

# ARCH CAPE SANITARY DISTRICT DRAFT MINUTES

16 June 2017

A quorum was present.

Sanitary Board: Darr Tindall, President  
Ron Schiffman, Vice-President  
Virginia Birkby  
Casey Short

Excused absent: Debra Birkby, Treasurer

Public: David and Jeannie Stockton

Staff: Phil Chick, District Manager  
Steve Hill, Secretary

Ms. Darr Tindall called the meeting to order at 7:47 pm.

**Public Comment:** None.

**Agenda:** ORD 17-01 SD to new business and terms of office. Mr. Short moved adoption of the agenda as amended which was seconded by Ms. Virginia Birkby. All in favor (AIF).

**Consent Agenda:** Ms. Virginia moved adoption of the consent agenda which was seconded by Mr. Short. AIF.

## **Old Business:**

**Audit Engagement Letter:** (Information/Action) Mr. Short moved execution of the audit review engagement letter for 2016-17 (attached) which was seconded by Mr. Schiffman. AIF.

**Septic System Connection - 79876 Hwy 101:** (Information) Mr. Chick reported that a formal notice had been sent requiring a connection within a year and that legal counsel had been consulted regarding the letter used. He believes that the property in question has been on a septic system for the last thirteen to fourteen years. The mailing had been done to the property owner who lives in San Diego.

**Emergency Needs Items List:** (Information) Ms. Tindall reported on her investigation on systems and supplies available to individuals and communities in the event of an emergency (attached). A goal was stated to have something in place in fall of this year.

**New Business:**

**System Development Charges (SDC) Adjustment Resolution 17-03 SD:** (Action) Mr. Short moved to adopt RES 17-03 SD SDC Update (attached) which was seconded by Mr. Schiffman. AIF.

**Membrane Replacement Cost:** (Information) Mr. Chick reported that Kubota offered a greatly reduced price for our expected membrane replacement by as much as \$100K if a purchase agreement could be reached over a multi-year period covering expected need. Kubota is scheduled to provide an update on our current membranes life expectancy. A discussion ensued as to obtaining input from Curt McLeod of CMI as well as a legal review of the process and whether a request for proposal would be involved. Mr. Chick will report back to the Board on developments.

**ORD 17-01 SD Lien Satisfaction for Service:** The wording of the proposed ordinance was by agreement adjusted to correspond with those changes made in the Water District version of this ordinance (attached). Mr. Short moved that Ordinance 17-01 SD be read into the record reflecting the previously mentioned changes which was seconded by Ms. Virginia Birkby. AIF.

**Public Hearing:** Ms. Darr Tindall opened a public hearing at 8:15pm for public questions and comment and hearing none closed the public hearing at 8:17pm.

It was agreed to refer the ordinance to legal counsel for review and Mr. Chick will inform the Board of the results.

**Terms of Office:** (Information) To be discussed at next month's meeting.

**Reports:**

**Accounts Receivable:** Other than the sheriff's sale scheduled for one of our non-performing accounts in early July, receivables were reported to be in good condition.

**District Manager's Report:** (attached) Mr. Chick reported that Mr. Gardner passed his certification one level tests for both treatment and collections. He was directed to extend the congratulations of the Board to Mr. Gardner and that it was to be so noted in the minutes.

**Treasurer's Report:** For next month.

**Board Comments:** Ms. Virginia Birkby expressed her belief that we were reaching closure on emergency preparedness and Ms. Tindall expressed her thanks to Mr. Chick and Mr. Hill. Mr. Short said that he would not be at the next board meeting.

**July Agenda Items:** Possible ordinance consideration, terms of office, swearing in of new directors, emergency preparedness, sole sourcing information from Mr. Chick, septic conversion update.

**Public Comment:** Mr. Stockton expressed his belief that the smoke testing alert insert in the most recent billing round was a good idea.

The meeting was adjourned by Ms. Tindall at 8:25 pm with the next meeting scheduled for Friday, 21 July 2017.

Respectfully submitted,

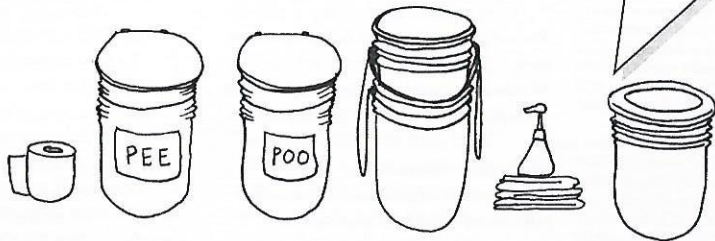
  
Steve Hill

Attest   
Ms. Darr Tindall, President

An Emergency Sanitation Kit  
for 2 people for a week



add a curb-side bin full of wood chips and this will take care of 2 people for a month!



Toilet Paper  
(store in water proof container)

Twin Toilets

Tap Up Hand Sink

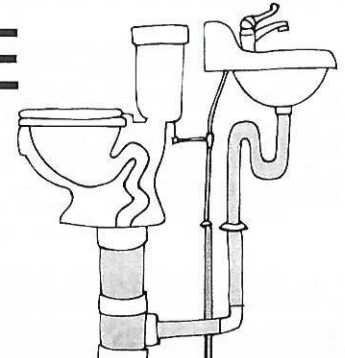
Soap towels and wipes.

Extra bucket and lid

Brought to you with support from:



# A SEWER CATASTROPHE COMPANION



Dry Toilets for Wet Disasters



# EMERGENCY

The year is 20\_\_.

The Juan de Fuca tectonic plate has shifted, causing an **earthquake** with a magnitude of 9.0, devastating the Pacific Northwest.

Underground infrastructure has shaken. **Sewers are broken** and leaking into waterways.

You have food and water, your house is still habitable, and your friends and family are all accounted for. Finally, you can slow down and take stock.

You need to poop. **Where will you go?**

# RESPONSE

This guide presents a toilet system that you can do yourself without relying on a coordinated and timely response by someone else. This system served after earthquakes destroyed sanitation systems in Haiti and New Zealand. This guide is for planning ahead and preparing kits, whether for yourself, your household, your apartment building, or your block. This flexible system is built around ubiquitous and freely available 5-gallon buckets.

A solution for today that's not a problem for tomorrow.

1. Pee in Bucket



Urine itself is sterile, it can be applied to land, dramatically reducing the amount of material handling.

2. Poop in Bucket



After the earthquake in New Zealand, people used separate toilets for poop and pee to reduce material handling, disease risks, and work.

3. Wash Hands



Washing hands is fundamental. We designed a simple, efficient, and ergonomic portable sink using buckets.

A solution for managing excreta that's not excreting problems later.

1. Cap and Store



Store materials until they can be properly processed and treated. This allows time for an official response and pickup, or to build your own compost processing area.

2. Load Compost Pile



Cracked sewers and roads take time to repair. Composting allows hygienic human waste and food scrap handling for when trucks and pipes can't deliver service.

3. Rinse Buckets



This bucket toilet system with hot composting served after earthquakes in Haiti through the Oxfam funded SOIL project, and in Christchurch, NZ through the New Zealand Permaculture Guild.

4. Pour Rinse Water on Pile



5. Cover with Carbon



or

**A Sewer Catastrophe Companion:  
Dry Toilets for Wet Disasters**  
First Edition

**Contributors**

This handbook came out of a collaboration between Pacific Northwest College of Art's (PNCA) Collaborative Design's inaugural cohort and MDML.

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**Acknowledgements**

Thanks to Peter Schoonmaker for initiating this collaboration. Much appreciation for the patience and graciousness of the Sanitation, Hygiene and Integrated Technologies Lab at PNCA. This publication wouldn't have happened without your enthusiasm for dealing with complex sh\*t. Thanks to Carol McCreary and friends of Public Hygiene Lets Us Stay Human for editing and encouragement. Thanks to Robby Kraft, Naomi Krasnow, Andrew Kurtz, Ezra Spier and Jeremy O'Leary for pre-testing.

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**mdml**



**cewas**  
international centre for water management services

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## Getting enough buckets

A curbside bin can hold



for 4 adults

If the pipes break, it can take anywhere from a month to a year to completely restore the underground piped infrastructure and treatment system. What does it look like to contain and treat your waste for a year? Each adult poop is 3-10 ounces, each pee is 4-40 ounces. Although highly variable from event to event, it averages out over the week to about 2 lbs of poop and just under 2 gallons of pee.

In the US, it's illegal for food service businesses to reuse their plastic buckets for food. That means that supermarkets, food processors, bakeries and any place that handles food produces huge quantities of polyethylene buckets. Lids can be harder to find since they're not always saved or they're torn off.

= 65 gals. They range from 55-70 gal in the US or 240 liters in the UK.

### Poop by the Bucket

4 gallons of toilet paper, carbon, and poop in a 5 gal bucket

This chart assumes 2 large scoops of carbon cover (sawdust, wood chips, coffee hulls, etc see page 12) and lots of toilet paper are used with each addition. Buckets are filled 4/5ths full.

# of people served	days to fill a bucket	/day	/week	/month
1	14			
2	7			4 x
3	3			10 x
4	1+			14 x

### Pee by the Bucket

4 gal. of urine in a 5 gal bucket

# of people served	days to fill a bucket	/day	In Buckets & Gallons /week	/month
1	16		2 gal	8 gal
2	8		4 gal	4 x
3	4		7 gal	8 x
4	2+		11 gal	12 x
5	1+		20 gal	20 x

## Twin Toilets- a lesson from Christchurch, New Zealand

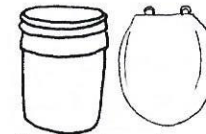


Pee and poop together require more odor control than each alone. The poop bucket takes pee and poop, but if you're only going to pee, use the pee bucket. Poop is covered with sawdust (or similar material, page 11) and then held until collected or composted (see page 10), while pee is applied directly to root zones in measured doses (see page 12). Filling the pee bucket with wood chips will keep odor down. The pee can be emptied out without disturbing the wood chips, which can be reused until they develop an odor.

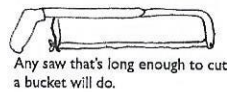
Several manufacturers create snap-on bucket seats for using a 3-5 gallon bucket as a toilet, they generally cost \$10-20 (see page 18).



### Materials



To make a toilet seat that can be fitted to buckets 3.5-7 gallons, take a 5 gallon bucket and cut the bottom off and screw the lip of the bucket into a toilet seat.

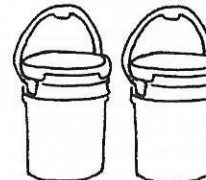


Any saw that's long enough to cut a bucket will do.



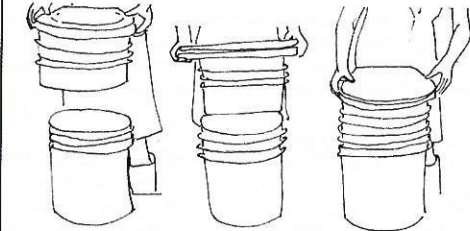
drill & screwdriver bit

four 1/4" long screws

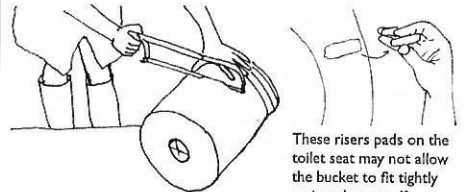


At least two buckets with handles and lids. See page 6 to calculate how many your household will need.

### Make Your Own

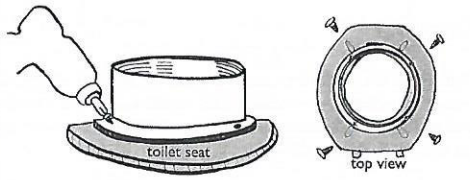


A cut off bucket becomes a flange to fit a seat tightly into a bucket.



1. Cut off a 5 gal. bucket 4" below the rim.

These risers pads on the toilet seat may not allow the bucket to fit tightly against the seat. If so, detach, pry, or cut off.



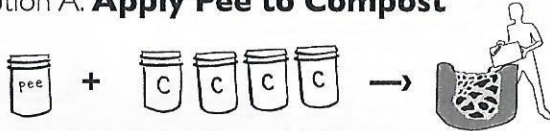
2. Place cut off bucket on top of the toilet seat so that the opening of the seat is entirely inside the bucket flange. Screw the cut off bucket into the toilet seat through the outer rim of the bucket, taking care not to screw through the wall of the bucket. Use four screws.

Cut off 5 gallon bucket as flange for toilet seat developed by Ole Errson.

## What to do with Pee?

Pee can be applied directly to land because it is mostly sterile and a low disease risk; some bacteria and viruses may be present in low concentrations. Urine is not a health risk unless it contains blood, which can happen if someone has a severe kidney infection. Pee contains a considerable amount of nitrogen, an essential plant nutrient that if over-applied to land can create smelly releases of ammonia. In large enough quantities nitrogen can poison groundwater. Urine is mostly water (ranging from 95-97%) and less than 1% nitrogen. There's about the same amount of salts in urine as nutrients (Phosphorus, Magnesium, Potassium and Calcium (Putnam 40, Olkowski 215, Hoeglund 4). Salts make nutrients unavailable to plants, urine should not be applied to heavily to the land.

### Option A: Apply Pee to Compost



Urine can be added directly to compost to provide moisture and an easy source of nitrogen for microorganisms. If adding urine to an already moist pile, add 4 buckets of wood chips or other carbon bulking material for every bucket of urine (See page 19 for the calculation references).

### Option B: Dilute Pee & Pour on Land

Different soils and plants can accept different quantities of pee, see *further readings* to get a handle on the complexities, or just use this simple rule:

"A rule of thumb is to apply the urine collected from one person during one day (24 hours) to one square metre of crop... For most crops, the maximum application rate before risking toxic effects is at least four times this dosage."

Joensson, et. al.  
Guidelines on the Use of Urine and Faeces in Crop Production

\*Using this guideline urine can be reapplied every 6 months. This is based on a fertilization rate of 3.13 g of Nitrogen/year. A 120 lb person can fertilize 6.3 sq ft of garden every day (Olkowski 211).

## Safety

"Pathogens that may be transmitted through urine are rarely sufficiently common to constitute a significant public health problem and are thus not considered to constitute a health risk related to the reuse of human urine in temperate climates." (Hoeglund 52).

## Special Considerations for Gardens

Pee contains salts people eat, and potentially some viruses and bacteria. Some plants are especially sensitive to salts and especially in acidic soils. To lower disease transmission risks even further, wait at least four weeks after applying pee to pick plants (Hoeglund 49).



## Quantifying Pee

Day to day your pee contains similar levels of nutrients and salts, but can vary widely in the amount of water. Safe land application is therefore more related to person-days (one person's pee for one day) than volume (Joensson 7).

For more on managing poop and pee safely see page 14.

## What to do with Poop?

Poop can contain more than 120 pathogens and is a high disease risk if it touches people before it is treated (Stenstroem et al. 3). There are many ways to sterilize poop. Two of the simplest methods for home owners are to either retain it for 2 years and/or make sure the compost pile rises to 55° C (131° F) for 3 consecutive days (National Research Council 265).

In the US the major concern is spreading Hepatitis A and diarrhea through contact with untreated feces. Poop is a hazard for the same reason it makes a great fertilizer: it contains nutrients plants and animals want, like Nitrogen, Phosphorus and Potassium. If your excrement is treated to reduce the pathogens, the nutrients in it can be used to nourish crops. Currently, most wastewater treatment plants in the US treat sewage and apply it to crops as "biosolids."

Every day you excrete about 1 pint of poop.

### Option A: Store it and Wait



If your sewer pipes aren't working, find a curbside bin or other sturdy waterproof container and fill it 1/3 full with wood chips or another carbon material. Empty the contents of your emergency toilet into the container and cover with more carbon material.

Even with wood chips, poop in a closed bin will decompose without oxygen. This will smell very bad. Make sure to add carbon materials and store in the shade to keep contents from heating up and smelling. Note: This is a short term solution, not a long term strategy.

### Option B: Compost it to Treat it



Compost needs a buffer to keep it off the ground and insulated. Make sure the walls and bottom of the compost have a floor of carbon material to insulate them from extreme weather and pests. The edges and bottom of the pile need to get to temperatures hot enough to kill pathogens (131° F for 3 days). A long thermometer will be useful

to track the progress of the pile. If you can't assure your pile reaches high temperatures, hold it for 2 years before applying it to food crops (National Research Council 265).

Composition of Human Urine and Feces\*

	per capita wet	per capita dry	Moisture	Nitrogen	Phosphorus	Carbon	Calcium
Feces	0.3-0.6 lbs	0.08-0.16 lb	67%	5-7%	3-5.4%	40-55%	4-5%
Urine	1 3/4- 2 1/4 pints	0.12-0.16 lb	95%	15-19%	1-2.5%	11-17%	4.5-6%

\*Farallones institute 118.

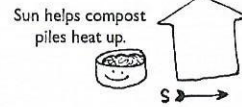
## Redundant Design: Make the Easiest Choice the Most Hygienic Choice

Provide multiple barriers between yourself and untreated feces. Redundancy makes a system hygienic even if users make small mistakes. Make sure carbon material is within arms reach of the emergency toilet so that feces is never left exposed. Feces left uncovered is open to contact with flies that will later land on food. Design your setup so the easiest choice is also the most hygienic choice. Don't make it a hike to get a new bucket for the toilet and a lid for a full toilet. Keep supplies stocked nearby.



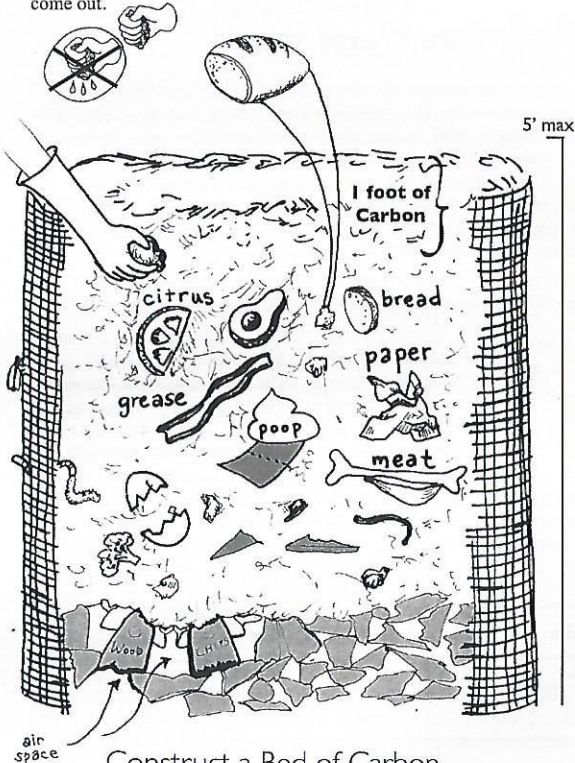


## Building Compost an overview



### Moist but not Wet

Compost likes to be 45-70% saturated with water (Dickson 8). This is the same as a moist sponge. A good test is to put on a glove and squeeze a bit of compost. Liquid should bead up, but not more than a drop or two will come out.

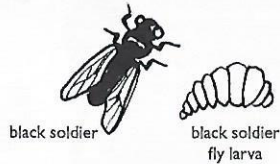


### Covered Compost Piles Don't Smell

All odors should be absorbed by a **foot of carbon on the sides and top**. Always cover up after all additions or disturbances.

### Not Too Tall or It Compacts

Compost begins compacting and losing air when it is built more than two feet high. Wood chips' bulk holds air spaces that can extend the height up to 4 or 5 feet, but at that height the bottom of the compost must be turned up frequently (Yamada 49).



### Bugs Volunteer for Vital Jobs

Bugs will join your compost and help out. Their small mouths break apart compost, making nutrients available to bacteria, and their tunnels provide aeration. Their digestive tracts also chemically transform the contents of the pile.

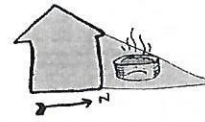


### Add Paper in Shreds

Cardboard, and paper can form mats that stop air flow when concentrated in one area. Cardboard and paper cannot be the sole source of carbon material. They must be mixed with bulkier materials like wood chips and straw.

### Construct a Bed of Carbon

Carbon materials absorb odors, create air spaces, and provide food for microbes. Sawdust, leaves, wood chips, paper, cardboard, and other materials are all sources of carbon, and make up more than half the pile by volume, and about half by weight (see page 12 for more info).



## Building Dumps how not to compost

Wet piles cool down and smell of methane.



### Proteins and Fats Require Hot Piles

Fats and proteins only break down aerobically above 110° F. At low temperatures they go rancid and attract rats and other pests.

### Dumps are Dumps

Compost is the deliberate compounding of organic materials to encourage decomposition and make new soil. A pile of rotting food and paper waste in the back yard is not "bad compost," It's not compost. It's a dump in the making, and a hazard.



### Don't Invite Flies and Pests

High temperatures, plenty of air, and carbon cover will deter pests such as flies, birds, and rats. Animals are clever and have teeth. Focus less on fencing them out and more on not attracting them. Active fungi and bacteria make everything less delicious and attractive to pests.

### Large Things Block Air

Smaller pieces break down faster. Even the largest worms have small mouths.

### Pressure Treated Wood

Contains Heavy Metals. Don't use it in gardens or around compost. Beware of painted and stained wood as well. Steel mesh and unfinished wood are safe.




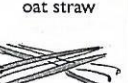
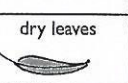
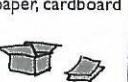
### Don't Allow Leaching

Even with a cover over it to keep rain out, compost will leach water. Water is created during the respiration of decomposers and is called leachate. Its nutrients can poison groundwater if they escape, but a layer of carbon can absorb them and protect groundwater. A layer of coarse carbon such as wood chips will also provide air flow to help the bottom of the pile decompose.

For further readings on the safety of composting feces see page 14.


## Compost Materials and Processes

### Carbon Sources for Compost\*

	Advantages	Disadvantages
 sawdust	<ul style="list-style-type: none"> <li>• can be the only carbon material you use</li> <li>• available from woodworkers and small scale sawmills</li> <li>• available as animal bedding at pet stores</li> <li>• small enough to evenly mix with compost</li> </ul>	<ul style="list-style-type: none"> <li>• the high lignin content will take years for these complex polymers to completely break down (1-2 years)</li> </ul>
 woodchips	<ul style="list-style-type: none"> <li>• readily available from tree trimmers and city parks &amp; recreation departments</li> <li>• can be the only carbon material you use</li> </ul>	<ul style="list-style-type: none"> <li>• large size means it takes even longer than sawdust to decompose (2 years+)</li> </ul>
 coffee hulls	<ul style="list-style-type: none"> <li>• contains less lignin than wood so decomposes very quickly</li> <li>• small, dry particles provide a lot of digestible carbon for biological activity</li> </ul>	<ul style="list-style-type: none"> <li>• must acquire from coffee roasters</li> <li>• does not hold air spaces in the compost, tends to flatten in the rain</li> <li>• best if used with woodchips or sawdust to hold air space</li> </ul>
 oat straw	<ul style="list-style-type: none"> <li>• quickly decomposes</li> <li>• easy to acquire from farms</li> </ul>	<ul style="list-style-type: none"> <li>• tends to start decomposing during storage (before it hits the pile)</li> <li>• does not provide a barrier to pests and vectors unless using more than 16" over a hot pile.</li> </ul>
 dry leaves	<ul style="list-style-type: none"> <li>• easy to acquire</li> </ul>	<ul style="list-style-type: none"> <li>• tend to mat down and not hold air space</li> <li>• need to be blended with other carbon sources</li> </ul>
 paper, cardboard	<ul style="list-style-type: none"> <li>• readily available in most homes</li> <li>• breaks down quickly if ripped up</li> </ul>	<ul style="list-style-type: none"> <li>• needs to be ripped up: large packs of paper create wet, airless pockets in the pile</li> <li>• tends to mat down and not hold air space</li> <li>• needs to be blended with other carbon sources</li> </ul>

\*Cornell Waste Management Institute.

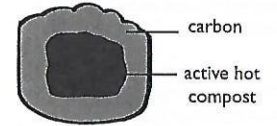
### Commonly Mistaken as Carbon Sources

	Advantages	Disadvantages
 ash	<ul style="list-style-type: none"> <li>• covers odors effectively</li> <li>• contains potash, phosphate and other trace minerals</li> <li>• up to 20 lbs of it can be added to a 100 square foot garden a year (Lerner 1)</li> </ul>	<ul style="list-style-type: none"> <li>• not a source of carbon</li> <li>• 25 - 60% calcium carbonate which raises the soil pH, making it caustic</li> </ul>
fresh leaves, fresh or dried grass clippings	<ul style="list-style-type: none"> <li>• good source of nitrogen</li> <li>• decompose quickly</li> </ul>	<ul style="list-style-type: none"> <li>• not a source of carbon</li> <li>• compacts easily, smothering air spaces</li> <li>• does not effectively cover odors</li> </ul>

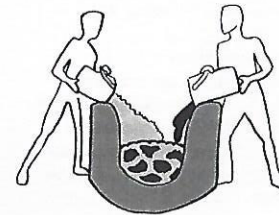
### Loading a Compost Pile



1. Put on gloves and open the compost pile to uncover the active hot center zone. Pile the compost cover you removed on the side of the pile.



When opened up, compost should smell like a mixture of the sharp, sour odor of moldy bread and the deep earthy smell of fresh rain (geosmin). A distinct rotten egg odor indicates that there is no air inside. Add carbon and mix. A "poop" smell indicates there is not enough carbon inside. Add Carbon and mix.



2. Add 2 buckets of carbon material to the hot active zone.

For every bucket of



Add this many buckets carbon



Add one bucket of poop, pee or food scraps at a time. After emptying each bucket add the amount of carbon it needs.

The goal is to have the carbon dispersed throughout the pile to maintain air spaces.

See bibliography for calculation.



3. Use captured rain water and toilet brush to rinse out buckets.

A little water goes a long way- clean multiple buckets with the same water.



4. Pour rinse water slowly over compost, slowly, spreading out over the whole pile.

Optional- rinse a second time.



5. Cover with at least a foot of carbon material to make sure any smells are absorbed by the carbon and not by noses of nearby animals looking for food.

EMERGENCY PREPAREDNESS  
ARCH CAPE SANITARY DISTRICT

June 16, 2017

**3 Tsunami Evacuation Sites in Arch Cape**

**Preliminary Ideas and possible needs:**

5 gallon sanitation buckets – “The Twin Bucket Emergency Toilet”

10 Twin bucket sets at each of 3 evacuation sites = \$20 per set x 30 = **\$600**

Hand sanitizer – 1 gallon \$20 each x 3 = **\$60**

Shovels - \$15 each x 3 = **\$45**

Rakes - \$15 each x 3 = **\$45**

to rake up carbon material from forest floor

Pop Up Privacy Tent - \$30 each x 3 = **\$90**

Tarps – 2 pack \$20 each x 3 = **\$60**

Trash Bags – 13 gal to line buckets \$15 each x 3 = **\$45**

33 gal misc trash \$15 each x 3 = **\$45**

Gloves – District buys by the case = **\$180**

Toilet Paper – District buys by the case = **\$60**

Bleach – has a shelf life and is stocked by the Water District

Kitty Litter or carbon material from forest or absorbent for liquids = ???

Feminine Hygiene Products - ???

Guesstimate of how many residents/vacationers to plan for = ???

**Estimated Total Cost This Sheet = \$1230**



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Sports & Outdoors > Outdoor Recreation > Camping & Hiking



Roll over image to zoom in

TMS

### TMS Portable Green Outdoor Pop Up Tent Camping Shower Privacy Toilet Changing Room

261 customer reviews

22 answered questions

Price: \$37.43

Sale: \$29.95

You Save: \$7.48 (20%)

In Stock.

Want it tomorrow, June 16? Order within 3 hrs 5 mins and choose One-Day Shipping at checkout. Details

Sold by TMS Warehouse and Fulfilled by Amazon in easy-to-open packaging. Gift-wrap available.

- This very lightweight and portable privacy tent is the perfect shelter for outdoor toilets, changing on the beach, the park, by the pool, or to be used as a dressing room for outdoor venues. The enclosed roof design ensures that no outside critters get inside uninvited.
- Includes 4 metal stakes that lock town the tent for additional stability, and security. The waterproof polyester fabric allows you to use this tent as a private shower as well.
- The single door U shape zipper provides a safe and sound lock that is very easy to access from both sides. Entire tent folds into a compact ring that stores into the provided 2 strap carrying bag. There are many functions that this tent can be used for making it a must have for anyone who wants to make the outdoor life more private and civil.
- Specifications: Pop-up dimension: 75inch (H)x 40inch(L) x 40inch(W). Folded dimension: 22inch diameter.
- Package Included: (1) Pop-up Tent. (1) Carrying bag. (4) Metal mounting stakes.

Used & new (5) from \$29.95

Report incorrect product information.

This item's packaging will indicate what is inside. To cover it, select Ship in Amazon box on the checkout page.

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Ship to:

Blue Line Transpo- Portland - 97217

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Add to your Dash Buttons

#### Other Sellers on Amazon

\$34.99

Add to Cart

+ Free Shipping

Sold by: CoreStone Wholesale

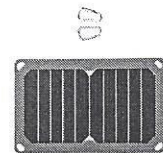
Used & new (5) from \$29.95

Have one to sell?

Sell on Amazon



Renogy, The Future of Clean Energy.



\$29.99

51

Shop now

Ad feedback

EUREKA

### Eureka Spire

> Shop now

Eureka Spire dual burner camp sto...



Ad feedback

Frequently bought together

## Getting Everything Together

Commercial reuse of plastic buckets for food is illegal so supermarkets, restaurants and bakeries often give them away for free.

Donated buckets may lack lids but both buckets and lids are sold at hardware stores and online.

Buy toilet seats that fit buckets at camping stores or online. Or adapt seats from home toilets to fit.

Handwashing is critical. Use of hand sanitizer and disposable gloves and wipes will help you conserve your emergency water supply for essential handwashing.

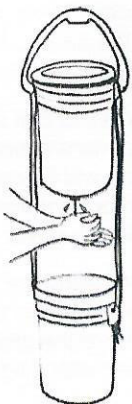
Keep toilet paper, soap, bottled water, disposable gloves, towels or wipes and starter bags of carbon material in a bucket. Include sanitary napkins or diapers, if needed. Nest in empty buckets that remain available for everyday cleaning chores.



## For More on Disaster Sanitation

See [www.phlush.org](http://www.phlush.org) and [www.cloacina.org](http://www.cloacina.org)

For handwashing, make the Tap Up two-bucket hand sink. See directions in MDML's *Sewer Catastrophe Companion*.



Preparing compost that is safe to use in gardening requires extra work. The process is explained in *Sewer Catastrophe Companion* and on website of the New Zealand team. [www.composttoilets.co.nz](http://www.composttoilets.co.nz)



PHLUSH (Public Hygiene Lets Us Stay Human) is an all-volunteer advocacy group based in Portland, Oregon. We receive support from the Old Town Chinatown Neighborhood Association and Neighbors West-Northwest. PHLUSH is a member of the World Toilet Organization and a partner in the Sustainable Sanitation Alliance.

We are grateful to the New Zealand Permaculture Emergency Response Network for the practical elegance of their design.

The Portland Bureau of Emergency Management has reviewed the design and posted instructions at <http://www.portlandoregon.gov/pbem>

We are indebted to Molly Danielsson and Mathew Lippincott of MDML for their expertise and permission to use illustrations from their *Sewer Catastrophe Companion*.

## PHLUSH

Public Hygiene Lets Us Stay Human

115 SW Ash Street #400G, Portland, OR 97204

[www.phlush.org](http://www.phlush.org)

[info@phlush.org](mailto:info@phlush.org)

Twitter: @PortlandPHLUSH

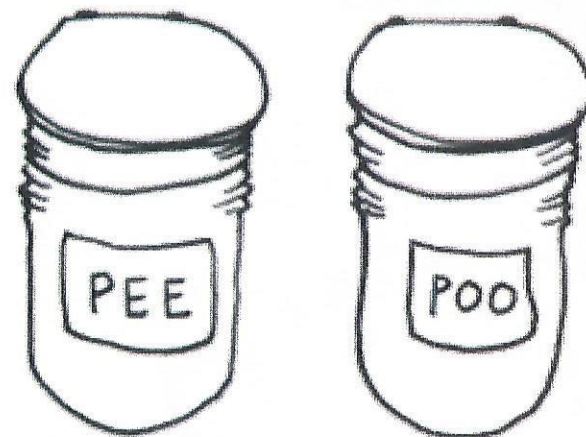
Facebook: PHLUSH



partner of

sustainable sanitation alliance

# The Twin-Bucket Emergency Toilet

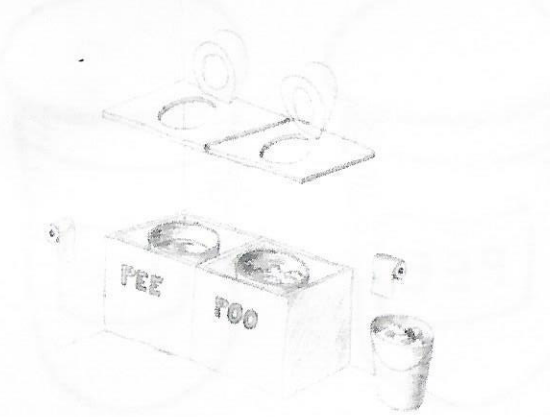


## A Household Toilet for Oregon Emergency Kits

## Why do we need toilets in our emergency kits?

Giant earthquakes off the coast of Oregon have occurred 40 times over the last 10,000 years, or at about 250-year intervals. The Oregon Department of Geology and Mineral Industries states that last megaquake was a magnitude 9+ in 1700. The next Big One can happen at any time and will likely cause widespread damage to water and sewer systems, preventing our plumbed toilets from working properly.

After the earthquakes in Christchurch, New Zealand in 2011, people quickly built twin-bucket toilets appropriate for the emergency stage of the crisis. Sewer service has not yet been restored to all parts of the city so many residents continue to use these waterless toilets in their homes.



Guidelines on emergency preparedness usually fail to mention toilets as they are not compromised in most emergencies.

In the Pacific Northwest, some agencies recommend single-bucket camping toilets. These fill up fast. The assumption is that disruption of water or sewer service will be short term and that toilet contents will be buried, or bagged and trucked away. Such practices can lead to polluted groundwater and the spread of disease.

## The Solution

The Twin-Bucket Emergency Toilet adapted from the New Zealand design works even for high-rise apartment dwellers.

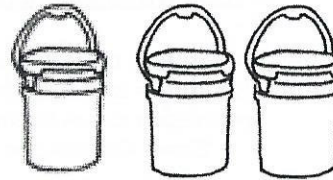
- Safe and manageable.
- Buckets, lids and a seat cost \$20 or less.
- Supplies in nested bucket make a hygiene kit.
- Twin buckets separate urine from feces.

A day's worth of pee has 10 times the volume of poo. Pee is generally sterile while poo contains pathogens and requires special care.

Not mixing urine and feces is a proven principle of ecological sanitation. In separating pee and poo, the twin-bucket toilet reduces disease risks and odor and makes the contents of each bucket easier to handle.

## Toilet Components

- Plastic buckets - 5 or 6 gal. size; 2 buckets for 3-4 people for 3 days; a dozen buckets for a month.



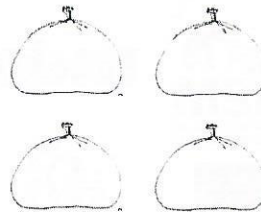
- Lids for buckets.



- A plastic seat that fits the buckets.



- Carbon material to cover the poo: A supply of sawdust, coffee husk chaff, finely shredded paper, or coir fiber. About a gallon bag per day.



## The No-Mix Principle

The great thing about pee is that it's clean (unless a household member has a kidney infection or blood in their urine). It poses almost no health risk. With extra buckets and lids, you can store pee until it can be sprinkled on land as a fertilizer. High-rise apartment dwellers without access to land may have to dispose of pee in a functioning street drain.

The poo bucket contains most of the pathogens. Poo needs to be treated, or contained until treated. But, the great thing about poo is that it doesn't take up much space. Each of us produces only 4-10 oz daily. It takes a couple of weeks for 3 people to fill the bucket with poo and carbon material.

## Using the Twin-Bucket Toilet

1. Mark the twin buckets "pee" and "poo" (or #1 and #2, or urine and feces, or yellow and brown, etc).
2. Put buckets in a private space with carbon covering material nearby, along with a plastic scoop.
3. Decide if you need to use the pee bucket or the poo bucket. The seat can be moved from one to the other.
4. Try not to mix pee and poo. This is important although it's understandable that there will be mistakes. The pee is the component that produces the bad smell in toilets that mix the two.
5. After using the pee bucket, you can put the toilet paper in the poo bucket. Then remove the seat from the pee bucket and cover with a lid that closes well.
6. After using the poo bucket, sprinkle as much carbon material as needed to completely cover the surface of the poo. This eliminates odors and keeps flies away.
7. Put the toilet seat back down on the poo bucket so it doesn't invite pests.

## Managing Poop and Pee Safely

When is the compost containing poop safe to use on an annual garden?

### Option 1: Retention

Retaining compost can kill many pathogens by keeping pathogens away from their host (our gut), however, *Ascaris* eggs (roundworm) can last up to 130 days and still be viable. Retaining compost for two years (730 days) is considered extremely safe (National Research Council 265).

### Option 2: High Temps

Most pathogens are adapted for a narrow temperature range around their host's body temperature, and very few survive outside of that range (Gotaas 81). Two consecutive days at 57°C (135°F) kills roundworm eggs. Federal guidelines for sewage sludge treatment require three days at 55°C (131°F) for pathogen reduction (National Research Council 265).

### The Tomato Test

If you want to use the compost on the soil before two years add a few tomato seeds to the compost pile when you start the pile. Hardy tomato seeds can survive as well as *Ascaris*, and many municipal co-composting systems now throw them in as an indicator (Germer). If tomatoes spontaneously sprout up, then pathogens may have survived too.

### What are the Risks of Composting Here in the US?

Depends on what crops you're using it on. If you're just burying it in the soil near trees and bushes the risks are negligible. If you're using it on annuals you should make sure you can guarantee pathogen destruction before use. In the US par-

asites are not as common as in other places in the world. On average a typical North American's feces will contain: *Salmonella*, fecal coliform, *Clostridium* and *L. montocytogenes*. Children and pets are most likely to have parasites like pinworms.

No treatment is guaranteed safe, but the most complete decomposition happens when the widest variety of decomposing organisms expose the material to the greatest number of extreme environments. **Diversity is the key to the safety** and broad effectiveness of composting against pathogens and organic pollutants. Anaerobic and saturated anaerobic (in liquid) processes are not as diverse.

### Urine Disease Risks

In healthy people urine is sterile, although it may pick up bacteria or feces while leaving the urethra. Those with severe kidney and bladder problems may transmit infections through blood contaminated urine (Schoenning 3). Urine from a person with kidney problems could contain blood which might contain hepatitis A & B, CMV, JCV and BKV (flu-like viruses), albeit at low levels with a low risk of infection (Schoenning 13).

### Addressing Urine Disease Risks

When retained outside the body, the urea and water in urine quickly change to ammonia and then ammonium during retention, raising the pH from around 7 to around 9 (Schoenning 8). The pH change and presence of ammonia (which is toxic to all living cells at high concentrations) is enough to inactivate most bacteria within 2 hours (National Research Council 57). Retention of urine at 20°C (68°F) for 6 months reduces the risk of pathogen exposure to negligible (10 to 15 logarithmic reduction) for

bacteria (*C. jejuni*), protozoa (*C. parvum*) and viruses (*Rotavirus*) found in feces that may be present in collected urine (Schoenning 9). After urine is applied as a fertilizer to fields, pathogen inactivation continues from UV-radiation and exposure to soil biota (Schoenning 23). Simple UV sterilization or aerobic co-composting of urine is an additional treatment option. In Sweden, urine is used as a fertilizer for any crop after a one month retention at 20°C (must be applied one month before planting for crops that are to be eaten raw) (Winblad 10).

### Pharmaceuticals

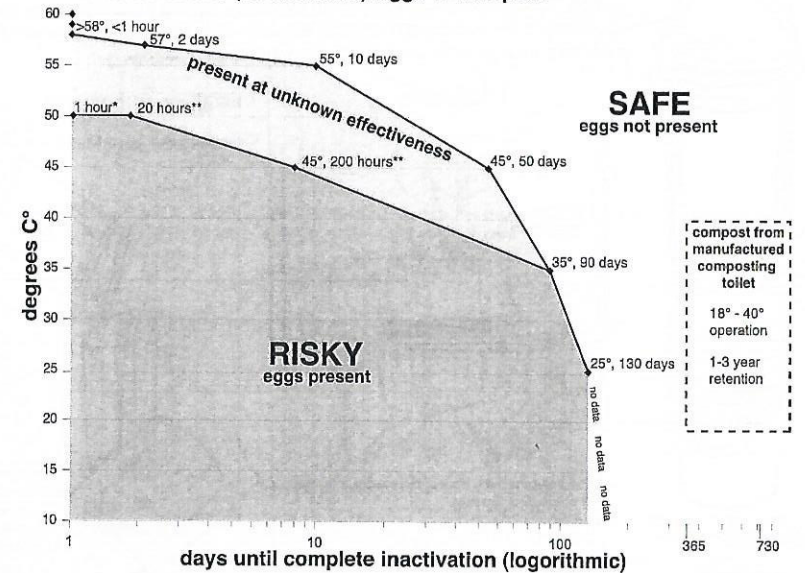
Pharmaceuticals are excreted primarily through urine and secondarily through feces (Daughton 1). Pharmaceuticals end up in our waterways from both treated and raw sewage. The health effects of our pharmaceuticals on other animals range from sex changes to kidney failure to disturbing the symbiotic relationships between bacteria and plants, though research has only begun in the past 10 years (Sumpter 11, Xia 93).

The research indicates that aerobic composting can significantly reduce (84-90%) pharmaceuticals within five months and that mesophilic temperatures are more effective than thermophilic\* (Hakk 949). The most diverse group of decomposers lives in the mesophilic range. In-vessel, unmanaged open piles, or managed open piles are all effective at degrading veterinary antibiotics (Dolliver 1).

*Temperature Ranges of Compost	
Mesophilic (intermediate loving):	20-45° C (68-113° F)
Thermophilic (heat loving):	46-71° C (114-160° F)
The exact ranges are debated between academia, industry and gardeners.	

## Killing the Tough Bugs

### Inactivation of *Ascaris* (Roundworm) Eggs in Compost



#### Data Points:

\*Gotaas, Harold B. (1956). "Composting - Sanitary Disposal and Reclamation of Organic Wastes" p.81. World Health Organization, Monograph Series Number 31. Geneva.

\*\*Feachem, et al. (1980). "Appropriate Technology for Water Supply and Sanitation." The World Bank, Director of Information and Public Affairs, Washington D.C. 20433.

All other data points: "Biosolids Applied to Land," Table 6-2, pg 265, National Research Council of the National Academies, Washington DC, 2002.

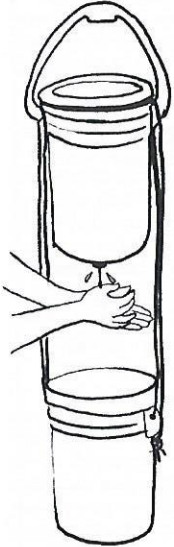
original citation: Mbela, K.K. 1988 MS Thesis. Dept. of Environmental Health Sciences, School of Public Health and Tropical Medicine, Tulane University, New Orleans, LA. Compost from manufactured composting toilet based on operational instructions: ClivusMultrum.com

This chart presents the upper and lower limits of time and temperature necessary to kill roundworm eggs.

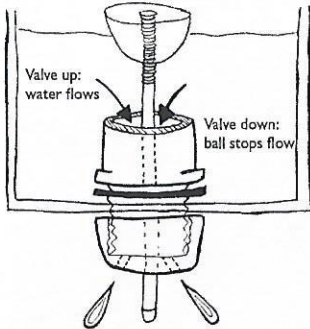
Roundworm eggs are one of the most difficult pathogens to eliminate. Roundworm eggs are larger and have classically been easier to detect than other hard-shelled pathogens, such as spore-forming bacteria. Human and pig *Ascaris* are used as "indicator" organisms, introduced to evaluate a processing technique alongside common indicators fecal coliform and *Salmonella*. Low levels of indicator pathogens denotes effective treatment of a range of pathogens.

## The Tap Up - a two bucket hand sink

This hand sink is a simple option for food prep, eating, and first aid areas, as well as around restrooms. This bucket system is easy to fill and empty, and can be made with any two similarly sized buckets. We recommend coupling this sink with a foaming soap dispenser. Foam does not require water to lather up, generating significant water savings.



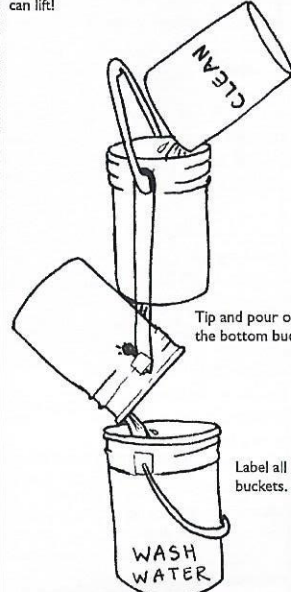
### The Valve



A quick tap from the back of the hand pushes the rod up, opening the valve.

### Filling & Emptying

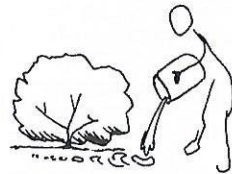
Clean water goes in top. Be safe, pour only what you can lift!



Tip and pour out the bottom bucket.

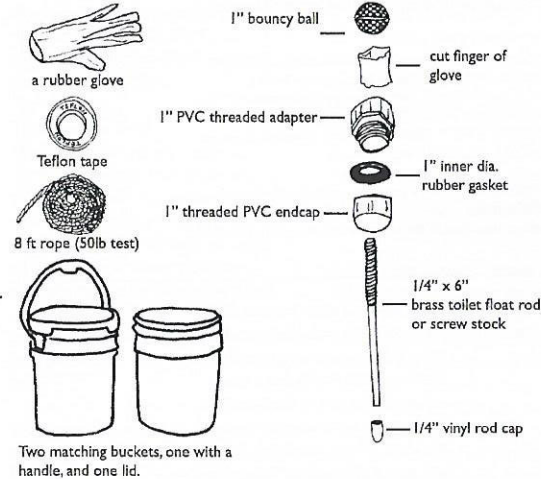
Label all wash water buckets.

Designate an area to empty your wash water and label it. Choose somewhere near the root zone of a tree or bushes. Avoid waterways, including drains. Seek a place unlikely to be exposed to yourself, the public, pets, and kids. Label your wash water bucket so it is not confused with a potable water container.



Walk and pour. Water splashed on leaves can hurt plants.

### Materials



Two matching buckets, one with a handle, and one lid.

Full buckets can be heavy. A 5 gallon bucket of water weighs 45 lbs when full. Choose buckets that you can handle, and don't fill buckets beyond the strength of their attachment point.

Tap Up Designed by Mathew Lippincott, 2011, released by CERN Open Hardware License.

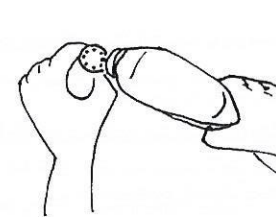
## Assembling the Tap Up

Tools needed:

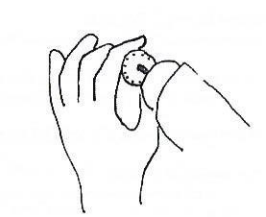


1/16" bit is for the water holes, 1/4" is to allow the tap rod through, and 1" cuts into the bucket.

Drill a 1" hole in the bottom center of the bucket. Go slow and keep the drill level.



Hold PVC end cap in a clamp or wear gloves to protect your hands. Drill eight 1/16" holes for the water. Angle the drill out away from the middle of the cap.



Drill a 1/4" hole in the middle, straight down.



OPTIONAL: cut bouncy ball in half with a knife to make it easier to drill. Cut along the ball's seam.



Drill a 1/4" hole in center of the bouncy ball.



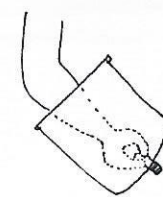
Screw the 6" long 1/4" toilet float rod or 1/4" screw stock into the bouncy ball.



Wrap Teflon tape around the 1" PVC threaded adapter.



Stick 1" inner dia. rubber gasket around 1" PVC threaded adapter.



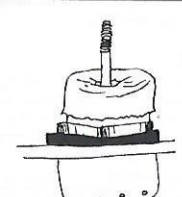
Screw 1" PVC threaded adapter through and out the bottom of the bucket.



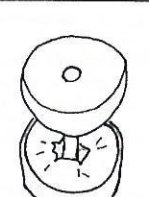
Screw 1" PVC end cap onto threaded adaptor. Tighten against the bottom of the bucket.



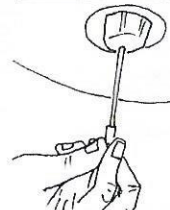
Cut the finger off of a disposable glove to make the top gasket.



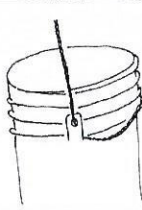
Pull cut glove over the top of the 1" PVC threaded adaptor so that it leaves an opening around the rod.



Put bouncy ball with toilet float valve screwed into it through the 1" PVC threaded adaptor.



attach 1/4" vinyl rod cap onto the end of toilet float rod.



Run rope through the handle attachment hole on the lower bucket without the valve



Run rope through the handle of the upper bucket (with valve) and tie off. Repeat on other side.





## Bibliography- and Further Readings

### Getting Enough Buckets

Feces: based on 843g/week, Digestive Diseases and Sciences, Vol. 43, No. 11: 1998, 2358. and Gotaas 0.3-0.6 lbs/day.

Urine: based on 2 pints/day. Gotaas, Composting-Sanitary Reclamation of Organic Wastes. World Health Organization, Monograph No. 31. Geneva: 1953.

Water: based on .9 gal/flush 5 flush/day Caroma dual-flush toilet, Caromausa.com: 2010

Provisioning of Buckets  
Based on our experience in our household of 4 adults and above citations.

### Twin Toilets

Ersson, Ole. "How to Make and Use a Sawdust Toilet." Appropedia. <[www.appropedia.org/how\\_to\\_make\\_and\\_use\\_a\\_sawdust\\_toilet](http://www.appropedia.org/how_to_make_and_use_a_sawdust_toilet)>.

Public Hygiene Let's Us Stay Human. "Emergency Toilets." PHLUSH. October 11, 2011. <<http://www.phlush.org/emergencysan/intro-to-emergency-toilets/>>

Snap on Toilet Seats for Buckets  
Reliance- produces the Luggable Loo seat  
Emergency Essentials produces Tote-able Toilet  
Custom Leathercraft, produces 1140 EasySeat  
Travel John, Quake Kare also produce lids

### Suggested Readings

Jenkins, J. The Humanure Handbook. Pennsylvania, Jenkins Publishing, 1999. Web. <<http://weblife.org/humanure/index.html>>. *The first edition of this book was published in 1995. Joe Jenkins is an incredible resource for composters.*

Olkowski, Helga, William Olkowski, and Tom Javits. The Integral Urban House: Self-reliant Living in the City. San Francisco: Sierra Club, 1979. 110-40.  
*This two inch thick book is old, but it's still the most thorough reference on self-reliant living for city dwellers. It has primary sources and great illustrations. The newer edition decided to use an unattractive and meaningless stock image for the cover instead of Diane McIntosh's iconic cover design.*

### Loading a Compost Pile

See Building Compost readings for more specifics on compost dynamics and balancing inputs. At a small scale, managing moisture content and smells, as covered in this guide, will achieve better results than looking at carbon to nitrogen ratios and other calculations. We use a free compost calculator from Green Mountain Technologies. Add a two new feedstocks with this data:

Material	%N (dry weight)	%C (dry weight)	C:N	%Moisture	Bulk Density
urine	15-18	11-17	.8	97	1000
feces	5.5-6.5	40-55	6-10	66-80	1000

Compost Calculators:  
Compost Calc, Green Mountain Technologies. <http://www.compostingtechnology.com/probesandsoftware/compostcalc/downloads/>  
Washington State Compost Calculator Spreadsheet: <http://www.puyallup.wsu.edu/soilmgmt/CompostMixCalc.htm>

### Suggested Readings

Del, Porto David., and Carol Steinfeld. The Composting Toilet System Book: A Practical Guide to Choosing, Planning and Maintaining Composting Toilet Systems, a Water-saving, Pollution-preventing Alternative. Concord, MA: Center for Ecological Pollution Prevention, 2000.  
*This book is a thorough reference on composting toilet systems including installation and operation. It gives case studies for each type of composting toilet and includes a section on graywater.*

Tuladhar, Bhushan and Dorothee Sphuler. "Co-composting (Small-scale)." SSWM Fact sheet. <http://www.sswm.info/category/implementation-tools/wastewater-treatment/hardware/site-storage-and-treatments/co-composting>  
*The Sustainable Sanitation and Water Management Toolbox is an extensive reference on the hardware and software necessary to create sustainable water and sanitation systems. This fact sheet points to the advantages, disadvantages, case studies, further readings and corresponding educational materials for household scale composting with human excreta. It is updated regularly by Secon Intl.*

Van der Ryn, Sim. The Toilet Papers. Santa Barbara, Calif: Capra Press, 1978.

### Carbon Materials and Processes

Cornell Waste Management Institute. "Compost Fact Sheet #5 Compost Bulking Materials." Ithaca, NY: Cornell, 2005. <<http://cwmi.css.cornell.edu/compostfs5.pdf>>  
*Cornell's extension service provides a thorough description of carbon sources and ideas for where to find them.*

Lerner, Rosie B. "Wood Ash in the Garden." Indianapolis, IN: Department of Horticulture and Landscape Architecture, 2000. <[http://harrison.agrilife.org/files/2011/06/woodash\\_18.pdf](http://harrison.agrilife.org/files/2011/06/woodash_18.pdf)>

### What to do with Urine & Feces

Hoeglund, Caroline, "Evaluation of microbial health risks associated with the reuse of source-separated human urine" Royal Institute for Applied Technology (KTH), Superseded Departments, Biotechnology, Stockholm, 2001. ISBN: 91-7283-039-5. <<http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-3090>>

Joensson, Stintzing, Vinnerås, Salomon, "Guidelines on the Use of Urine and Faeces in Crop Production." Stockholm Environment Institute, EcoSanRes Project, 2004 <[http://www.ecosanres.org/pdf\\_files/ESR\\_Publications\\_2004/ESR2web.pdf](http://www.ecosanres.org/pdf_files/ESR_Publications_2004/ESR2web.pdf)>

National Research Council. Biosolids Applied to Land: Advancing Standards and Practices. Washington, D.C.: National Academies, 2002. p 57.

Olkowski, H. See Twin Toilets Suggested Readings.

Putnam, David F. Composition and Concentrative Properties of Human Urine. NASA Contractor Report. July 1971. p 40

Stenstroem, Thor Axel, Razak Seidu, Nelson Ekane, and Christian Zurbrugg. Microbial Exposure and Health Assessments in Sanitation Technologies and Systems. Stockholm Environment Institute, Stockholm 2011. <[http://www.ecosanres.org/pdf\\_files/Microbial\\_Exposure\\_Health\\_Assessments\\_in\\_Sanitation\\_Technologies\\_Health\\_Assessments\\_in\\_Sanitation\\_Technologies\\_Systems.pdf](http://www.ecosanres.org/pdf_files/Microbial_Exposure_Health_Assessments_in_Sanitation_Technologies_Health_Assessments_in_Sanitation_Technologies_Systems.pdf)>

### Building Compost

Dickson, N., R. Thomas and R. Kozlowski. "Composting to Reduce the Waste Stream. A guide to Small Scale Food and Yard Waste Composting." Ithaca, NY: Northeast Regional Agricultural Engineering Service Cooperative Extension, 1991. <<http://cwmi.css.cornell.edu/compostingtoreduce.pdf>>  
*Written by researchers from Tellus Institute and Cornell University. A thorough 45 page document on household scale composting. Table 6 Composting Trouble Shooting Guide is very useful.*

Yamada, Y., and Y. Kawase. "Aerobic Composting of Waste Activated Sludge: Kinetic Analysis for microbiological Reaction and Oxygen Consumption." Waste Management 26.1. 2006: 49-61.

"a compost pile should not smell"  
Aerobic decomposition  $\text{CH}_2\text{O} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + 6722 \text{ kcal/mole}$   
organic material + oxygen produces carbon dioxide and water and heat

Anaerobic decomposition  $(\text{CH}_2\text{O})_x + \text{H}_2\text{O} \rightarrow \text{CH}_4 + \text{CO}_2$   
organic material- + water produces methane and carbon dioxide

Cornell Waste Management Institute. "Compost Fact Sheet #5 Compost Bulking Materials." Ithaca, NY: Cornell, 2005. <<http://cwmi.css.cornell.edu/compostfs5.pdf>>  
*Cornell's extension service provides a thorough description of carbon sources and ideas for where to find them.*

## Other Simple Handwashing Sinks

Tippy Tap <[http://www.akvo.org/wiki/index.php/Tippy\\_Tap](http://www.akvo.org/wiki/index.php/Tippy_Tap)>

The Tippy Tap is a simple hand washing device that can be made from readily available household containers.

Andy Handy <<http://www.andyhandy.com/>>

The Andy Handy is a simple hand washing valve made and sold in Finland. The 'tap up' sink is similar, but lacks the delay of the Andy Handy. Recommended for permanent unplumbed restrooms.

### Suggested Readings

Oasis Designs <[www.oasisdesign.net/greywater](http://www.oasisdesign.net/greywater)>

*Art Ludwig maintains an excellent resource site with case studies, instruction and FAQs on greywater. Look past the web design to the high quality content.*

## Managing Poo & Pee Safely

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Xia, Kang, et al. "Occurrence and Fate of Pharmaceuticals and Personal Care Products (PPCPs) in Biosolids." *Journal of Environmental Quality*. Vol 34, January-February 2005. 93.

## Notes

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## Earthquakes in Contemporary Cities- getting perspective

The Pacific Northwest rests on the Cascadia Subduction Zone, where the Juan de Fuca and North American plates meet. The last earthquake here was in the year 1700, sending a tsunami to Japan. The geologic record says the average time between magnitude 8 and larger earthquakes in our region is about 240 years (Revkin). Practically speaking, "Cascadia is '9 months pregnant' and overdue" (Revkin).

The devastating 1906 San Andreas earthquake caused pipelines and structures to move 6 feet laterally, and as a result there was no water when the city burst into flames (Richie). At that time, San Francisco's plumbing systems were no more than 20 years old and mostly carried water. Many of America's pipes today are over 100 years old, and according to the Natural Resources Defense Council, the amount of sewage they carry to wastewater treatment facilities would be enough to fill all of the Great Lakes every four months (NRDC). The earthquake that is expected to occur in the Cascadia region is predicted to be of greater magnitude than the San Francisco earthquake of 1906.

The dangers associated with fecal contamination are demonstrated dramatically in the outbreak of cholera in the aftermath of Haiti's 2010 earthquake, a plague unseen in Haiti since the 1800s. Left untreated, the disease has a fatality rate that can reach fifty percent (Shapin). In Haiti, the World Health Organization has stepped in to provide re-hydration treatment units.

Our experience with the next earthquake in the Northwest may be similar to the 6.3 magnitude quake in Christchurch, New Zealand in February 2011. Most people were "able to flush" their toilets by August, but the contents were directed to the river without treatment. This led to confusion about when and if people could use their household toilets again. Portable and chemical toilets were brought in from various outside aid organizations, but many people found them difficult or unpleasant to use, preferring instead to dig "long-drop" toilets in their backyard (Show Us Your Long Drop. co.nz). Unlike Christchurch however, most urban areas in Oregon have high water tables and impermeable clay soils that make digging pit latrines a health hazard.

Amidst the confusion in New Zealand, a local community of permaculturists stepped forward to teach people about composting toilets (Compost Toilets. co.nz). The workshops focused on emergency use, but the discussions extended to the wider issues of environmental impacts on the city (Williams 2011). Once people became aware of this more user and environmentally friendly solution to their sanitation crisis, the workshops spread by request and volunteer instruction. The widespread success of the composting toilet solution in Christchurch is a beautiful model for how communities can take charge of their own sanitation design to build resilience and protect health.

by Morgan O'Hara

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U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. "Haiti Cholera Outbreak - Five Basic Cholera Prevention Messages." Www.cdc.gov. Centers for Disease Control and Prevention -- U.S. Department of Health and Human Services. <[http://www.cdc.gov/haiticholera/five\\_messages.htm](http://www.cdc.gov/haiticholera/five_messages.htm)>.

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## When the pipes break . . . What's your plan?

I'm going to safely store our excreta . . .

My family has \_\_\_\_ (#) curbside bins.  
It will take us \_\_\_\_ (#) weeks to fill one bin (See page 6).  
It will take us \_\_\_\_ (#) weeks to fill all our bins.  
We have \_\_\_\_\_ (amount) of carbon materials stored at \_\_\_\_\_ (location near our dwelling) to add to our curbside bin after we empty the toilets.

I'm going to safely compost our excreta . . .

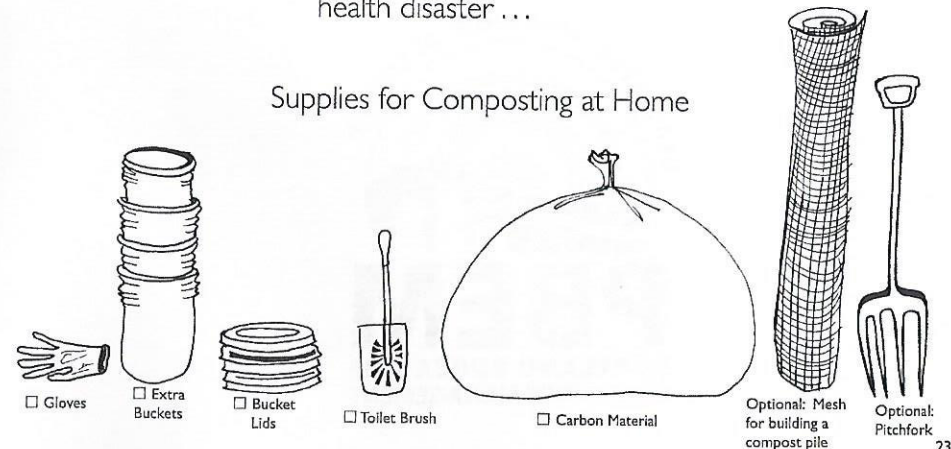
We have \_\_\_\_\_ (quantity) of carbon materials on hand.  
We have enough carbon cover materials for \_\_\_\_ (#) weeks (See page 6).

We can get carbon materials at \_\_\_\_\_ (nearby pet stores hay from farms, wood chips from Parks Department, arborist, sawdust from local mills, coffee hulls from local roasters). Their phone # is \_\_\_\_\_. They're located at \_\_\_\_\_.

We have \_\_\_\_\_ (type of container) to store urine.  
Each can hold \_\_\_\_ (#) of gallons/liters). We can store up to \_\_\_\_ (#) of days) or urine from \_\_\_\_ (#) of people).

I'm going to excrete in water and create a public health disaster . . .

### Supplies for Composting at Home



ARCH CAPE SANITARY DISTRICT

RESOLUTION 17-03 SD

A RESOLUTION REVISING SYSTEM DEVELOPMENT CHARGES (SDC) / EQUIVALENT DWELLING UNIT (EDU) FEES FOR THE ARCH CAPE SANITARY DISTRICT (the "District")

Whereas, the District adopted Ordinance 98-1 SD establishing a System Development Charge methodology and rates; and

Whereas, Section 4B of the ordinance provides for adoption of SDC rates by resolution; and

Whereas, it is felt prudent to update those charges to more properly reflect changes through investment in District infrastructure and current cost indices; and

Whereas, it is determined that one SDC is equal to one EDU; and


Whereas, the District allows for the annual adjustment of fees in accordance with the Engineering News-Record (ENR) Construction Cost Index (Seattle); and

Whereas, the Engineering News-Record (ENR) Construction Cost Index (Seattle) used in Resolution 16-04WD was 10,181 and the April 2017 Seattle ENR Index to be applied for the purposes of this Resolution is 10,678 (Index Ratio=10,678/10,181=1.049);

NOW, THEREFORE, be it resolved the ARCH CAPE SANITARY DISTRICT System Development and Connection Charge herein established become effective July 1, 2017.

<u>3/4 inch meter</u>		<u>1 inch meter</u>	
Improvement Fee	\$ 88	Improvement Fee:	\$220
Reimbursement Fee	\$7,801	Reimbursement Fee:	\$19,504
Administrative Fee	\$ 79	Administration Fee:	\$197
Total SDC/EDU Charge	\$7,968	Total SDC/EDU Charge:	\$19,921

Adopted and signed this 16<sup>th</sup> day of June 2017.

  
Darr Tindall, President

Attest 

## **ORDINANCE 17-01 SD**

### **AN ORDINANCE ESTABLISHING THE REQUIREMENT FOR SATISFACTION OF OUTSTANDING UTILITY LIENS IN OBTAINING SERVICE FROM THE ARCH CAPE SANITARY DISTRICT.**

**Whereas**, it is the responsibility of the Arch Cape Sanitary District (the “District”) to collect monies owing to the District for past services provided a given property within the District,

**And**, it is necessary to take all reasonable steps to collect monies owing to the District;

**And**, an emergency exists because it is anticipated that there will be a Clatsop County Sheriff’s sale of 80405 Carnahan in Arch Cape at the Clatsop County Courthouse at 10:00am on Thursday, July 6, 2017 where there exists an outstanding utility lien against the property in favor of the District;

**IT IS HEREBY ORDAINED AND ORDERED** that the District adopt the following ordinance for obtaining service.

- 1) The District will use its right to disconnect sanitation service to a property within the District having outstanding filed and unpaid utility liens; and
- 2) That resumption of service shall not be made by the District until all outstanding utility liens have been satisfied.

Adopted and signed this \_\_\_\_\_ day of \_\_\_\_\_ 2017, this ordinance shall take effect on the 3<sup>rd</sup> day of July 2017.

Darr Tindall, President

Attest \_\_\_\_\_

## **Manager Report June 16, 2017**

### **SANITARY:**

Weyerhaeuser has a timber cut scheduled coming up in August or September of approximately 28 acres. This will not be in the watershed, but timber will be hauled out of the gate that we access to get to the biosolids site. We will coordinate with them as needed to access the site.

There will be a Sheriff's Auction of the property at 80405 Carnahan Rd. on July 6<sup>th</sup> at 10:00 a.m. The location will be at the Clatsop Co. Sheriff's Dept office. Opening bid information will be posted on the Department's website two days in advance. The District has a lien on the property, and we are working with Liberty Home Equity Solutions' attorney to acquire payment.

Operationally, the annual I and I report has been submitted to Oregon DEQ. A flyer insert for smoke testing within the District was sent out with the recent Sanitary billing. Maintenance and repair of irrigation site sprinkler heads continues, and Biosolids hauling and site work is complete.