a knowledge of how they work and how different ingredients should be combined to get the cleaning power needed for a specific job.

Baking Soda
is sodium bicarbonate. It has a number of useful properties. It can neutralize acid, scrub shiny materials without scratching, deodorize, and extinguish grease fires. It can be used as a deodorizer in the refrigerator, on smelly carpets, on upholstery and on vinyl. It can help deodorize drains. It can clean and polish aluminum, chrome, jewelry, plastic, porcelain, silver, stainless steel, and tin. It also softens fabrics and removes certain stains. Baking soda can soften hard water and makes a relaxing bath time soak; it can be used as an underarm deodorant and as a toothpaste, too.

Borax
is a naturally occurring mineral, soluble in water. It can deodorize, inhibit the growth of mildew and mold, boost the cleaning power of soap or detergent, remove stains, and can be used with attractants such as sugar to kill cockroaches.

Cornstarch
derived from corn, can be used to clean windows, polish furniture, shampoo carpets and rugs, and starch clothes.

Isopropyl Alcohol
is an excellent disinfectant.

Lemon Juice
which contains citric acid, is a deodorant and can be used to clean glass and remove stains from aluminum, clothes, and porcelain. It is a mild lightener or bleach if used with sunlight.

Mineral Oil
derived from seeds, is an ingredient in several furniture polish and floor wax recipes.

Vinegar
is made from soured applied juice, grain, or wine. It contains about 5 percent acetic

acid, which makes it a mild acid. Vinegar can dissolve mineral deposits, grease, remove traces of soap, remove mildew or wax buildup, polish some metals, and deodorize. Vinegar can clean brick or stone, and is an ingredient in some natural carpet cleaning recipes. Use vinegar to clean out the metallic taste in coffeepots and to shine windows without streaking. Vinegar is normally used in a solution with water, but it can be used straight.

Safe Substitutes for Personal Hygiene and Cosmetic Products

Moisturizers and conditioners
egg yolk, milk, yogurt, safflower oil (for light moisturizing), olive oil (for dry skin or hair), water, oatmeal, jojoba oil.

Astringents/after shaves
witch hazel, diluted isopropyl alcohol.

Deodorants
baking soda, white clay, deodorant crystals.

Toothpastes
baking soda, salt.

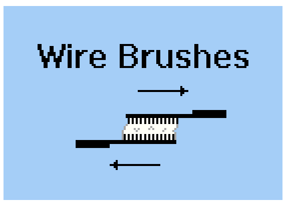
Soaps cleansing agents
castle soap, olive-oil based soap.

Troubled Times

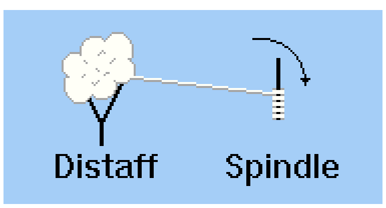
Spinning

Spinning a thread, a rope, or a strand of yarn involves three steps - straightening the material to be spun, putting a twist in a thin strand of the material, and winding the twisted strand onto a bobbin.

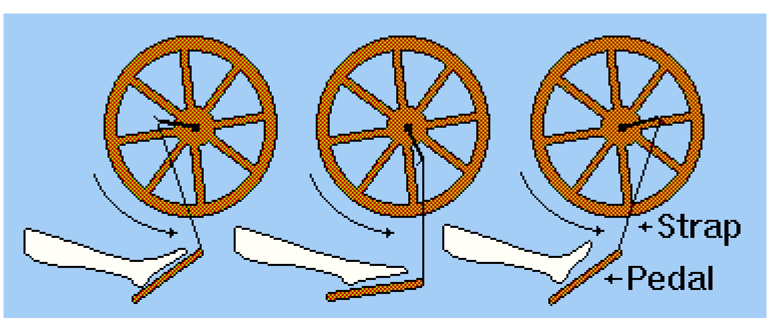
- Material to be spun can be any **fibrous material** such as wool from animals, flax and cotton from plants, or silk from silk worms. Preparing the material involves washing it, and in the case of flax, soaking and working it in water to remove rotting soft matter from the fibers. The clean fibers are then combed straight or carded, an action where the fibers are caught between two flat wire brushes, called **cards**, pulled in opposite directions.



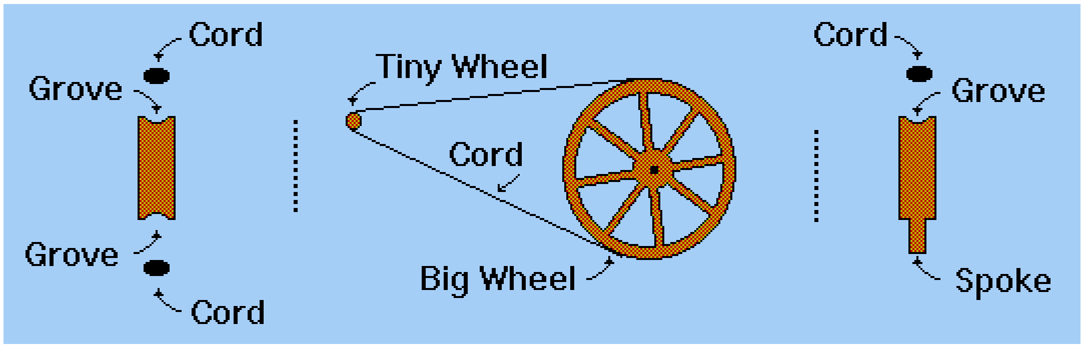
- In the most primitive form spinning is done with a **distaff** and **spindle**, where the hand-held spindle is moved in a circle by wrist movements and after a twist is put into the thread, is wound by hand onto the spindle. This process is used in one form or another in primitive cultures around the world.



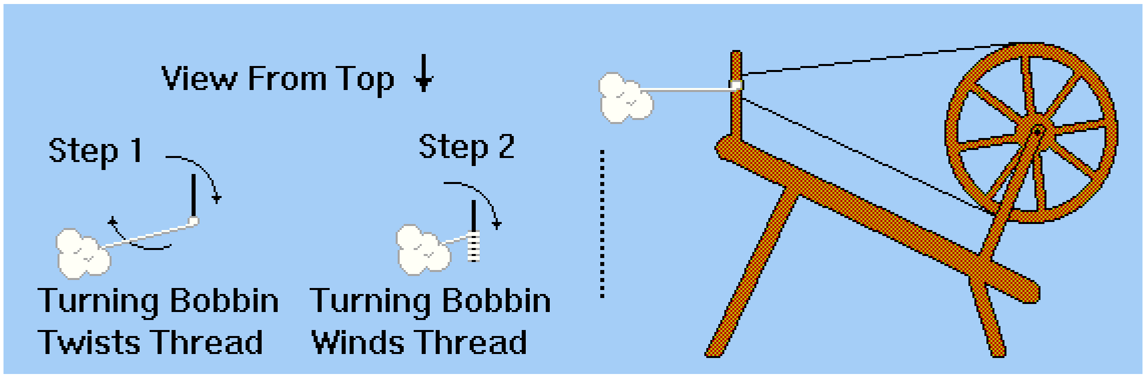
- The spinning wheel improves this process, allowing a **foot pedal** to create the spin while the hands are free to work with the material. The foot pedal is attached by a strap to a special spoke sticking out from the center and to the side of the wheel. When this special spoke is on the downward side of the circle, the foot gives a gentle nudge to the foot pedal, encouraging the motion. When on the upward side of the circle, the foot releases, allowing the pedal to raise up so as not to slow the motion of the wheel.



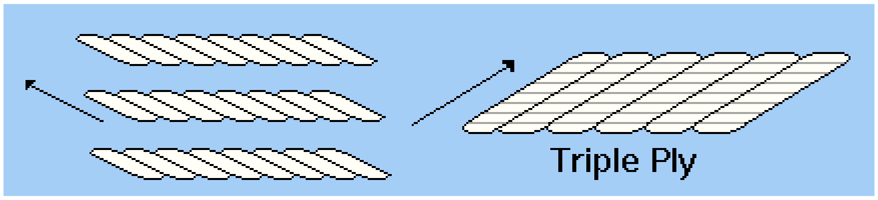
- There is a groove in the **wheel** that holds a cord, and a similar groove in a tiny wheel on the other end of the Spinning Wheel. The relatively slow motion of the large wheel thus makes for many turns of the tiny wheel, which is attached to the **bobbin**. This bobbin replaces the more primitive spindle. Enough tension is placed on the cord wrapped around the wheel and thence to the bobbin so that the cord does not readily slip on either the wheel or the bobbin. The knot in the cord should be as smooth as possible.



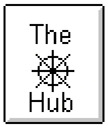
- A portion of the clean and straightened fibers are hooked onto the pointed end of the bobbin, and the turning motion begun. The material is first drawn out gradually to a **thin thread** while attached to the *end* of the bobbin. The spinning wheel now is giving a twist to the thread. The drawing out of the material should occur simultaneously to the twisting, so that the twist climbs back toward the receeding hand. When the material is twisted to an arm's length, the thread is allows to wind up along the length of the bobbin, coming back to the tip for the next thinning and twisting action. During twisting, a slight tension holds the thread back from winding on the bobbin.



- To prevent unraveling and give added strength, the single ply thread is spun *in the opposite direction*, into a **three ply strand**. This is done by running single threads between different fingers of the hand, skipping the twisting step and just winding onto a large bobbin while turning the wheel in the *opposite* direction from the direction used to create the single ply strands. Unraveling is prevented now because all twists are blocked by an opposing twist.



Authored by Nancy.



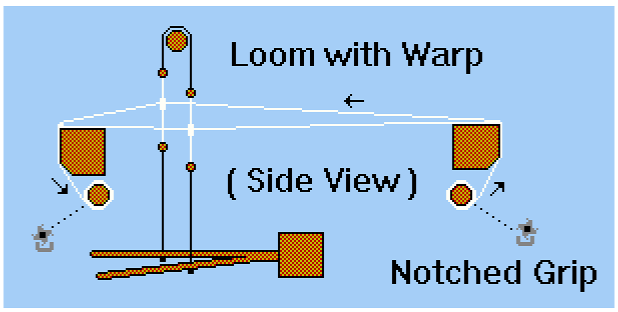
Troubled Times

Clothes

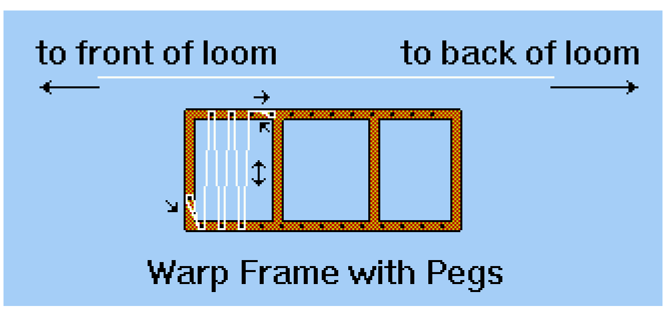
Weaving

Weaving requires two different threads - the warp and the weft. The warp is long and strung from the front to the back of the loom; the weft is laid from side to side during the weaving process. Looms can be large, several feet wide, or small enough to be placed on a table. Cloth woven on a small loom can be sewn together to make a larger piece.

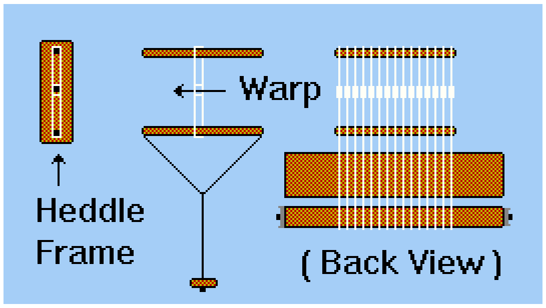
- The **warp** is long, runs from the front of the loom to the back, and is wound around horizontal wooden bars at the front and back. These bars turn, to wind the warp at the front end or unwind the warp at the back, by using a simple **notched grip** attached to the ends of the bars.



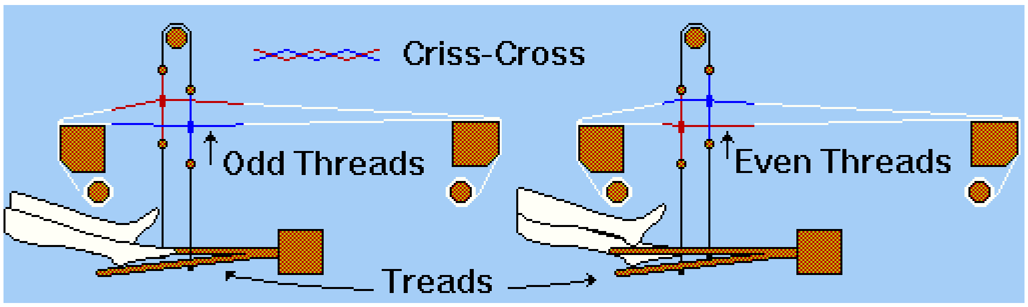
- The warp is strung by winding a continuous thread around pegs on a **warp frame**. Wind the thread back and forth several times, creating several warp threads at one time, and then grip the bunch on both ends and transfer the **warp lengths** to the loom frame. This is done repeatedly until the warp is as wide as the loom or as wide as desired. Make the warp as long as possible, as the very front and back of the warp can never be woven and become waste or fringe.



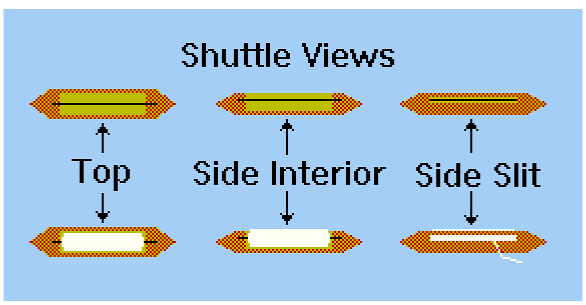
- The warp threads on the loom are threaded through **heddles**, which are also made of string or thread. A heddle is in essence a small string loop inside a larger string loop, with the small loop in the middle to hold a warp thread so it can be raised or lowered during the weaving process. The heddles are made on a **heddle frame** composed of three nails on a board, the top loop tied above the middle nail, then below the middle nail, then below the bottom nail.



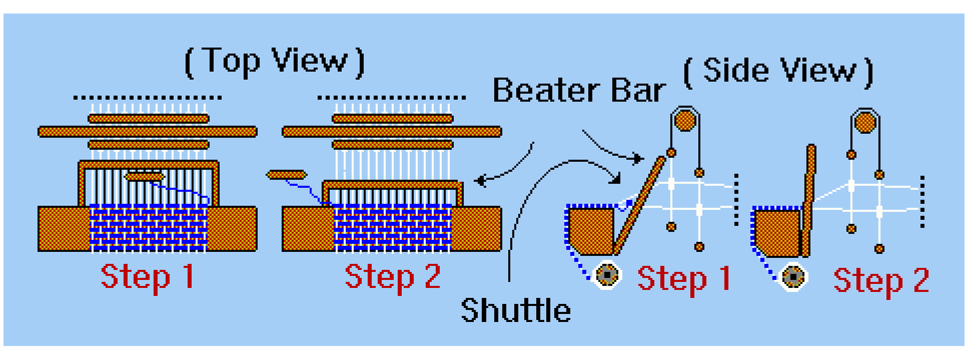
- The warp threads are strung through the heddles in the two heddle racks so that the odd warp threads go through the heddles on one rack, and the even warp threads go through the heddles on the second rack. Then, by pressing one **tread** or the other, the warp threads are raised and lowered by a pulley action, creating a **criss-cross** that secures the weft threads passed back and forth across the warp.



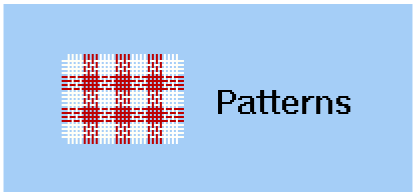
- The weft threads are wound onto a **bobbin**, a metal rod, that is passed back and forth across the warp threads inside a **shuttle**, as though they were sailing across the warp threads inside a tiny boat. The shuttle is a size that can be held in the hand, longer than wide, and the wood is smoothed to avoid snagging during the weaving process. The shuttle has a rectangle cut from the center where the filled bobbin is placed. The metal rod of the bobbin is held in place by notches at the ends of this hole. A slit is cut at the side where the weft threads unwind.



- After the shuttle is passed and the weft thread pulled so there is no slack, the **beater bar** is pulled forward to tap the weft snug against the criss-cross of the warp threads. Then the beater bar is dropped back, away from the weaver, and the warp threads reversed by the heddle pulley action controlled by the foot treads. The beater bar has a thin wire or reed to go between each warp thread, and is not used with force but a gentle tapping action.



Different **patterns** can be woven into the material by alternating colors in the warp thread and using a number of shuttles - a checkerboard by alternating groups of red and white warp threads and also alternating groups red and white weft threads. The edge of the material should be kept trim, so the material won't unravel, and when the material is removed from the loom the warp threads are tied on both ends and can be left as a fringe or woven back into the material with a needle to secure them.



Authored by Nancy.

Troubled Times

Clothes Spinning Wheels

I bought today a spinningwheel from someone for just 50 guilders (about 22 us dollars) and it's in top shape and complete. I am very happy with it and this is my first real item for the aftertime life that I’ve bought, which makes it rather symbolic too. Spinning Wheels can be Purchased in the US too.

Offered by Michel.

The Hub

Troubled Times

Linen

The flax plant not only produces grain - flaxseed - the plant *itself* is not a waste! Soak it in water and beat it and you get long fibers for spinning and weaving. Flax is what makes linen! I’m not sure if cotton has taken over this market, but in the old days, linen was valued. My grandmother’s spinning wheel had a few threads of flax on the spindle, from the old days at the turn of the century. These threads were still in good shape after almost a century!

Offered by Nancy.

The Hub

Troubled Times

Clothes

Sewing Machines

Hi Mike,
I read your small caption about turning a newer sewing machine into a treadle one. Do you have more information on the subject?
I have an older Singer about 60 years old, and would like to convert it into a treadle machine if it is possible.
Thanks, Marilyn

You need to pick up an old treadle wheel foot pedal unit. Has a place to put your feet on and as you rock it back and forth turns a pulley. This pulley then is adapted through a flex shaft or another set of pulleys to turn the shaft on the old motor that turned the sewing machine shaft. I picked up an old rocker treadle wheel for $30 at a garage sale once. You might be able to make one of these units. Has an eccentric bearing on a pulley that goes down to the foot pedal rocker.

Offered by Mike.

I have one of those old Singer machines (just gathering dust at the moment). It is a treadle-type - very common - and I would like to recondition it for use. Do you know anything about that or have any good sources? Is it better to get rid of an old machine and use the treadle with a new machine?

Offered by Craig.

Is there anything wrong with the old machine? If not, don't fix it! Often I have found that the older antique household furnishings are sturdier and longer lasting, not to mention easier to work on!

Offered by Roger.

Converting a new machine to work on an old treadle wheel takes some doing to get the rotational speeds correct. Do this as a last resort. Since clothing will be one of the long term vitally important items. The strategy I would recommend is fix up the old treadle unit if it looks like it will last a while. Keep this as a backup. Purchase a newer electrical power type unit whether used, or new, this is your choice. We know we will need power for food growth, and lots of it. These newer sewing machines take very little power and as such would work fine and will use a very small amount of the power that we will generate. One could use a 12V - inverter to provided 110v AC or straight 110V 60 Cycle from wind or water power.

Offered by Mike.

The Hub

Troubled Times

Clothes Treadle

Offered by Mike.

The Hub

Troubled Times

Felting

One of the things I learned at the **Awareness** camp is there is a process called felting which is an easy and inexpensive way to make wool garments. I saw some of the products they made in one of the classes and said to my self this is a great way to produce clothes under pole shift conditions. I will quote the coarse objectives.

> *Get ready for the cold season by creating your own felted garment! Different methods of felting and types of wool will be discussed and experienced in producing a variety of functional articles of clothing. The ancient tradition of felting produces garments of limitless design that are extremely durable and warm. Relative to other methods of fiber construction felting takes little time to produce finished articles. During this workshop you will have the choice of making a variety of articles - socks or shoe liners, hats, bags, mittens, etc. All materials are included. Extra wool will be for sale.*

This class was offered was offered in December and I had the chance to wear a pair of slippers they made during the **Awareness** class, I was impressed. **Woodswisdom** is located in Fayettesville, PA right off interstate 70.

Offered by David.

Troubled Times

Temperature Extremes

The key to staying warm, when the body is generating heat as in working or walking outside is to layer enough lighter clothing (and in the wind and/or rain) to cover the layered clothing with a shell that stops the wind and rain. The following are a few specific thoughts that relate.

1. The inner layer (underwear) should be of the kind that will "wick" perspiration to the next layer. Normal cotton "long johns" are not a good choice as they retain moisture. I know that EMS carries a very good line of wicking underwear that is light weight and very effective; it is expensive, but well worth obtaining at least a couple of sets. If your underwear is wet from sweat, you'll be cold!
2. Layers should be such that they will *not* retain moisture. That means that cotton is *out*! and wool and some other synthetics are *in*.
3. Obviously, as one heats up by working and cools down by resting, the inner layers are adjusted (taken off and put back on) to maintain a comfort zone.
4. 4. I choose layers that are different sizes. Each layer should be at least 1/2 size larger than the previous, with the outer layers a whole size apart. (That's how I do it and find to be most effective). A good choice for inner layers are light weight sweaters of an open weave. They insulate very well by providing "dead air spaces" and minimize the overall weight you are carrying - important in working or hiking.
5. Generally, when I plan for cloths that will be used for layering, I choose sizes and material (thickness) based upon my current cloths size. It occurs to me that most of us will be loosing weight, both because of an increased exercise level and a change in diet. Therefore, it may be worth considering planning for clothing that would be too small for us *now*. A perfect reason for digging in the closet or attic for those old cloths, and for looking at used cloths at yard sells and such. That way, the cloths are inexpensive, can have a few stains and repairable rips etc., and cost very little.
6. A *very* good source for inexpensive wool clothing is men's suites. That is what I use exclusively for layered pants.
7. I've found that, for me, the main problem with layered pants is how to keep then up! I've solved that quite well by using individual suspenders for the outer layers; but the best has been to purchase the wide (2 to 3 inch) suspenders made for holding the weight of a carpenters tool belt (look in the tools section). It will hold them all up at an even height and I don't get all entangled in them like I sometimes do when using multiple "normal" suspenders. And it's much easier to remove and replace layers using the single "heavy duty" one. The clips that attach to the pants open quite wide and the clip is very wide. The straps also being quite wide make carrying the weight of the pants on the shoulders much less tiresome.
8. With the exception of the underwear, I do/plan to rely exclusively on wool. Not only for the reasons stated above, but because my personal experience indicates so. Wool will *not* retain moisture, you can douse it with a hose and within a half hour or less, it may be damp but it will have regained almost all of it's insulating ability. If treated properly (washed and dried correctly) the original clothing will last for years before requiring replacement. In addition, it is something that can be easily fabricated (spun and woven; and other techniques like crochet), using well known and proven techniques. In my opinion, it's only drawback is that it is heavy, even when bone dry. Somehow, I expect that we will be healthier and stronger before long, so don't really consider that much of a problem. It is also perfectly adequate for face and head protection; although for really cold places we need to work on the head area as 80% of body heat is lost through the head.
9. The last area is the most outer shell. When necessary, like snow mobiling, I use a kayaking "dry suit". It is made of a synthetic material that is impervious to wind and water; and is expensive and rather fragile, can be torn or "poked" rather easily, and is *very* expensive. I don't have any ideas for this for the times after the initial "cache" is too worn to be effective. If there are wild animals, leather can be easily produced and will serve quite well. *If*

we can somehow support the growing of sheep for wool, perhaps leather can be made from their skin as they die for whatever reason. In the short term, the outer shell could be any of the items mentioned by others.

10. I guess my last comment/opinion is what *not* to plan for. It can be summed up as non-layered one piece garments, such as ski suites, quilted one piece outfits and single parka type coats. None of these allow for the necessary ability to adjust body heat as one works outside and as conditions vary. Neither do they allow the wearer to remove one or more layers to be removed and allowed to dry the moisture that has built up from strenuous activity.
11. One last thought. We also need to consider how/if we are are going to heat our shelters. If we are planning on hydroponics and even fish ponds, there is no option. Neither can be allowed to freeze or even get very cool. As for the people, the concept of layering of clothing applies just as much as when outside. It becomes much simpler if we are planning to grow food because we will be keeping the temperature at a level that the special underwear won't be needed; maybe some other material could be used for underwear inside, as not many folks can tolerate wool directly on the skin, especially the more sensitive parts of the body. We need to consider allergies that some folks have to some of these materials.

Offered by Ron.

Troubled Times

Conditions

There are three types of weather conditions:

1. Cold
2. Hot
3. Wet

All three have one thing in common, layering. With layering you can adjust your body temperature to the amount of energy you are expending.

Cold

GorTex against the skin, cotton shirt, fleece shirt. Hooded Parka: Waterproof and Windproof. Drawstrings at waist, base of the head, and supporting the hood visor so it can be shaped to form a tunnel against the wind. Button overlay on the zipper to keep out the wind. Gor Tex long johns covered by wool pants. 2 pair of socks in boots made for cold weather (rubber not leather) lined with wool felt. Gaiters to keep snow and ice out. High cuff mittens with leather palms. Cotton face mask and throat protector. In very cold areas apply Vaseline on the face to protect it against the elements. Campons to walk on ice, snowshoes and sunglasses for the snow glare.

Hot

Cover the whole body at all times while the sun is up with layers of light-colored clothing made of cotton. Cotton pants that have a drawstring at the ankles to keep the sand and crawly things out. A large woolen scarf for cold nights. Leather boots treated with saddle soap to keep the leather from drying and cracking, 2 pairs of heavy socks that must be aired out each night to retard fungus buildup. Wrap ankles with "puttees" (cotton wraps). Safari hat that allows air circulation to the head. A baseball cap with a towel under it will work, making sure the towel covers the ears and neck. Cotton face cover with slits for the eyes to protect the face from blowing sand. Sunglasses. In an emergency situation cut eye slits in a cotton strip and wrap around the face.

Wet

Gore Tex clothing next to the skin, cotton shirt and pants, rain slicker and rain pants, rubber boots with 2 pair of socks. Cotton hat or hard hat in narrow areas. Cotton gloves. Keep face clear of obstructions so changes in the air quality can be detected immediately. If you are anticipating bugs, wrap your neck, wrists, and ankles with cotton strips and place a netting material under your hat extending into your shirt.

Offered by Mary.

Space Blankets

All weather NASA space blankets can be found at **Eureka** tent sales stores! I found some this week. I was asked if "I was expecting an emergency" as I bought 5 of them.

Offered by Kristy.

Troubled Times

Material

What fabric or maternal works best for damp wet weather? I suspect cotton will not dry, and will eventually rot, whether kept inside or outside. I tried drying some all cotton shirts in my garage during a semi-rainy week and it took all week to semi-dry. If it was real wet outside I suspect it would never dry. Think some other fabrics must be better at drying in high humidity. I am defiantly no expert on this subject so need to ask. What materials would be best to have around for what purposes. For example what materials would make good towels both for dishes, and body drying. What would work for keeping warm in cold windy wet weather, outside with no place to go to dry out? I know for some, wool is scratch, and not comfortable. Is there one or more type of material best to put close to the body, and another for saving body heat, and another for shielding for water and wind. What to use - Polyester, wool, nylon, silk, Polyester/cotton mix, etc.; when is it best to use what material is the question? Possibly, for the cotton and other products we could use colloidal silver during washing to help cut down on the rot possibility.

What do the people in northern climates wear while sleeping, when there electricity goes off, and the house is cold in mid winter? What sheets do they use? I find my cotton sheets feel cold at 60-65 degree. What is this basic survival information.

> Offered by Mike.

My sister is Texas writes: Flannel is indeed the warm way to be in a cold bed. Flannel sheets are even made for water beds. But without the heater for the water, the bed gets so cold that you cannot put enough blankets between you and the waterbed mattress to keep away from the cold. The cold comes through.

Cotton fiber
: is the best against the skin. It breathes and absorbs moisture. Feels good. But the fiber is porous and fat. By fat I mean the fiber is thick and hairy. Like the end of a Q-tip as compared to a smooth thread for sewing. One is skinny and dries fast and the other is fat or thick and porous and dries slowly. It retains moisture and that is why it takes so long to dry. Flannel is brushed cotton fiber and is even more porous so it takes longer to dry.

Synthetic fabrics
: are skinny man made fibers. They do not retain moisture at all. 100% polyester fabric is the best. It is very warm to wear and sleep in. It dries very quickly because it doesn’t absorb moisture. That also makes it hot in the summer. The new thicker Polarfleece is wonderful even as coats and blankets. It is just thicker 100% polyester that has been brushed. Polarfleece is a brand name of 100% percent polyester that has been processed to be brushed so it feels soft like flannel cotton shirts. It is tremendously lightweight, doesn't wrinkle, is very very warm because it traps the body heat, and it washes easily and dries quickly. It just is too hot for summer. There are many brands out there, but if you ask for Polarfleece fabric, you will get thick 100% polyester even if you buy a cheap brand.

Silk
: is a natural fiber that has the same warm properties as polyester, but it does let moisture out and breathes with the body. It is good for winter *and* summer. It dries quickly. But it is expensive.

Offered by Mike.

Troubled Times

Layers

The biggest secret is dressing in layers, as air is your best insulator. This way, you will have a layer of air between each layer of clothes (loose clothes). Always wear a hat. Most of your body heat will escape through the top of your head. About three layers will keep you warm usually. Stay dry. When sleeping in a good, down sleeping bed, sleep in your long johns or underwear. It lets your body breath and not sweat. I have done it at -30 F. and colder and still sweat in the bag. You will also be warmer when you get up because you did not sleep and sweat in your clothes all night. Keep your clothes at the bottom of your sleeping bag on the inside to keep them warm. Getting dressed in the bag can be an exciting experience. If you dress outside the bag, you will learn to do it in hurry. All else fails, sleep with a friend if your manhood can take it. You will share body heat this way.

Offered by Clipper.

The Hub

Troubled Times

Mummy Bags

Ran into some mummy bags that look a bit like a sleeping bag but different. They have a draw stings that tightens up around the head. The majority of the brands did not have any cotton in them. Made of all non-water absorbable materials.

Offered by Mike.

The Hub

Troubled Times

Cotton

I just spent 4 days and 3 nights at a survival camp to learn about Awareness. This was my first experience with winter camping, as I took the option to tent camp all 3 nights. Temperatures ranged form a low of the high teens at night with 20-25 miles per hour wind gusts to the upper 30's during the day. The first lesson I learned was cotton kills. Although I layer up pretty good at night I had too much cotton on and almost froze. If the pole shift occurs and you are not equiped with the right type of fabric in your clothes you will greatly diminish your chances of survival. The gentleman who ran the camp wanted to teach me a lesson the first night and provided me with an article and some proper type clothes the 2nd and 3rd nights. The article is called **Fiber and Fabric Construction - Death by Exposure - Hypothermia** by William. W. Forgey. So I got all my cotton long underware and threw them out. The first paragraph of the article is as follows:

> *Cotton has been a mainstay of fabric construction since ancient times. Its use in outdoor clothing cannot be condemned too highly. Designer and traditional brands of jeans have no place in the outdoors. Cotton allows heat to be conducted through it, even when dry, at a rate 3 times faster than wool, nylon, polyester and acrylic fiber cloth. The latter fibers are about equal in their dry insulation ability. Olefin (Polypropylene) has about twice the dry insulation ability ot those fibers and 6 times that of cotton. All manufacturers of outdoor clothing generally avoid pure cotton due to its poor insulation ability. Other major problems with cotton are its low evaporative ability and its very poor insulation when wet. Wet cotton allows thermal conductance to increase by a factor of 9 times, thus making it a danger to its wearer.*

I do not live in a real cold part of the US and do not do a lot of outdoor activities in the winter, so I learned somethings the hard way as far as clothing. The second and third nights I was not overly cold except when I had to get up to go to the bathroom.

Offered by David.

Troubled Times

Clothes Polypropylene

On well bathed skin (this is one of the most important things many overlook) Polypropylene is worn as your first layer and a well made (military) "bear liner" (so nicknamed due to it being brown) or you may try polar fleas, breathable second layer and finally a Gortex outer garments, also breathable. Loose and in layers is the rule in winter outdoor clothing, also short work periods, plenty of water and keep you head covered. Brigade Quarter Masters has Polypropylene long underwear and a lot of other gear that is useful for all occasions: $16.99 for tops and $16.99 for Drawers sizes from small to XXXL.

Offered by Lou.

The Hub

Troubled Times

Natural Fibers

When I taught Hunters Education for the State of WA, we reminded hunters that the absolute worst item of clothing you could wear in any wet/snowy climate is Blue Jeans. They get wet quickly, stay wet for a long time and have no insulation value, in fact they suck warmth from the body. The pole shift promises to be wet for a long time so if you absolutely must wear jeans, make sure you have lots of them to rotate.

Offered by Mary.

So try to find good quality cotton and especially wool, which is tried and true in cold and wet conditions. Natural fibers will (somewhat) wick away moisture from the body, some synthetics chaff and hold moisture. Try these fabrics on a hot and humid day, and you'll get the idea. A good clue to what is best: notice what the military issues - check out a military surplus catalog, such as US Cavalry or such! Of course, for outer layer wear you want totally waterproof!!

Offered by Craig.

Troubled Times

Fire Retardant

NOMEX clothing is "fire retardant clothing". You may also want to check your local **Army Navy Surplus Store** and look for some NOMEX (it may be less expensive) gloves, hoods and flight suits as these are worn by helicopter pilots and flight crews in the U.S. Army. When buying NOMEX clothing it is import to insure that it is new and *not* washed in a washing machine. Follow the cleaning instructions on the tag. It is a requirement to wear NOME gloves where I work at all times when handling loading equipment and cargo that is turned in to us.

Offered by Lou.

Troubled Times

Resourceful

Various Troubled Times members have had some thoughts on how to meet special clothing needs during the pole shift and Aftertime.

- Clothing for the hands and feet, for the cold, and for fire are the only *special* purpose cloths that should be needed.
- As the fauna and flora will remain the same, and many cultures have learned to live off the land, perhaps it is skills and knowledge that need to be accumulated, not material goods.
- Good boots that are waterproofed are survival boots.
- Being a person who lives in a wintry climate, my only suggestion that we haven't yet done is buying everyone a pair of Sorel boots. They keep your feet warm down to -40 degrees Fahrenheit. In addition, mittens not gloves should be purchased.
- We must think beyond Reboks, jeans, and T Shirts, to something good enough to venture away from our shelters in as the need arises, i.e. bring in a straggler, water, repairs, food gathering, etc. Now as the climate for some could switch to deepest winter permanently, and in all cases we can expect rain, extreme wind, heat possibly fire, I don't think a K-Mart raincoat is going to do the job.
- I think a diver’s outfit would do on some occasions. I remember when a friend of mine was a diver for some time, and once he went diving in a mountain lake in December! It was freezing outside, but he said he was warm and dry in a lake that had an ice crust on it. Perhaps this would be an ideal outfit for cold pole shift times with continuous rains.

Troubled Times

Dog Hair

Long haired dogs can also provide hair that can even be woven (see the book *From Woof to Warp*, no kidding!)

> *Caring for items made from dog hair is surprisingly simple. Small items made from Chiengora are easily handwashed, while very large items can be dry-cleaned*.

Offered by Craig.

The Hub

Troubled Times

Clothes Rawhide

Scrape, dry and go no further. You have usable rawhide. When your ready to use it, just resoak it, stretch it over your drum frame, secure and let dry.

Benjamin Pressley
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Making rawhide means just what the word says: Raw Hide. This means you don't do anything to it! Just scrape off every little bit of meat on the flesh side on a fleshing beam or other standard ways. Then cut off the hair, and when it's short, scrape it off with a sharp scraper. Lots of work, this part. Now you have rawhide. Bernard Mason, in the book *Camping & Woodcraft*, states that "Salt ruins it for rawhide". Preserve your skin by drying or by freezing. I dry mine by nailing them to the barn walls. Once dry, they last for years, and when I need a piece of rawhide, for example for tying my dogsled uprights to the skis, I just soak a piece, cut it into strips, and use.

You can soak the hide in water, or water and ashes, or water and all sorts of other junk if you want to remove the hair more easily. After a while, the hair will fall out. Note, however, that when you use the water soak method, even if you use a stream with running water over your skin, you are beginning the rotting process of the skin, which will make it less resistant. For making really good and strong rawhide, as for making snowshoes, indians here *never* soak the skin, because the leather is much weaker.

To thin down the skin to even thickness, indians here stretch out the wet skin on a stretcher and put it out to freeze at -20 degrees or lower. They then use a scraper which looks a bit like an axe to which is attached a long perpendicular handle, and use it to shave off layers from the flesh side until the skin is the proper thickness. In warmer climates, you do the same thing, but dry scrape it to thickness. Note that the toughest part of the skin is on the hair side, and you don't usually scrape that side, except what is necessary to remove the hair bristles.

Andre Bourbeau

The Hub

Troubled Times

Clothes Scraping

If you were dry scraping make sure your tools were good and sharp and your hide is thoroughly tightened up in the rack and thoroughly dry before you scrape it. If you were wet scraping, make sure you soaked the hide in water long enough for it to swell enough that the layers kind of 'float' so you can clearly see the layers you need to scrape, so you do a thorough job of scraping. I for one have come to peace with both wet and dry scrape worlds and don't get in arguments about it. As you say, there are advantages and disadvantages to both. Doing dry scrape requires very sharp tools and requires near perfect conditions as far as humidity. The hide has to get dry before it can be wet scraped. It has been theorized by some that dry scrape may have just been used for thinning a hide. Most hide tanners I know that do a lot of hides every year will tell you that the dry scrape method produces a softer hide.

Maybe, I'll just avoid the controversial stuff and stick with the advantages I have found in both methods. I use both, interchangeably. The thing I like best about wetscrape is that everything can be done on the fleshing beam (fleshing, scraping). You don't have to punch holes around the perimeter of the hide, you don't have to string up the hide and stretch it out, re-tighten and re-tighten, etc., etc. You can also use dull tools on wetscrape, no constant tool sharpening. If you use a beam like Paul Dinsmore uses made from various diameters of PVC pipe you can vary the surface to accommodate stubborn areas. You can use a dull draw knife or a bar mounted with handles on each end. Now, I'm not just trying to sell wet scrape here. When I teach students I start them out learning dry scrape. Dry scrape allows you to study the hide a little closer so you see everything that needs to be removed. You don't miss as much as you do when you wet scrape.

You also asked what follows de-hairing. Whether wet or dry scrape you have to remove a layer of epidermis on both sides. If you have a good fleshing tool, if your stretching the hide in a rack (a la dry scrape) it can remove this epidermis or scarf skin during the fleshing process. That's the flesh side. On the hair side their is also a layer of epidermis to be removed. It is best to do this right the first time, for left over epidermis, particularly on the hair side, hinders good brain penetration and is very unsightly (nothing more embarrassing than someone coming up and stripping some left over epidermis off your just finished shirt leaving a white spot under the smoked hide. Of course, that never happened to me. (Hah!).

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The Hub

Troubled Times

Dry Scraping

My Indian friends would never even think of any other way of scraping and preparing a hide. After cutting off the hair as in the wet scrape method, the basic process is to get the skin good and wet, stretch real tight and put it outside at a temperature of -20 degrees Celsius or colder. Then a scraper (usually an ax head to which is attached a long perpendicular handle) is used to pull off scrapes of skin which look a little bit like very thin wood shavings coming off with a hand plane or spoke shave. This process is repeated until the skin is of uniform thickness everywhere. The rest of the process resembles the wet scrape method.

> Andre Bourbeau

Dry-scrape typically uses a sharp blade to de-hair the hide while it is stretched tight in a rack. The hide is usually stretched soft in the rack also.

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Wet Scraping

Steven Edholm and Tamara Wilder have a book out on Wet-scrape called *Wet-Scrape Braintanned Buckskin: A practical Guide to Home Tanning and Use* ISBN 0-9654965-4-6 pr send $17.95 plus $3.00 postage to Paleotechnics, Box 876, Boonville, CA 95415. Wet-scrape uses a dull blade to dehair the hide while it is draped over a beam. Wet-scraped hides are usually pulled soft (kind of like pulling taffy), and the hides are not put in a rack at all. Dry-scrapers and Wet-scrapers don't necessarily see eye-to-eye. Each camp tends to think theirs is the better way. You will have to decide that for yourself. I have written extensively on wet-scrape in my *Field Guide to Primitive Living Skills*, available for $20 (includes postage). Most of the hide-tanning section appeared as a two part article in *BackHome* magazine. If you are interested in "wet-scrape", we sell the video *Tanning Spirit* by Melvin Beattie for $40 (includes postage).

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Troubled Times

How Much

Some hair follicles go deeper than others. Mainly you want to remove the shiny epidermis. This will allow for brain penetration. It will not affect how well it is brained. It may affect how it looks, though depending on how visible and prominent the hair follicles are. It is a judgment call. Try to go as deep as you can and try to get past them but watch how much you are thinning your hide. If you're thinning your hide more than you wish it is time to stop. There is one point that it is very evident how much the hair follicles are going to show. When it is brained the hide will be milky white. At this point any hair follicles that are going to show on the finished product will look like a 5:00 shadow or pepper all over the hide. Not to fear. Get it on a fleshing beam and work on those areas a little more. Any hair follicles that are left after the hide is smoked, depending on how dark you smoke it, will kind of look like a dirty patch. You're still not lost. You can soak the hide even after it's smoked and take it to the fleshing beam, re-brain it, re-break it and then smoke it again, if needed.

Benjamin Pressley
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I think whether you continue scraping or not depends more on the thickness of the hide than anything else. You can scrape through. I usually play this one by ear. One thing I know, though, is that I have less of a tendency to leave hair follicles on the hide if I am able to scrape the hair and epidermis off in one single phase of the process. Where there tends to be situations like this is when the hair has slipped out previous to scraping, but this is no a hard and fast rule either.

Mark Zanoni

Troubled Times

Brain Tanning

As far as braintanning cowhide, as far as I know it can't be done. I know a guy in Michigan that has tried to braintan and he says it is the only mammal he has tried to braintan that would not take to brains.

> Benjamin Pressley
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You can use a cow brain from the market. I've heard a lot about trying to get around the old way and I think the key may be in the lecithin. Lecithin is in the brain material suppose to make the hide soft. One fellow I heard of used Crisco and lecithin but if memory serves me it didn't work very well. Too smelly or something.

> Howard Barker

There's a book out on dry scrape brain tanning that I found to be an excellent resource. It's called *Blue Mountain Buckskin* by Jim Riggs. It Costs $12.00. Write him at 72501 Hiway 82, Wallowa, OR 97885. The book is very well written and Jim has a great sense of humor. You'll find it answers a lot of questions. Even ones you haven't thought of yet! There was a question of how do you get brains. Supposedly, each animal comes with enough brains to tan its own hide, but friends of mine that do a lot of brain tanning get pork brains out of the meat section at the grocery store (you might have to hunt a bit).

> Ferrell A. Peterson

Cow or Pig brains work great.

> Gary Lowell

Sometimes I do take the brain out of the deer whose hide I am tanning, In general, one brain will do 2-4 hides, depending on the method of braintan you are using. As far as brain use goes though you can use any kind of brain. I just as often buy the frozen pork brains in the frozen foods section of my grocery store. Once, at a demo at a national park, I ran out of brains and could not find frozen anywhere and used the canned variety in gravy. It worked just fine, but was a little more expensive.

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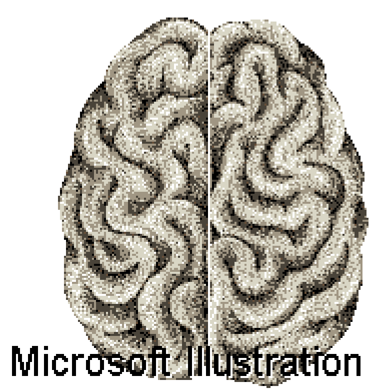

Troubled Times

Clothes Braining Steps

After thoroughly fleshing, de-hairing and scraping, the hide is ready to be brained. I mix my brains in a blender because the more thoroughly liquidated the more efficient the tanning solution. You can just mash them up by hand, though. It is also a good idea to mix them in warm water. Some people prefer actually 'cooking' them in the water, just don't boil them or actually cook them. Use just enough water to cover the hide. Now, Paul Dinsmore has illustrated to us that you can actually use one pound of brain to 5 gallons of water if you pre-smoke. The smoke is like an enzyme that strips the glues from the hide therefore allowing more efficient penetration of the brains. There are also many other methods of stripping these glues. There is an excellent article on this in *Primitive Technology*.

You then soak the hide in the brains about 15 minutes, working and wringing the hide in the solution. You then take the hide out and thoroughly wring it out using a fence rail and a stick or whatever works. Wringing is very important to good brain penetration. Soak and wring several times within an hour. It shouldn't take longer than this for a good braining. You can tell when you have good brain penetration when you can stretch the hide on any part of the hide in any direction and it stretches 2-3 inches. The brains also bleach the hide out white and it is also at this time that any left over epidermis will show up yellowish and any missed hair follicles will look like pepper all over the hide.

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Troubled Times

Clothes Soap Tanning

I've heard of people using "Joy Dishwashing Liquid" to tan hides. A friend of mine who spent time in Alaska says this is how lots of folks in the "bush" get hides tanned. Joy contains lanolin, which I suppose is the active ingredient that does the job. Another one I have heard of, but not tried is "Neats Foot Oil". I don't know how this stuff is made but, it may have lanolin and other similar chemicals in it in similar amounts to animal brains.

Mark Zanoni

I've seen Indians in the northwest territory use Ivory soap instead of brains in exactly the same manner as the braintan method. That should get you on your way. Check out the film *Indian Hide Tanning* by Henri Vaillancourt for an explanation on this.

Andre Bourbeau

The Hub

Troubled Times

Clothes

Smoking

You just lay them horizontally on the rack at the top of the tent, and then turn them over once in a while. You can also make the tent roof out of a skin or two, and they get smoked at the same time as the meat!

> Andre Bourbeau

To waterproof the hide you must smoke it. Just get a good bed of coals laid in a pit and then throw rotten, punky wood on it and keep the flames smothered out. This can be done in a smokehouse (just throw a metal plate over the pit) or smoke can be piped up through the hide by a series of pipes proceeding from something like a trash can that is smothering out the flames. The series of pipes being a stovepipe, followed by a tube of canvas, followed by a tube formed from the hide itself and suspended over a limb to hold it all up. There are also wilderness, primitive methods of doing this. The hide does have to be smoked on both sides thoroughly. You can smoke it as long as you want to get it as dark as you want provided you keep it from getting too much heat. It is animal organic material like meat and will cook and be ruined as far as usefulness as material. Smoking also insect proof the hide and bacteria proof it. You can wear a shirt made from smoked hide and sweat all you want and it will never retain a body odor! This is also useful in hiding your body odor when hunting.

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Troubled Times

Softening

Now, what really gets that hide soft? Breaking it. You can hang it up a short while depending on how dry it is. Don't hang it in the sun, though and don't let it dry out completely anywhere. Dry spots will be hard spots. When it is still real damp it is time to pull it (break it). The way I like to break it is across my knees while sitting. Just put your knees together, stretch the hide over your knees, then spread your legs while keeping the hide tight across your legs, stretching the hide as your legs spread apart. Keep moving the hide around in circles and doing this till completely dry. You need to keep a hide pulling until it is completely dry. Don't let it fool you. To test for places where moisture is hiding feel for cold spots on both sides. If you can detect moisture, keep pulling. The advantage to pulling it on your knees in this manner as opposed to putting it in a rack and breaking it with a paddle is several fold:

1. You don't have to put it back in the rack after taking it down. In fact, you can just trim it out of the rack.
2. You can quit if you get tired, just fold it up, bag it up and throw in the freezer.

Benjamin Pressley
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Some hides require much more than this though and in fact I have had to brain and stretch several hides more than once to get them to break. I do all my stretching at this time in a rack and use a variety of tools of varying sizes to work the hide. The toughness of the hide seems to vary based on several factors - time of year the deer was killed (summer and spring hides are much thinner and easier to work than fall or winter hides), size of the animal (although this theory breaks down also at times). There are those that argue that buck hides are tougher to tan than doe hides. I have not necessarily found this to be the case. I've seen some mighty thick and tough doe hides in my day.

Mark Zanoni

Troubled Times

Clothes Inuit Women

This comes from the book *Our Boots, an Inuit Women's Art* by Jill Oakes and Rick Riewe.

> Eider, murre, and other bird skins were used for stockings and over slippers when caribou skins were unavailable. ... Silatik Meeko provided a detailed description of the techniques employed by women on the Belcher Islands.
>
> Hunters bring back the eiders whole for the women to process. After the birds are allowed to partially thaw so the skin can be easily loosened from the meat, the wings and legs are taken off. The skin is sliced around the bill, another cut is made about halfway down the neck, and the head is pulled through this last incision. According to Meeko (1989):
>
>> I hold the bill in my mouth, grasp the skin at both sides of the neck, and peel the skin down towards the tail. The skin ends up being inside out. After removing excess blood and fat from the skin, I turn it right side out and rub it in snow until the feathers are clean.

The long neck skins are tied together in groups of two, hung over a line outside, and allowed to freeze-dry overnight. Then the skins are turned with the flesh side to the outside to dry for about a day. When the skins are partially dry, the loose surface fat is chewed and pulled off, and the fat embedded in the skin is removed by an action similar to sucking on a baby bottle. Meeko also said that:

> Beginners quickly learn not to suck too hard, as you can pull the feathers right through the skin into your throat, but if you suck too gently, the skin becomes moist. It takes about two hours to prepare one skin until it feels dry. My throat becomes red and sore after sucking off fat for several hours, until I get used to it. I often gain weight from swallowing some of the fat while preparing bird skins.

Like I said, you may have to make a few adaptations, but it may be an alternative to subsisting on bugs!

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The Hub

Troubled Times

Clothes

Bird Skins

In the Belcher Islands, way up north, the Inuit people one year saved their lives when the caribou did not migrate, by making coats out of tanned goose skins. I saw such a coat at the Yellowknife museum in the Northwest territories when I was up there researching on sabbatical leave one year. The skins were cut in a rectangle, and the feathers remained on the skin to make an incredibly beautiful coat which was obviously very warm. I'm not sure about this, but I believe the skins were simply removed, meat and fat scraped off, then stretched out to dry. They are thin skins and simple manipulation would soften them. Judging by the color of the inside of the coat I saw, I would say that the skins were also smoked in a similar way as other hides.

> Andre Bourbeau

I've been following this thread with interest because I made a Grouse Hat which still works (though it is a bit ratty and missing quite a few feathers) after 10 years. I've also tried it with other birds. This is what I did. With the grouse, I used the hot rock trick to cook the bird. When the bird was finished the skin slid off as it is supposed to do. I ate the bird. I turned the bird skin inside out and stitched the neck, wings and legs closed with gut from the bird and a needle made from bird bone. Nothing fancy. I filled the inside out bird skin with sand, till it was stiff. This made it easy to scrape the hide with another piece of bird bone. The sand protected the feathers. After it was scraped I used a borax/salt solution to wash the skin. I'm going to drop the narrative at this point and just go to the steps.

Let the skin dry for two days. It will feel starchy and appear to be semi-transparent. The feathers will be visible. Bathe the dry skin with a 50/50 mixture of glycerin and alcohol (the stronger the better Tequila is no good, Everclear is OK and Isopropyl works) don't drink the mixture. Rub the liquid into the skin until it begins to soften (I've been using the Alcohol/glycerin soak mix on snake skins for years. It works great with no other processing/ Well, pull off the fat with your fingers first! If you want to, soak a rag in the mixture and wrap the skin. That will keep the mixture in contact with the skin for a longer period of time. When the skin feels fairly supple, open up your appendage holes and let the sand drain out. Carefully turn the skin back to the way it was when it was hatched. Now you can cut or wear the feather bag. It will remain fairly soft. If it stiffens just use the mixture again.

I've done this with quail, which is problematic since the skin is so thin, and even with a few sparrows (hacky sack sparrows).

> Ron Hood
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The Hub

Troubled Times

Clothes Resources

Book on tanning are:

- *Blue Mountain Buckskin* by Jim Riggs
- *Braintan Buckskin* by John & Geri McPherson
- *Braintanning, The Sioux Way* by Larry Belltz
- *Description of the Pre-smoking Method of Brain Tanning* by Paul and Snowbird Little Spear

The Hub

Troubled Times

Needle & Thread

Learning how to hand sew will suffice in *most* situations since we'll be mending more than making from scratch. In my humble opintion, it is easier to port around a few needles and thread! Unless we are prepared to either store fabric, or learn to spin, etc., it would be more useful than learning to machine sew. Have several sizes of needles, heavier ones for heavy fabric, and some leather making ones. If you are going to hunt for game, you may as well use the skins! A couple of patterns may be nice, some *very basic* ones, of course. Get *lots* of thread, the best quality you can find since the cheap stuff rips open if given heavy use. All the supplies could fit into a coffee can or similar sized container, at least the bare necessities would. I have read where you could even make a rawhide type thread from skins as well, good for leather crafting.

Offered by Alberts.

Don't forget to put a thimble in there, you need one if you use heavy fabrics.

Offered by Gus.

Troubled Times

Natural Needles

Oh, well as for needles, one can use thorn apple thorns.

> Offered by Kristy.

A cactus-needle! I have one right here. Pretty sharp!

> Offered by Michel.

The Hub

Troubled Times

Firestorms

Regarding an oil like substance falling from the sky during a cataclysmic event, our own site talks of fire in the sky and fire falling from the sky as do many other prophecies about end times. So my ideal clothing concept starts with an Arabic style garb with cape/head cover, made of say an aluminized material like the popular space blankets. This would all need to be water proof and possibly oil proof and able to insulate against heat and cold. Possibly some commercially available items such as ocean going long distance sailors use might be a starting point, also in Australia a popular outdoors stockman's coat and cape made of super tough, waterproof material might be considered.

Offered by Darryl.

Troubled Times

Clothes Durable

One of the strongest (and most expensive) clothing for survival is **Filson**'s. It is not uncommon that **Filson**'s garments are passed from generation to generation. Some people claim that have them for 50 years. They are made from duck cotton, and are highly recommended. **Filson** is based in Seattle but they have dealers across the country. For best results stay with wool if you can. It is a good insulator even when wet.

Offered by Chris.

The Hub

Troubled Times

Army Surplus

A good source I've found for survival clothes is U.S Calvery. They are an army surplus/survival store. I bought a Swiss Army surplus wool great coat from them for $19.95 USD, and it's warm! They also sell new products, that I think are a bit overpriced, but the army surplus stuff is great! They also have wool pants, and surplus wool blankets.

> Offered by Brent.

Beware of Camo Clothing! Being shot for impersonating a soldier or taking the clothing from a soldier is a possible in times of martial law or no law.

> Offered by Bobby.

Troubled Times

Second Hand

As summer arrives in most areas Garage Sales are in abundance. I would like to pass along a suggestions to all of you. Clothing will be needed after the pole shift. For a couple of dollars at these garage sales you can purchase all kinds of clothes, especially children's clothes. I have no small children at home but have purchased a couple of plastic containers and when I go to one of these sales I always buy a couple of dollars worth of children's clothing and place them in these boxes. I also buy old bedding as these can be made into almost anything. I have a couple hundred spools of thread, needles, etc., and these also go into containers. When they are full I will simply seal them up and put them aside. In my area I have a "bargain" store where I can buy cakes of soap for $.10 each. Ten dollars worth (not all at once) bought 100 bars. What I hope to do with this stuff is to help survivors get cleaned up. A hot bath, clean clothes, and a smile can do wonders for attitude. If I can get a working worm casserole (that tastes good) to fill their stomachs the future may not look so dim.

Offered by Mary.

Keep an eye open for used but good condition tennis, running, and hiking shoes of all sizes. Hard to make after the pole shift but easy to find now. Hard to walk in a primitive environment without shoes. The fact that it is used will quickly be overlooked by the lucky one you hand this to. Occasionally you my run into a junk box at garage sales with a mixture of wire, nails, screws, house fixtures, or nuts-bolts all sizes. Think of what you would need to go through after the pole shift to make one simple wood screw. Gives one an idea of its true value after the pole shift. Usually these junk boxes have little value before the pole shift and can be picked up relatively cheap for a few bucks. After the pole shift one could sort by type and size. These items become quite useful for construction and repair. As an example some of the wire could be used to make a snare for a small animal or as a belt to hold up pants.

For those thinking about buying lots of sewing supplies, consider this. Clothing already made at $1-$2 per piece is a much better deal than lots of yarn or lots of spools of thread and lots of sewing equipment. We will simply not have the time to make cloth for some time after the pole shift. Invest in used clothing and have enough thread and sowing equipment to alter to fit or repair the used clothing you purchase. I learned this strategy the hard way. Second point - polyester, nylon, and silk are warmer, last longer, don’t absorb water (runs off the fiber), and will resist rot as compared to cotton. Tend to go for these type items in garage sales. Cotton will not dry out in near 100% humidity. Even polyester-cotton blends are better than straight cotton. Keep the cotton you have though, as it will be useful for some things. As an example - woman during menstrual cycle could use a cotton rag when their Kotex are all used up.

Offered by Mike.

The Hub

Troubled Times

Closeout Sales

About a month ago a Salvation Army store close to me had a sale going for about a week. 1$ for any peace of clothing. Included leather jackets, men and woman's jackets, sweaters, wet suites, wool, polyester and silk. They were moving to a new location and didn't want to move it all. I ended up, after washing and folding, with 12 of those flip top 12 gallon containers plus 2 suitcases stuffed full. The point is - watch for these type of sales. Old tough plastic-metal suitcases are another thing to look for at garage sales. They will take the bounce around of the pole shift and could be useful for protection from water after the pole shift.

Offered by Mike.

Be on the lookout for stores going out of business, it’s a steal. I've found recently a warehouse that is to be demolished. They're getting rid of 400 watt MH fixtures for $45 dollars, about $140 less than market for a new system.

Offered by Aron.

Troubled Times

Clothes Boots

Boots are very important for survival. For all of you who live in dry hot climate and never experienced wet cold weather. During last twenty years I have tried all kind of boots including quite expensive up to 350$. I was quite disappointed, because none of them work well in wet and cold weather. **Leather and Cordura** (heavy nylon) did not pass my expectation for exterior residence to elements and mechanical damage. Snow and rocks were able to effectively damage outer skin in less then a year. I was using them on average three times a week. In addition drying a leather boot is not an easy task. It takes up to three days to dry leather boot in cool dry air. I decided to switch to a pack boot. They are constructed from natural rubber bottom and leather or cordura top. New models have steel shank and heel reinforcements.

There are three types of boots:

1. Light - for summer and fall priced from 55$ to 120$ - no liner
2. Fall and light winter with insert 6mm thick
3. Winter and cold winter. Inserts are up to 13 mm thick.

Pack boots are maintenance free. The only thing you have to do is to remove an insert for drying. When buying you may consider a model which has insulation between rubber and insert. I like models that are at least 12" (height) to give you and additional protection from knee down. I have seen models up to 17". The other option is to use your regular hikers and gortex socks. **Gortex socks** come in two versions: insulated and non-insulated. This combination works well. Most materials will not tolerate water for long time. The only thing to consider using rubber boots is to make sure that moisture is drawn away from your feet. **Wool sock** will do quite well. I still have a pair in good shape that I have bought in 1981 (I have changed inserts of course).

Offered by Chris.

The Hub

Troubled Times

Clothes Sorel

I use boots made by **Sorel**. To get catalogue call **1-800-265-2760**. What's good about Sorel is that they make boots for women, kids and men. The other company is La Crosse.

Offered by Chris.

The only kind of warm weather boots - **Sorel**! Everyone in the north knows and owns them! Sorels are available in virtually every northern U.S. state and throughout Canada. Maine, NH, VT, upstate NY, MI, WI, Montana, N. Dakota, S. Dakota, MN, ID, WY, CO, WA, for sure. Look in the Yellow pages, they usually tell you if they carry them there.

Offered by John.

The Hub

Troubled Times

Clothes La Crosse

I am familiar with La Crosse Footwear. I have a couple of pairs of their boots. They make excellent footwear and are competively priced. They also have an outlet for deeply discounted boots and shoes with extremely minor defects that do not affect the wear of the shoe/boot.

> **La Crosse Footwear Incorporated Factory Outlet**
> 1320 Saint Andrew St
> La Crosse, WI 54603-2868
> 608-782-5630

Offered by Pat.

The Hub

Troubled Times

Clothes

Mud Walking

I seem to remember from my dim and distant childhood that stilts were the best thing for walking through mud and stuff. Is this true?

> Offered by Helena.

Not a good idea, especially if we're talking about deep mud. You'd need to lift your legs pretty high for each step unless you were planning on sliding each stilt in turn. Wellington's are a problem because of the air lock that is created beneath the boot. All you need do is equip each with a piece of plastic tubing so that it runs down the back to the heel. This releases the trapped air and solves any sticking problem. You can actually buy boots with this already fitted, or so I was once told, but I've never seen any and besides why pay expensive prices when do it yourself works just as well.

> Offered by Brian.

The Hub

Troubled Times

Good Buys

Military Surplus stuff is pretty readily available. I just ordered a new East German dark grey full length, lined wool coat for $20 and matching wool slacks for $18. Should make a nice winter coat for next year. Three years ago we bought a Marine Corp. radio that was used as a high country base station during Viet Nam for $200. We are able to broadcast as well as receive radio and teletype messages from all over the world. This year we will be picking up some Canvas Tents: one 24' x 52' for $150 and two 16' Hex for $ 50 each. All three tents come with all the poles, etc. At past meets we've found great buys such as:

Heavy duty **Coveralls**	$5/pair
Alice Packs (**Knapsacks**)	$5 ea.
Wool **Underwear Shirts** (Henley style) - New	3/$7
Wool Sweaters	$7 ea.
Misc. **Canvas Bags**	$1 & up
Insulated Canvas **Coolers** (big enough to hold a whole case of beer) (keeps things colder longer than our Coleman cooler TOO !!)	$14
Collapsing Canvas **Water Buckets**	$3 ea.
Wooden Boxes with hinged lids - 10” x 12” x 36" (105 mm shell shipping boxes made with 3/4" boards & have rope handles)	FREE
Wooden **Ammo Boxes** like above - 26” x 14" x 18"	$11 ea.
Metal **Ammo Cans** - 4” x 7” x 11" (water, fire & explosive proof !!)	$3.50 ea.
24 volt gas powered **Generator**	$150

Offered by Cat.

The Hub

Troubled Times

Catalogs

To find out more about Military Equipment Collectors in your area - check out affiliated clubs. They all collect more than vehicles. I get several catalogs and lists from all over the US. A mail order company that has some of the best prices is:

> **Gold Nugget Army Surplus, Inc.**
> 215 Globe Street
> Radcliff, Kentucky 40160-9504
>
> Phone Orders 1-800-942-8769
> 24 hour Fax 1-502-351-1480

Offered by Cat.

Troubled Times

Auctions

There are many dealers all over the US. They all get their equipment from the General Services Administration or Defense Reutilization & Marketing Office, known as the D.R.M Service and mark it up to sell to the general public. The GSA is the agency that's responsible for selling off all non-military owned surplus for the Federal Government. Instructions are also available to explain how to acquire equipment either thru sealed bid or oral auctions.

The DRMS International Sales Office (ISO), located in Memphis, Tenn., is responsible for the sale of personal property on a national and international level. The International sales program generally includes major property such as:

- Agricultural Machinery and Equipment
- Aircraft and Aircraft Parts
- Bearings
- Chemicals and Chemical Products
- Clothing and Personal Equipment
- Communication Equipment
- Construction Equipment
- Electrical and Electronic Equipment
- Engines, Turbines, and Components
- Fuels
- Hardware and Abrasives
- Instruments and Laboratory Equipment
- Materials Handling Equipments
- Motor Vehicles and Parts
- Oils and Paints
- Pumps and Compressors
- Railway Equipment
- Recyclable Materials
- Scrap Metals, All Types
- Ships and Marine Equipment
- Woodworking Machinery and Equipment

National Sales by Sealed Bid. Bids are hand-carried, faxed, or mailed to the International Sales Office. These bids must be received by the specified date and time in ordered to be considered. All bids are opened at a specified date and time. Bidders need not be in attendance at the bid opening. Bidders must be present (unless otherwise specified in the sales catalog). Bids are taken as each item is offered for sale. If you are interested in receiving a "How to Buy" brochure, in the United States call:

> **1 800 GOVT BUY** (1-800-468-8289)

or write for a free "How to Buy" brochure.

> **DRMS International Sales Office**
> Attn: Customer Service
> 2163 Airways Blvd.
> Memphis, TN 38114-5211

Offered by Cat.

The Hub

Troubled Times

Swap Meets

We attend annual meets with other **Military Equipment Collectors**. A good source of meet information can be found through the **Military Vehicles Magazine**. While these meets are designated especially to showcase the Military Vehicles, most of the ones I have been to have swap meets of a wide variety of useful items. They keep an updated calendar at this site. It even includes the Beltring, England show, billed as the "War & Peace Show - World's Largest MV Rally". The *big* show in the US during 1997 will be the national MV Collector Show in Memphis, Tenn. July 11-13. For information call Kay at 1-800-365-5798.

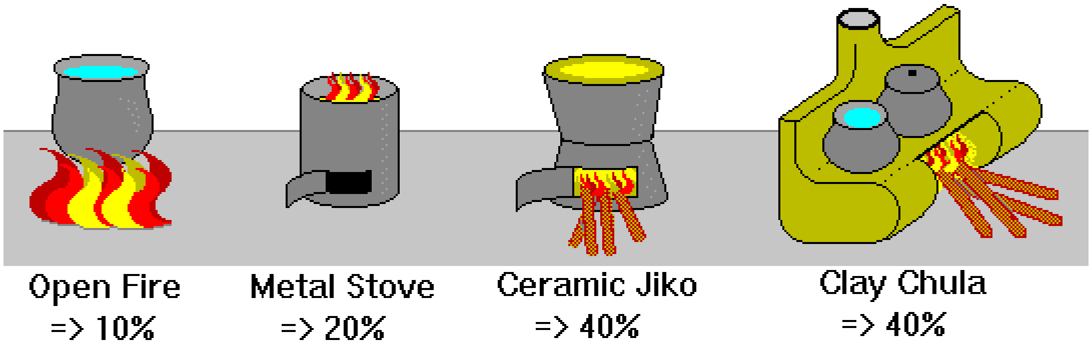
Offered by Cat.

Troubled Times

Cook Stoves

Cook stoves can vary in efficiency, depending on design, as an article in the July, 1995 issue of *Scientific American* show. Excerpts from the article follow:

> Half the world's population of nearly six billion people prepare their food and heat their homes with coal and the traditional biomass fuels of dung, crop residues, wood and charcoal. ... Combustion of biofuels contributes to the hazy pall that hands over the cities of the developing world. Carbon dioxide, methane and other greenhouse gasses from cooking fires may also foster global warming.
>
> Since the energy crisis of the 1970s, international aid organizations have targeted the improvement of traditional cooking practices as a simple and affordable way to address the environmental, economic, and energy issues posed by the home fire. ... Over the past decade government programs, development assistance groups and community-based organizers have undertaken a thorough review of the requirements for successful dissemination of cookstove technology. A new generation of stove programs is now implementing these hard-won lessons. This effort encompasses everything from an examination of stove thermodynamics and materials science to market research and grass-root educational campaigns.
>
> Almost one million households now cook with the Kenya ceramic Jiko. The Jiko - the word means "stove" in Swahili - consists of a metal casing with a ceramic lining that helps to direct 25 to 40 percent f the heat from a fire to a cooking pot. The traditional metal stove that the ceramic jiko replaces delivers only 10 to 20 percent of the heat generated to a pot, whereas an open cooking fire may yield efficiencies of as little as 10 percent.
>
> Even more fundamental problems plagued some of the early prototypes. Designers acted as if it would be an elementary exercise to improve the efficiency of the common metal stove, a deceptively simple canlike enclosure into which charcoal or wood is fed and ignited. In fact, after much trial and error, it turned out that an extensive investigation of stove physics and engineering design was needed. This analysis revealed that the largest loss of heat from the fire, about 50 to 70 percent, occurs from radiation and conduction through the metal walls.
>
> The design of one early improved jiko model emerged after an aid group named the Kenya Renewable Energy Development Program sponsored a research trip to Thailand to inspect an improved stove - the Thai bucket. The resulting jiko design had inward-sloping metal walls, like the Thai stove, as well as an insulating liner made of ceramic and a mica called vermiculite.
>
> Higher efficiency cookstoves have been adopted throughout the developing world. China has by far the world's most extensive program, with more than 120 million stoves in place - seven out of 10 rural households own these units. ... The Chinese stoves, which burn wood, crop residues and coal, consist of a brick and mortal construction with a chimney that fits in the central living area of a home. An insulating material, such as ask and mortar, is packed around the circular cast-iron opening, which holds a wok.



The Hub

Troubled Times

SunFrost

SunFrost is apparently a well sought after unit. The problem is, it has a minimum delivery time after ordering of currently about a year and has a high cost of approximately $2,695 for 19 Cu ft and $2,575 for 16 Cu ft refrigerator-freezer depending on where you get it from. You do have the advantage of being able to order it to work off 12 Volts or 24 volts DC. Don't know how well it will stand up under the strong jolts (especially upward thrusts) with the compressor in the top.

> Offered by Mike.

In the back of Home Power magazine there is a classified ad section. Almost always there are a few ads selling **SunFrost** refrigerators.

> Offered by Steve.

The Hub

Troubled Times

Energy Efficient

Some retail stores like FedCo for example have a comparison chart of several hundred models that exceed the 92 average refrigerator energy needs by 20% (called energy efficient). The report was published by Edison Company. Last year Edison and some other power companies offered a $50 rebate to their customers if they purchased any of the greater than 20% energy efficiency new refrigerator. The program is expected to run again this year starting approximately 1 may 99. The following is a sample of a few entries to give an idea of what's available as of 1998.

Manufacture **Model**	**Cu Ft**	**kW/Year**	**Efficiency**
SunFrost			
RF-16	14.31	399	40.7%
Whirlpool			
E0220S-D0	21.67	561	41.2%
Magic Chef (Maytag)			
CTL1511AEA	14.96	437	31.3%
Amana			
BR22S6	21.7	524	34%
BG20T2W	20.5	575	21.1%
Danby			
PCR1706WE	17.4	438	30.8%

Note that according to Edison there are other refrigerators that get about the same efficiently as SunFrost. These are a factor of 2-3 times cheaper in price. However, they do not run on DC. Because the power companies have been offering rebates to get people to buy the more efficient units, refrigerators have been improving in efficiency. In 1992 the average 20 Cu Ft refrigerator in use consumed 1,132 kWh/year or 129 watts for each hr of the day on an average. The average 20 cu ft refrigerator sold during 1992 consumed 792 kWh/year or 90 watts for each hr of the day. Last year refrigerators were being made that are reported to be up to 41% more efficient or about 54 watts for each hr of the day on an average for a hypothetical 20 Cu Ft unit.

Some unexplained inconstancies: As per SunFrosts (19 cu ft uses 22 kWh/month) an equivalent 20 Cu ft. should use about 32 watts each hour on an average. As per Edison's chart a 20 Cu ft SunFrost should use 557 kWh/year or 64 watts each hour on an average. Also, as per Edison's chart 40.7% less energy than 90 watts is 54 watts. So depending on who we believe SunFrost could be running the same or up to twice as efficient as the current most efficient off the shelf common refrigerators. My own measurements at a room temperature of about 70 degrees, using a power meter over several weeks have resulted in the wattage of a 10-15 year old Montgomery Ward Signature Side by Side Frostless 20 Cu ft to be 3.576 kWh/day or 149 watts/hr average or 1305 kWh/year. A new energy efficient Amana (freezer in the bottom) model BG20T2W was measured to use 1.108 kWh/day or 46.2 watts/hr average or 404.5 kWh/year. This is 3.23 times less power used for the new energy efficient unit as compared to the older unit.

Assuming a SunFrost uses 32 watts/hr on the average and the Amana uses 46 watts/hr, this results in 14 extra watts/hr or 1.43 times more energy usage for the Amana. Another way to look at it is the SunFrost uses 30% less energy for the same Cu Ft. The Amana is about 3.8 times less price with much easier local availability. The point is other current energy efficient refrigerators can be expected to be comparable or possibly better. There are new refrigerators that are not energy efficient being sold. So don't be fooled. Check the numbers.

Summary: When shopping for a refrigerator, things to consider:

- Will you be using it before and after the pole shift?
- Will you have enough 115 V AC or only 12V or 24V DC.
- Look for smallest Cu Ft. that will work for the number of people you plan to support.
- Look at the average per year kWh needed to see if it is at the left end of the energy scale on the energy efficiency tag. This will indicate this unit is one of the more efficient ones for that size. Also, compare this number to the above table adjusting for proper Cu Ft.
- As time gets closer to the pole shift, refrigerators May be getting more and more energy efficient.
- Bolt down the compressor (if this is possible) empty out the refrigerator and take out the shelves when it gets near pole shift time. Strap, bolt or tie down the over all unit in place. Strap the doors closed.

Offered by Mike.

Troubled Times

Gas Refrigerator

In a community where I lived for a while and which didn't have electricity at all, most families that felt they really needed refrigeration used the gas refrigerators. But these are dangereous, and a friend of mine's two story house burned to the ground, wasting about two years of his work, from an accidental spark caused by falling rocks, which ignited the gas from a leaky faucet. Luckily, he was away with his family at the time, but it was horrible enough for him, having to rebuild from scratch, with his wife pregnant with their third child.

It's important to remember that most of the products we are usually eaten before they are spoiled, especially if they grow right there in your garden. In addition, certain goat and lamb cheeses can last for a week without refrigeration, even in our summertime temperatures of near 40 or 45 degrees C. Of course, the products have to be kept as far away from the sun or any source of heat as possible. I eventually dug a hole in the ground, in a place that was in the shade of some rocks most of the day, and kept a box in there, covered with about a foot and a half of dirt all the time. In this box, even in the summer, fresh meat and milk survived for about as long as in a regular refrigerator, four to six days. The big problem with this is digging and covering the box every time, so only the really perishable items should be kept there. An actual deep cellar with a regular door, like many villages in Russia use even today, is much better, of course, but requires a lot of hard work to dig and reinforce, so I ask myself if it's really necessary, when most foods are eaten right away, and only slaughtering game or stock animals for meat may cause a problem with perishability.

There are many methods of curing and salting meat and fish so that they keep almost indefenitely after the process, like beef jerky and dried fish, but these are not as tasty. The best is to share a slaughtered animal communally, and finish off all the meat in one or two days. Goats should be milked daily anyway, whether they have a kid or not. After the pole shift it is theoretically possible to construct a simple Gas Refrigerator. But you need to find a lot of metallic junk and know how to make it into the shapes you want, such as hollow tubes and the like. These technological solutions probably won't be worth much in the horrible reality we'll face right after the shift, and definitely long term storage of perishables for the initial time should be considered seriously, as it indeed is being considered here.

Offered by Shaul.

Troubled Times

Clothes Washer

Ran across a "portable laundromat" that holds up to 5 pounds of clothes at a time. It's hand-powered and looks sturdy in the picture. $49.99 from **Heartland America**, (800) 229-2901, Item No. L4-2133. It also dry cleans clothes.

Tip from John.

The Hub

Troubled Times

Sewing Machine

Lehman's *Non-electric Catalog* has a new treadle sewing machines. They state they are "serving the unique needs of the Amish and others without electricity since 1955."

> *Lehman's Non-Electric Catalog!*
> P.O. Box 41, Kidron, OH 44636 USA Telephone: (330) 857-5757

Offered by Pat.

If you get a old sewing machine with the motor mounted on the outside then they can be reasonably modified to manual action. I have one my mom bought for me, and I use it more then my wife uses hers. I sewed a **Norse A-Frame** tent out of canvas with it and even if you don't know all the rules about sewing, it is really easy to do.

Offered by Gus.

A foot powered sewing machine can be made in several ways from a modern sewing machine by the use of a common bicycle or bicycle type exercising unit. Peddle powered wheel with tire held by spring in contact with the approximately 6" fly wheel that most sewing machines have. This is the wheel you turn by hand to get the needle positioned so that the cloth can be removed. Take the belt off the sewing machine motor so as to reduce friction of turning the motor.

A second approach or alternative would be to mount a flex shaft so as to be driven by the bicycle tire. With the other end of the flex shaft replace the motor so that the sewing machine is divan by its same belt. This would take some preparation before the pole shift but could be worth the effort. Would allow for better distance and arrangement of the peddle so as to make it easier for one person to use it. With more thought I am sure there are more possibilities.

Offered by Mike.

Troubled Times

Jade Mountain

Jade Mountain and some of their products:

Wood-Fired Hot Water Heaters:

Burn kindling & woodscraps for instant, on-demand energy-efficient hot water A proven, effective design - made for over 40 years in Mexico, hundreds of thousands still in use. A thin water jacket surrounds the firebox. As the water heats it rises to the top and draws in replacement cold water at the bottom. As long as the fire burns, you have plenty of hot water. Higher efficiency than conventional water heaters and no need for electricity, natural gas, or propane. Great for cabins, camps, heating hot tubs, solar heating system back-up, or standby hot water during power failures. #HW415 $185

Sun-Mar Composting Toilets

Turn waste into a resource quickly and safely. Scores of happy users, dating as far back as 1976, write and call to tell us how well Sun-Mar composting toilets work. They require no septic system, use no chemicals, and produce no pollutants. It only takes about a week for this system to naturally compost human waste - almost 100 times faster than a septic system. No wonder they received a Gold Medal for best invention at the international Environmental Exhibition in Geneva, Switzerland. Approved by both the Canadian government and the National Sanitation Foundation (NSF) in the US. The unique "Bio-drum" mixes and aerates to supply oxygen for aerobic bacteria which digest the harmful microbes. Freezing temperatures will slow but not halt this digestive action. The composting works best at 60+ degrees. If temperatures stay below 50 degrees for extended times, provide a small heat source like a light bulb. Once or twice a year, pull the handy drawer to use the finished compost. 2-year warranty. All prices include vent kits.

Jade Mountain
info@jademountain.com
(800) 442-1972 or (800) 449-6601
Fax: (303) 449-8266

Hot or Not

For information on the tankless water heaters and chemical free water treatment, call

Hot or Not, Inc.
800-851-9891,
PO Box 763,
Lake Charles, LA 70602

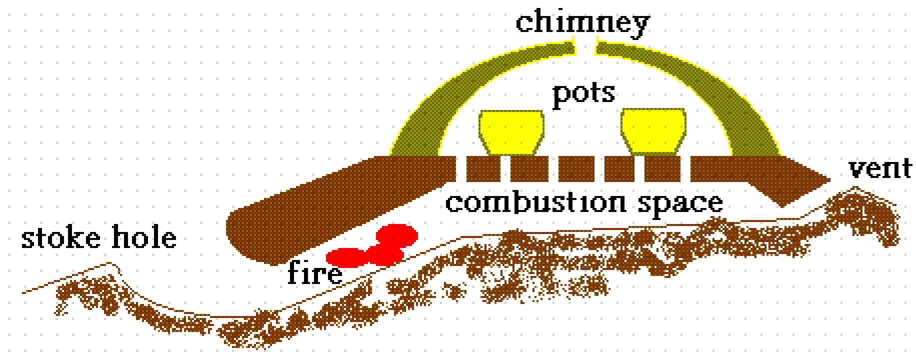
Their chemical free water treatment is "NASA tested", but I don't know if it passed!

Offered by John.

Troubled Times

Romano-British

From *The Potter's Dictionary of Materials and Techniques*, by Frank and Janet Hamer, 1991,
ISBN 0-7136-3337-9, published by
University of Pennsylvania Press, 418 Service Drive, Philadelphia, PA 19104 or
A&C Black Limited, 35 Bedford Row, London WC1R 4JH.



Romano-British Kiln: The kiln was a low beehive structure sunk into the ground with a dome which was remade over the closely packed pots for each firing. There was no chimney, only an exit hole in the dome, and the firemouth was a pit leading to a circular area with a central clay column supporting the chamber floor, By digging the kiln our of the clayey ground the kiln became a fired pot unit but was probably considered fairly expendable since more than one is usually found at one site. They also face different ways, perhaps to make use of different winds.

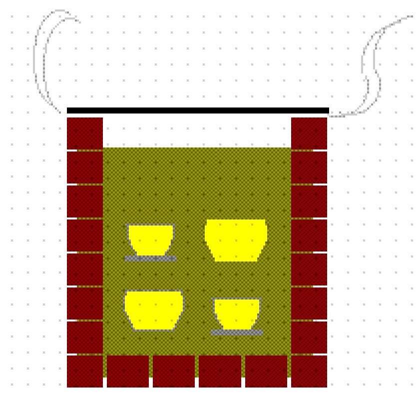
The Hub

Troubled Times

Sawdust Firing

From *The Potter's Dictionary of Materials and Techniques*, by Frank and Janet Hamer, 1991, ISBN 0-7136-3337-9, published by
University of Pennsylvania Press, 418 Service Drive, Philadelphia, PA 19104 or
A&C Black Limited, 35 Bedford Row, London WC1R 4JH.

Sawdust Firing. A simple system of firing inwhich pots are set in sawdust within a brick or metal box with lid. The sawdust burns more slowly achieving sufficient heat to turn the clay into pot. Pockets of oxidation and reduction are caused which product interesting decoration especially on burnished red clays.



The Hub

Troubled Times

Pottery

Simple Process

Simply, you need to first find a source of clay.

Dig it.
Wet it if dry.
Clean it.
Form it into shape (usually a bowl)
Let it dry

At this stage it can be used under limited and controlled circumstances. It will be very brittle and will dissolve if wetted. Clay, mixed with straw and baked in the sun has been used as bricks (adobe). Bowls can be used for *dry* storage. Not as practical as fired pottery, as fire will transform the water soluble clay into a material that will allow you to use the bowl not only for storage, but also the boiling of water.

Offered by Steve.
Source: *Primitive Wilderness Living & Survival Skills* by John & Geri McPherson, $24.95.

The Hub

Troubled Times

Clay Soil

Without getting technical, clay is a type of soil that

1. when moist becomes plastic.
2. dries hard retaining its molded shape
3. will change characteristics when fired, so it will not dissolve once again when wetted, allowing storage and cooking

Most everyone knows what clay is. You just have to find some. It really is a rather abundant earth material. One will most often easily find clay along stream banks, ponds, and road cuts. If wet when found, a step and time is saved. Just dig back into the vein a bit to get away from the surface debris(that will only have to be removed), and dig it up. If dry, it needs to be re-wetted. Lots of ways to do this.

What most good potters do is to pound/grind up the clay before adding water to allow for better absorption. Add enough water to completely dissolve the particles to make a "slurry" solution. You want it kind of thin, which will allow you to stir the solution well. Let it set for 20-30 seconds to allow the heavier stones etc. to settle and then carefully pour off the thinner, silty clay solution into another container. This can be repeated if necessary. Once amost of the impurities appear to have been removed, the container should be set aside to allow the heavier clay to settle. The lighter water should occasionally be poured off. This can take several days. As the clay begins to thicken, it can be spread out on a smooth surface for drying. When it reaches the right consistency, it is ready to use. If you are in a hurry, you can mix the water and clay, kneading and working it until it's "right", feeling the larger impurities and removing them with your fingers. This is OK for smaller, quickie bowls, but it is believed that the longer the clay sits wet, the better.

For working, the moisture content must be "just right". Too wet and it will be too sticky and will slump, not holding its shape. Too dry and it will crack as you work it. If a little too wet, it can be worked in your hands. This additional working is good for the clay, most notably removing pockets of air. Alternatively, it can be spread out, allowing the sun or wind to dry it. If the clay is just a little bit dry, dipping your hands in water, shaking off the excess and working the clay works well.

Not all clays will work! A good simple test is to roll it pencil thin and tie it into a knot (like a pretzel). If it doesn't break or crack, it's a good candidate. Plasticity is the key. The amount of shrinking during drying is also an important factor. Too much can hurt. The addition of "temper" can sometimes help here. Some clays may have all the outward characteristics of a good clay but blow apart when being firing. If you follow all the instructions and still have firing problems, change clays.

Offered by Steve.
Source: *Primitive Wilderness Living & Survival Skills* by John & Geri McPherson, $24.95.

Troubled Times

Temper

According to *Webster*'s dictionary:

> **temper**: to mix (clay) with water or a modifier (as grog).
> **grog**: refractory materials (as crushed pottery and firebricks) used in the manufacture of refractory products (as crucibles) to reduce shrinkage in drying and firing

First we clean the clay of rubble and then add more? The theory being, temper (grog) is stable, the clay is not. A lot of rubble (stones etc) in the fresh dug clay is not, so it needs to be removed. During drying, and especially firing, the clay will shrink and expand to a certain degree. Too much, it will crack and/or break. The temper helps to keep the vessel (clay) more stable during those periods. Some clays don't require temper. Others might need up to 1/3 addition. Each clay can be different. Small pots require none, or less temper, than larger ones. Large pots have a tendency to slump when building. The addition of temper helps counteract this.

The intended use of the finished product has some bearing: vessels which will be in and out of the fire (each time experiencing expansion and contraction) will require more than those used primarily for storage. The addition of temper actually weakens the pot. More and coarser temper should be added to cooking vessels as it takes the heat shock better. Minuscule cracks develop every time the pot is heated or cooled. Temper acts as a stopping point for those cracks.

What to use for temper?

> **Sand/Grit** is usually available. But beware of what makes up the sand in your area. Some, but not all, sands with limestone can at times blow the pots during firing.
> **Grass, Dried Cow Dung**, and other organic materials.
> **Broken, Fired Pottery (Shards)**, crushed fine.
> **Shell**. Most all shell will work. One caution, fire or burn the shell first. Unfired shell is less stable than clay, firing stabilizes it.

Offered by Steve.
Source: *Primitive Wilderness Living & Survival Skills* by John & Geri McPherson, $24.95.

Troubled Times

Pottery Working

Mix the temper and clay to desired proportions and keep working it. It can't be worked too much. Slam it. Beat it. Work it in your hands or on a hard surface. Compress everything well and remove any and all air pockets. If a bit wet, work it until it is just right, if dry, wet it by dipping your fingers in water. At some point take a baseball size hunk of the mixture and work with that. Work it. Work it. Work it. After several minutes, take the ball of clay and begin forcing your fist and/or fingers into it to develop a hollow; the beginning of a pot. Keep the forming pot moving all the time. Work out cracks. Start "pulling" the clay from the bottom up towards the top. Put your fingers against the inside walls of the pot and pat the outside opposite to further compress. Some people use a stone on the inside and a wooden paddle on the outside. All air pockets should be worked out.

At this point take your *slightly* dampened fingers over the whole pot, inside and out, smoothing and compressing, being careful not to get it too wet. After you have the pot the size you want it (cereal bowl size?), keep it in the shade to dry *slowly*. Fast drying will cause it to crack. It will take a couple of days to a couple of weeks, depending on conditions, of slow drying. Keep it protected. *All* moisture needs to escape ... it needs to be bone dry. Any moisture left in it will explode in firing. Now if you desire a larger pot, form it as large as you can before it slumps. When you reach a certain height, it will sag under its own weight. You now have to let the main body of the pot dry somewhat before adding more weight, but you also need to keep the rim wet so more clay can be "welded" to it. Set the pot in the shade, wet the rim with damp fingers, cover with green leaves or something similar to keep just the rim from drying too much as the body dries. This may be an hour or so, or maybe even overnight.

When the pot is ready for the addition of more clay, roll out a coil of prepared clay (called "coiling"), the same thickness as the pot walls (less than a 1/4 inch up to a 1/2 inch). Now this can be added to the pot. Be careful to not get too much weight at once. You may be able to add more than one coil at a time. Just don't get too rushed. Use your fingernail or a tool of bone/wood/whatever to "draw" the coils together, inside and out. Squeeze and compress it all together to weld into one. In this manner, the pot can be built about as large as you desire.

When satisfied, set it aside as you did with the smaller pot. It needs to be dried slowly. Sometimes this can take as long as 2 weeks. Some people speed up the process by rotating it around a fire, from fresh clay in the morning to firing it that evening. After a day or so, under most circumstances, the pots can be handled. It is good to turn the pots upside down at some stage to allow the bottom to dry well. If you desire to decorate the pot, this should be done prior to drying. When still fresh, or after the initial drying of a day or so (leather dry), lines can be etched into the pot. This can be done when dry but seems to work better at the leather dry stage.

Leather dry is also the stage to thin the pot, if desired, by gently scraping away thicker areas, using a piece of bone, stone, or shell. A very smooth pebble or piece of bone can be used to smooth and burnish the pot; a good idea for the inside of a pot designed for cooking and/or eating. This can be done at the leather dry or dry stage.

Offered by Steve.
Source: *Primitive Wilderness Living & Survival Skills* by John & Geri McPherson, $24.95.

The Hub

Troubled Times

Pottery

Firing

In primitive firing, many things can go wrong, as the pots are very susceptible to breakage at this stage. Sometimes a 50% failure rate is not unheard of. Actually we should refer to the firing in two stages, the pre-firing, and firing. As the pot heats, it will expand. Any remaining moisture has to be driven out slowly. Gradual heating thru-out. So we pre-heat. Then the pot must be transferred from indirect heat to direct heat. You can lose a lot of pots here. Two critical stages; 1) when the pot reaches a temperature around boiling (212F/100C), the remaining *unnatural* water leaves, and 2) at a temp of 8-900F, the *natural* chemical water of the clay is burned out. After this second stage, the clay cannot be returned to its original condition and be reworked. A few firing techniques and tips/suggestions.

Scrape a wide shallow depression in the ground, about one inch deep and two feet in diameter. Place a few pebbles on the bottom which to lay the overturned pot. Lay a piece of cordwood the same diameter as the pot on each side. Leave a space between the logs and the pot. Next lay two same sized pieces in-between the logs and up almost touching the pot. Take a few dried cow chips and crumble them up in small pieces and cover the pot. Then carefully cover the pots with a few more smaller logs like a flat roof using the logs as sides. Build a teepee fire on top of the logs and let the whole thing burn down to coals. The pots should be allowed to cool slowly, but cooling can be sped up some by periodically scraping some of the coals away from the pot, and eventually taking the pot out with some sticks.

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Thats a one step firing (no pre-heating) that can be successfully used atleast for small pots.

Offered by Steve.
Source: *Primitive Wilderness Living & Survival Skills* by John & Geri McPherson, $24.95.

The Hub

Troubled Times

Two-Step Process

For the 2-step firing, the pots must be pre-heated.

One method is to build a circular fire around the pots and gradually move the fire in until finally the pots are actually in the fire itself. Eventually building the fire up with larger pieces of wood and letting it burn for a couple of hours, or instead of using large pieces of wood, constantly replenishing with smaller twigs spaced around/between and above the pots. Another method is to build a fire and to move the pots closer, turning and rotating them until well pre-heated, then scraping the fire away, laying the pots in the coals/ashes or on an insulated layer of pre-heated rocks or old pottery shards. Let the pots sit a short bit to allow gradual heating up before adding more fire.

Another method, pre-heat, then set on coals for a bit. Then add pine needles etc to make for slow heating. Then begin adding small woods, and then finally larger woods. When burned to coals, re-build. Twice for smaller pots, Three times for larger pots. Avoid wind or rain threatening days to fire. A cool draft or drop of rain can ruin your efforts.

A more complicated method is to build a primitive kiln. This allows more control in heating gradually. Simply, the kiln is dug into a hillside, a firing chamber below it. The heat and smoke of the fire is tunnelled through the kiln. The ancient Chinese used this method extensively, often stairstepping kilns up the hillside, heating from one fire chamber.. You must ensure that the required temperature (12-1600 degrees F, color will be from dark red at the lower temp, thru cherry red, bright cherry red, to orange at high temperatures). This temperature should be maintained for 2 to 4 hours. The chimney escape should ideally be through the bottom of the kiln (so as to retain as much heat as possible, which rises) and then up, and the opening needs to be large enough to allow enough draw for fire to reach the high temperatures required.

The final test is to cook with the pots. Don't pick them up by the rim to avoid breakage. A well constructed and sound pot will get better with age.

Offered by Steve.
Source: *Primitive Wilderness Living & Survival Skills* by John & Geri McPherson, $24.95.

Troubled Times

Trans-port Horseback

Would a feasible form of transportation be by animal? I wonder how practical it would be to have pastures and the like, available for horse grazing? What I'm concerned about is the fact that some forms of communication will undoubtedly be down, and that long distance communication will be difficult, even if the radio relay internet is successful. Also, many small clusters of communities will need to be brought together - strength in numbers as it were. Are ash in the air and poisoned land going to make pastures impossible? Also, are fields of hay impossible to produce with hydroponic methods?

Offered by Ted.

Even if the plants die, their stalks will remain. Alas, hay. If there's a lot of ash - there might be a problem. Getting out in it to gather anything could be the worst. One can always wash it, if there's water (doesn't have to be potable for humans - just wet and clean enough to get the ash off). Otherwise dust it. If you've ever seen a hungry quadraped herbivore - you know they'll eat tree bark if they have to (and like it). Give them a scratch behind the ears every day - brush'em down when they sweat under your weight, and keep'em indoors so they can breathe and have drinkable water (strained or filtered no need to be pure as we need it - different exposure bacteria; they can drink stuff that would kill us). They also reproduce and we can eat them. So, in an emergency they actually have a two-fold usefulness.

Offered by Geoff.

The Hub

Troubled Times

Carts

I was looking for a light cart to carry stuff after the pole shift. What I found so far was :

1. Game carrying carts rated up to 550 lb. 24"x 82" platform - around $120. The only problem is that the wheels are looking like 19” bike tires - which means puncture. I wonder how long tires are going to last. Is there any substitute for bike wheels - like a solid rubber, etc.?
2. Carts used to carry kayaks and canoes. They have smaller wheels made from rubber or plastic, are solid (no air inside).

   Offered by Chris.

If you can find one an old military cart used by airborne forces to carry ammo that would work. It might be expensive but it should take the abuse, they have solid tires.

Offered by Mike.

Things to consider:

1. In general bigger (larger diameter) wheels are easier to push or pull by hand especially over rough ground.
2. Wider wheels work better with mud, sand.
3. Larger diameter and wider wheels would work better for our application but tend to have move mass to move. One must take into account the mass or weight of the wheel as compared to the mass being moved, so as to keep the unit light and efficient.
4. Tube type tires can probably be made near puncture proof by filling with 2 part foaming rubber (chemical reaction hardening) or flat fix available at local auto parts houses. For real hard, fill with 2 part epoxy (use the softer more rubbery type) mix. Theoretically you could ware the rubber off and still keep going. Will make the wheel-tire heavier.
5. No mater the decision, patches for tube type tires should be keep in stock. There will be enough tube type tires others will have or you will find that will need fixing.
6. Garden carts and large red wagons are also possibilities. Harbor Freight Tools and some garden shops sell these in various sizes at a reasonable prices.
7. A used wheel chair if not needed by a person after the pole shift could be used to move cut logs or rigged with a couple of sticks wired to it's frame, such that it can be tipped back and pull or strapped to a person to carry there belongings. These things can be picked up for $50 or less at garage sails. I bought one for $30 this last weekend. If the thin rubber tire wares out then the rim and the pipe hand hold becomes a long lasting metal tire.

   Offered by Mike.

Troubled Times

Trans- port Hunting Carts

My husband has used both single wheel and double wheel carts for hunting. The single-wheeled cart is easily overturned, and is hard to balance even with two people pulling. The double wheel cart can easily hold up to 500 lb., is easy to pull even in mud. It has 21" wheels, 8" of axle clearance, the weight is only 28 lb. which makes it easy to transport. When not in use can also double as a cot. One person can pull it quite comfortably. He has used it crossing creeks, up rocky terrain, across wash outs and in open sage brush country. Last year he brought out a 450 lb. elk in one trip, approximately 1 1/2 miles in about 35 minutes, with 2 people pulling.

Cabelas, 1 800 237-4444, sells this size for about $129.00. They have several other styles also. Once you have seen the picture from their catalogue, it should be relatively easy for a handyman to construct one out of old bike tires and scrap metal. The deck is made from canvas or tarp material.

Offered by Mary.

The Hub

Troubled Times

Tires

All our priorities should be: reliability first. I believe the approach of making a puncture proof hard tire out of a tube type could be a reliable alternative only surpassed by a solid rubber tire.

Offered by Mike.

I saw at our local Fred Meyer's store (like Wal Mart, K-Mart etc.) a soft but solid donut shaped piece of rubber soft enough to absorb shock yet firm enough to maintain it's shape. Found it in the mountain bicycle accessory area of the sporting goods department.

Offered by Lou.

The Hub

Troubled Times

Dinghies

Dinghies can be attached to the sides of larger objects. You can even make a raft of several smaller dinghies by using ropes. Perhaps some people will be needing dinghies to float upon after the pole shift, and they can carry items like foods and other necessities. Inflate several of them, attach them to the inner sides of a big dug-out, and when people are swung from side to side the possibilities for injury may be smaller.

Offered by Michel.

Troubled Times

Wind Car

For the essentials, visualize 4 wheels mounted to a large box type frame. Wheels widely spaced for stability. Two wheels for steering like a car. In the center of this box frame a pipe sticks up that is held in place with 4 wires attached about 1/3 from the top of the pipe to the 4 corner's of the box. This allows space for the carved wood propeller to turn without hitting the wires. On top of this pipe is a wind mill that turns a shaft (smaller pipe would work for the shaft) inside the support pipe. This next turns a rear end with pinion shift pointing up. Attached with U-Joint. The axial shaft then either goes to the rear end that drives the wheels or through a standard transmission for speed control.

The actual parts used would depend on what one can find available at the time. Cable or hydraulic brakes for stopping and a way to turn the propeller out of the wind would be needed. A clutch for to allow shifting of the transmission would be desirable. For the assisting sail - attach this to the center post like a mast on a sail boat. Boxes or buckets could be mounted just inside the 4 wheels to be used for movable counter ballast. This would be used to keep it from tipping over. The up wind side would get the most weight. The driver and riders could even ride on the windward side to help hold it down a bit like a racing sail boat.

Offered by Mike.

Troubled Times

Electric

Electric cars or off road electric vehicles:

As we approach the pole shift these will become quite attractive and useful to us. Hopefully in the next 5 years electric vehicles will gain more popularity, and become more available. Aside from being a movable battery power source the wheels are powered by strong electric motors which could be used to make wind, or water driven generators. Some of the designs have the motor become a generator, so that when going down hill it recharges the batteries, thus saving power.

Turtle dome:

Put wheels on a dome after the polar shift. Power it using a windmill attached to the top. Move around slowly during the day. Charge up the batteries at night. The wheels could be tractor tires. The power could come from hydraulic motors driven by an electric driven hydraulic pump, or the wheels could be driven directly by electric motors. Could work for light domes on hard flat ground, not so good for deep mud-sand or lots of small hills.

Off road electric vehicle:

Buy an off road electric vehicle. Mount a windmill over the center of gravity. Drive around in the daytime. Drive to the top of a hill to charge up at night. Put out metal support legs (tripod like) at night to keep it from tipping over in strong winds. While driving around, the wind-mill could be laid back, or kept going, depending on how strong the wind is.

The point is - We need to keep track of electrical vehicle development, and manufactures over the next years leading up to the pole shift.

Offered by Mike.

The Hub

Troubled Times

Electric Tractor

I think an electric tractor could solve both the transportation and gardening needs in one product after the pole shift. Standard tractor implements would attach to the power take off for plowing or tilling. For those that will end up roaming around after the pole shift, just hook a trailer on the back to carry family and personal needs. Electric tractors are not a New Idea. Note that those who have electric tractors like them very much and report low maintenance.

One possibility would be to buy or build the unit with one or two windmills mounted on top that run all the time, night and day, and possibly even while the tractor is moving. Don't purchase the solar cells. The windmills could be semi-permanently positioned above a roof to keep the rain off. Travel or garden by day and charge batteries by day and night. Top speed could be 8-10 MPH, most of the time travel will be much slower. Wouldn't want to shake the windmill too much as you bounce along, so the top speed wouldn't be that high. With the roads torn up I don't think we will be going any place very fast. This unit could travel across country without needing roads. Once in a while we may need to out-run someone running on foot. I think 10 MPH could do that.

Offered by Mike.

There was a garden tractor called **Speedex** which I thought was engineered by a genius. It was fabricated from stock off the shelf stuff or at least looked like it was. It had what appeared to be a car’s rear axle and frame of I beams with a **Briggs** engine that slid back and forth to tighten or loosen the belt to the transmission. That was the clutch. It would be easy to copy using auto junk yard parts, I think and I had a notion to try that once. It would work as well with an electric motor, in my opinion. I would try to scale it up to a larger size tractor than a lawn mower of course.

Offered by Darrell.

Series Motors

A series wound DC motor has an advantage over the parallel wound motors in that it is a simpler and cheaper controller which can be bought from some vendor. For AC and separately excited DC motors suitable controllers for vehicle use are not on the common market. Technically the best solution is an AC or separately excited DC motor with a proper controller but the cost is much higher. A series wound DC motor produces strong torque at low RPMs which is needed in vehicles. But when the RPM increases the torque goes down very quickly. If the maximum speed is low then a series wound DC motor is a good solution.

A series wound DC motor takes as much current as the controller can deliver in low RPMs, so it doesn’t need less current. When RPM increases it cannot take as much current anymore, and the torque goes down. A separately excited DC motor can take more current at high RPMs and thus produce more torque and power. But the range of an electric vehicle equipped with batteries depends on what the batteries can deliver and the series wound DC motor limits the current and power taken from the batteries at higher speeds by itself, thus producing better range.

Offered by Olli.

Troubled Times

Converted Cars

Some time ago I saw an article in the paper where an organization of some type was collecting older cars and stripping them to the frame and shortening the frame and converting them into farm tractors (full size) which they were shipping to India to help the farmers there modernize somewhat. Something like that could be done with electric. I think they put 2 stick transmissions in series so they could get the lower geardown needed on tractors for heavy pulling. When I lived on the farm we used old car frames to make into flatbed hay wagons when we went from making loose hay with horse power to making baled hay. They worked well. Some were made into grain wagons with grain boxes to haul oats, wheat. or corn or whatever. It wouldn't take much to make them into covered wagons of a sort suitable to camp out in, travel in, etc.

I think about 30 years ago a fellow took a junked van of the box shaped type with the engine under the front seat, and removed the engine and other non-essential parts including the front windshield, where he installed a piece of plywood with a slot maybe 6 inches high and a foot or so wide. He converted the front wheels to a trailer tongue setup and rigged it to be horse drawn. He had a set up where the wheels ran a car alternator to charge a set of batteries to run lights and the radio, etc. I guess it was set up like a camper on the inside, but I never saw that much detail on the vehicle. I mostly saw clips on the TV news and articles in *Popular Science*. My guess is he took out the transmission and left the drive shaft where he probably mounted a large V belt pulley and belted it to the alternator to power it and gear up when the wheels turned. This wasn't a new idea then even. I’ve seen WW1 news clips of a horse drawn 1937 Packard sedan used as a taxi, the engine and the front fenders were removed, and maybe the windshield removed too. The driver sat on the roof above the windshield. That was in north Africa.

Offered by Darrell.

Troubled Times

Recharged

The **Land Rover** is renowned for off-road versatility around the world. It was designed as a multi-purpose utility vehicle for rural areas. In a truly rural setting, an electric powered utility vehicle has a tremendous advantage over its gasoline or diesel powered counterpart. The operating fuel can be obtained on-site via solar collectors, or wind or hydro generators. The Daimler-Benz Fuel Cell Car can travel over 400 kilometers on 38 liters of methanol. And, if you have an electric vehicle in your garage, when a brownout occurs, you have available 8,000-10,000 (8-10KW) watts stored in the batteries which can be used to power you refrigerator, lights, TV and computer for several hours.

About a month ago I sat in on a Electric Vehicle introductory design class at my local collage. Told them I was going to build an off road vehicle that would be charged by driving up a hill and setting up a wind mill or parking by a fast moving stream and using a pelton wheel, water wheel or propeller type generator. They all (students and professor) instantly liked the idea. For those of you who have access to this type of class. Take it - It will teach you the care and feeding of batteries - generators - DC motors - best and worst practices. Has lots of hands on experience. I may never take the class but I plan to buy the book used to teach the class as soon as it is restocked in the book store.

Offered by Mike.

Troubled Times

Problems

I worked from 1989 to 1993 in a project developing an Electric Van. It was based on the Japanese **Subaru** minivan chassis and used lead-acid batteries with a series wound DC motor with **MOSFET** controller connected to the original clutch and 5-speed gearbox. Top speed about 70 km/h but in city traffic it was perfect. The Curtis PMC controller is similar to the model used in the **Elcat** minivan, a 1209-6402, which was a very quiet and efficient unit. The characteristics of the series wound DC motor made it accelerate well with lower speeds. The biggest problem was the batteries. There were 12 batteries (12 volt) in total. They were connected six in series and another six in series in parallel to produce 72 V operating voltage. The problem was that when the batteries were used for awhile some batteries were not fully charged due to the minor differences in the batteries' properties and this created imbalance in the battery pack. And because the total performance is defined by the weakest link the range per charge dropped dramatically. I guess in general building an electric drivetrain is easy and cheap when the top speed is low. There are a lot of electric forklift trucks with suitable components.

Offered by Olli.

I think our most efficient batteries configuration would be made up of a series of rebuildable single cells. I have found some very large single cell **Nicad** (not rebuildable though). Haven't seen any large single cell lead-acid. Finding rebuild-ability is even tougher. The industry is into disposability. With battery packs made of single cells one can swap out a single cell if it gets weak or dies.

Offered by Mike.

Troubled Times

Bikes

I can see off road bicycles could have some use on harder types of ground-gravel-rock. However, due to the non-stop rain and no vegetation to hold the soil in place, suspect in most places bicycles will not be able to be used for sometime. Good to have them though for when they can be used. Mountain bike may work for some areas. For the most part there will be lots of mud with no vegetation holding it. Roads will be all broken up. The gravel side of the road may be passable in some places. However an off road or mountain bike with puncture proof tires is one of the most likely things that may work. Carts should have light weight, wide puncture-proof tires, with large diameter rims for mud use. Even then it will be rough going when pushed by hand. At the very least we can predict at some point in time after the pole shift once the rains slow down that these things will be useful.

Offered by Mike.

I feel we will have no roads, more or less. You know what earthquakes do to roads. I think horse back and pack horse or ponies would be a good way to go. Another option is to load a strong bike with packs like a pack animal and ride where you can and walk and push it where you can't. I learned that one from the Viet Cong. That is how they brought supplies down from the north to south Viet Nam.

Offered by Darrell.

Troubled Times

Quadracycle

This looked interesting for a possible mode of transportation after the fact, foot powered. Rhoades Car, the 4 wheel bikes that drive like a car.

> The Quad Recumbent Pedal Car. One seat, two seat, and four seat recumbent bikes, Multi-speed, Stable, Quad cycle traction, More comfortable than a Trike or tandem bicycle, Factory assembled, Street legal, Easy to pedal, Auto like transportation.

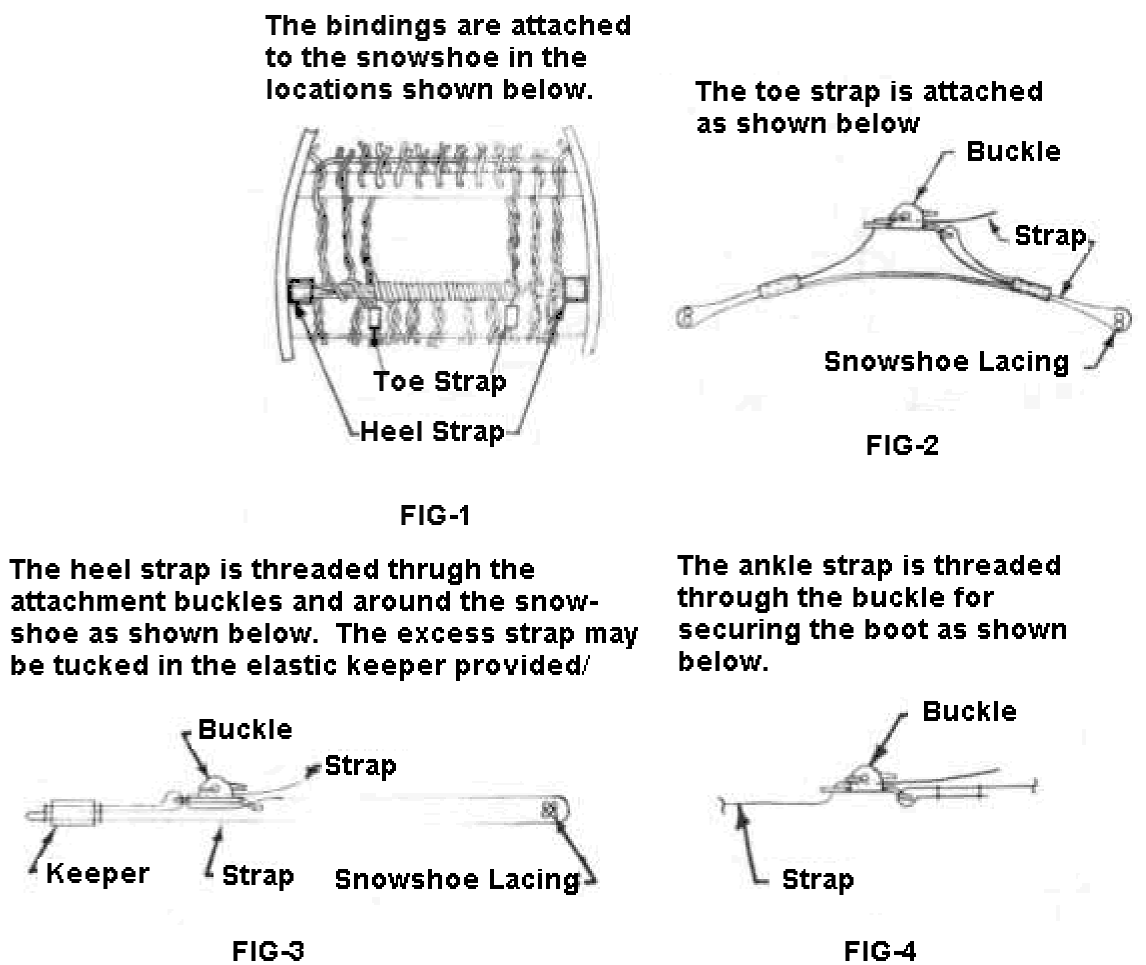
Offered by Bill.

I have a **Rhoades** car. It is a two place long bed. Like a human powered truck.

Offered by Robert.

Troubled Times

Snowshoes



Offered by Lou.

The Hub

Troubled Times

Electric Boats

With lots of rain and water everywhere, getting around by boat may be the only way for sometime after the changes. Here is a company that produces Electric Outboards - expensive!

Offered by John.

Poke Boats

Poke Boats are a much more stable boat than a canoe which may be needed post pole shift.

Offered by John.

Troubled Times

Motor Homes

Lately I was thinking about vacation, and made the connection to caravans and the fact that most fridges work not on direct electricity but on gas in caravans. This may be far fetched but maybe this technology of running necessary household equipment on gas is not a bad idea to work out.

Offered by Michel.

Some of the older camping trailers (like mine) have appliances that run on direct electric, propane gas, or 12V battery. It is nice because I always have a choice. If one form falls apart, I can go to another.

Offered by Shekhina.

Used travel trailers can be purchased relatively inexpensively. Trench out an area in a low hill side and back it in. You can then: secure it down with rebar and pipes cemented in the ground, cover with metal (oh, that stuff for deck covers, what ever that is called, its ribbed), secure to the pipes and you have protection from fire. Just a thought.

Offered by Mary.

I had been thinking about the travel trailer concept for a couple of months and I agree that it might be a viable temporary shelter, but will it survive in the conditions we are expecting during and immediately following the pole shift? If it will, it might be useful for those of us that are either riding the fence (so to speak) or feel the need to hang on until the last minute in case our families wake up and want to join us.

Offered by Roger.

The Hub

Troubled Times

Parked

Most travel trailers are made of light construction so as to not use much gas for transportation. The light duty goes all the way down to the utilities, plumbing and wiring, which are not long lasting. Unsupported the sides would probably cave in if the trench caves in, and untied down these units would surly be picked up by the wind. I think 300 mile/hr winds would tear it apart, especially if there is any debris in the wind (like flying trees and rocks). I personally think by the time one gets done with the cost and effort of beefing everything up you could have built two domes. In general it is probably safer and cheaper to live in a tent before and after the pole shift. Build a cellar or a small dome to stay in during the pole shift. Bury all your supplies and building materials to be dug up after the pole shift.

> Offered by Mike.

In other words, we should not spend our precious resources in strengthening a travel trailer in hopes that it would survive the pole shift. Instead we should plan on building a shelter that is more likely to survive. I agree. Tent dwelling up to and after the pole shift also sounds like an excellent idea (and what most of us will likely wind up doing), but what about living in a travel trailer? It would give one more of a sense of security and more shelter from the elements than a mere tent can provide. This, in my opinion, will provide mobility and that certain sense of home that will help alleviate depression. Of course that doesn't mean that a person should attempt to fortify their trailer in hopes that it will survive, instead they should plan on building a small dome for shelter from the pole shift.

> Offered by Roger.

Most definately if one has a travel trailer, use it up to the point of the pole shift. Just don't plan to be in it during the pole shift. There may be some exceptions, but for the most part I figure there are three options for cars, RVs, travel trailers and other vehicles. Abandon it and let it blow away, bury it, or build a special garage-dome for it. Most of us will not be able to afford the garage-dome. As an alternative, one could dig a hole, drive the vehicle into it, cover it with plastic and cover with dirt to the ground level. This way you may have some parts and raw materials to salvage after the pole shift.

> Offered by Mike.

I agree that a small Monolithic concrete dome could be built for about the same amount as a fortified travel trailer. Materials for the finished shell are about $15/sq. ft. You could finish it nicely for about $30-40 /sq. ft. A 24 ft diameter dome is quite livable for 2 people. You could build it yourself for approximately $14,000 to $18,000. While you lose the mobility, it will withstand earthquakes and 400+ mph winds.

Travel trailers have another little known problem. Many use urea formaldehyde insulation. This type of insulation outgasses formaldehyde vapor for years. Extremely unhealthy, not to mention what happens if it burns. Make sure if you buy a trailer, it does not use urea formaldehyde insulation. The safest insulation type would be some type of urethane foam insulation (either Isocyanate or Polyisocyanurate.)

> Offered by Michael.

Troubled Times

Cars

Bury a car up to the trunk and use the trunk as a door. I believe it is in Japanese airports where there are sleeping cubicles for busy executives. They put in a couple bucks and climb into this coffin looking drawer in the wall. A car could have the seats removed and replaced with a mattress and this would leave a protected steel cage to sleep in, your own personal cave!

Offered by Aron.

The only problem I see is the matter of water flooding into the car through it's many cracks and openings. You would also need to use a very sturdy car in case of trees or other heavy debris falling on top of you. If you're inside a Gremlin or other small vehicle when the trees start tumbling, you might be caught in your own personal coffin! I hope that no one is under the impression that the roads will be clear and passable after the shift. You may be in for an ugly surprise.

Offered by Doug.

Not only will vehicular travel be impossible after the pole shift, we should consider whether travel at all will be possible in the weeks leading up to the pole shift. We may be under Martial Law by that time with travel prohibited, or there may be so many people leaving their areas in sheer panic of what is to come, or possibly a manufactured gas shortage, as in the '70s. I think that we all should strive to be in our locations no later than September of 2002.

Offered by Mary.

Some thoughts to improve ones chances of survival if one wants to try this. Support the sides, and top with many layers of plywood supported on the top and bottom with pipe or 4x4 so that the vehicle doesn't easily get crushed in all the strong jolts causing increased vice like pressure of the earth. Take out the windows or duck tape up the inside so small particles of glass suddenly don't become part of what is bouncing around with you. Safety belt your body and your pad to one spot. Remove the gas tank and battery, you don't want gas fumes, electrical sparks, or other effects of battery acid as part of the reason you didn't make it. If you have the time - remove the engine. This being rather heavy, can tare loose from its rubber mounts, and become a battering ram you don't want to be close to. Like wise get rid of anything loose - not tied down in the car. Provide a way to get fresh air.

Offered by Mike.

Troubled Times

Trans-
port

Trucks

One relocation venue that may be wortwhile is some form of mobile home with wich one takes an "early holiday" to a safer area when the cataclysm draws close, leaving for the holiday about a week ahead of things starting to happen. People that can´t find themselves able to justify the financial outlay of a ready-made mobile-home can buy a used lorry or military surplus truck and do some cheap modifications to allow it to function as a mobile home. I myself am planning to re-build a US M46 type military vehicle for this purpose. A budget of ca. $3000 for the vehicle and $1 to $2000 for the modifications is a realistic estimate, at least where I live (Scandinavia). The "slightly above average" do-it-yourselfer can, with the budget above, create a mobile-home that will rival all but themost expensive of mobile homes. Also, a vehicle that can tow some form of trailor behind it will allow you extra space for needed supplies (seeds, fuel, water filters-tools etc.)

Offered by Tomas.

The Hub

Troubled Times

Diesl Substitute

The June ‘98 issue of *Home Power Magazine* has an article describing a school project that built a diesl engine powered van that ran on used cooking oil. The engine is unmodified. The oil is heated and treated with alcohol and lye - making the fuel oil. The article further states the the diesl engine was actually designed to run on canola oil, (no such thing as diesl fuel when it was invented.).

Offered by Travis.

The Hub