

# Confessions of a Recovering Urinator

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My urinary epiphany came the day I peed outdoors in bright, intense sunlight. I knew from reading that "the urine streams twists and spirals for approximately 6 inches and then disintegrates into a centrifugal spray", but seeing it in bright sunlight is a different thing. Small, shiny drops flew off to the right and to the left. Not just a few inches, but feet in all directions by the time they hit the ground. The drops flew to both sides, down near my feet, and the last few down on my feet.

Like most stand-up urinators, I had long been in denial that I cannot hit the inside of a toilet bowl. But actually, there are insurmountable technical problems to doing so:

## "... chaotic spray ..."

A urine stream twists and spirals for about 6 inches, and then disintegrates into a centrifugal spray, assuming a roughly conical shape.

## "... a warped cone with shifting base ..."

The initial problem is the inability of the male to predict or position accurately the initial point of impact of the urine stream. Although accuracy is reasonable in most instances, 'accidents' can result in a wildly erratic stream going in any direction, or often 2 or 3 different directions at once, missing the container entirely or urinating on one's shoes or feet.



## “... significant splash-back...”

The initial target of some men is the water in the center of the toilet bowl. When the stream hits the flat water surface, drops splash in all directions.



BTU Splash Lab [www.splashlab.byu.edu]



## “...successive corrective maneuvers...”

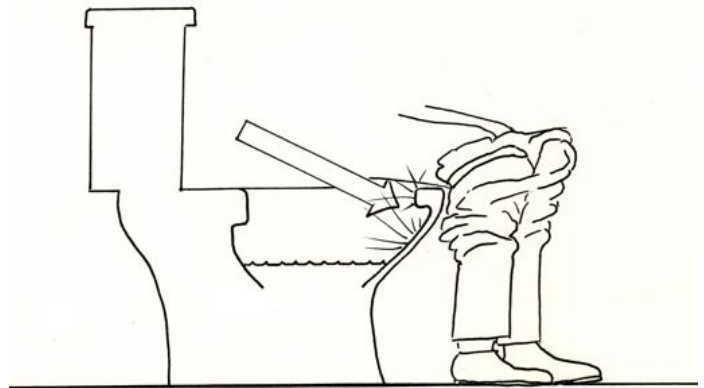
However, “..... most men will avoid urinating into water to avoid the embarrassment of the noise.” The most common initial target, then, is the back wall. Then gradually, as the length of trajectory becomes less and less, the target becomes the sidewall of the bowl.

Unfortunately, the sidewall is small, narrow and difficult to hit. Half the conical shape of the urine stream inevitably falls on the rim or outside the bowl on the floor, “... no matter how careful one may be.” Finally, at the end, the last droplets either fall straight down, or are shaken off to fall on the rim, seat, floor, clothes, shoes or feet.



## splashes from inside toilet bowls

One of the little-discussed hazards of sitting down to use a conventional toilet is that the urine stream hits full-force against a very close flat surface. It can splash up, run down a leg, or splash onto the inside of rolled-down pants. Or worse. But it happens out of sight, and the unsanitary results are only noticed afterwards.



## splashes caused by flushing

When a toilet is flushed, the force of the flushing action shoots out water droplets six to eight feet out in all directions. These drops may contain urine, pathogens from feces, or bacteria and virus that develop permanent populations in the bowl and bowl water.



Even worse, for at least two hours after each flush, an invisible aerosol cloud of bacteria and viruses stays in the air, settling on the walls and ceilings, and floating off with air currents into other rooms.

So it turns out that between drops of urine on the floor, and pathogens on surfaces and in the air, the use of conventional flush toilets contributes to an extremely unsanitary bathroom in the home.

Add to these health issues the continuous daily work of scrubbing and cleaning the bowl and around the bowl, the use of multiple toxic cleansers that go down the drains during this cleaning, and the roughly 30,000 gallons of drinking water used each year to flush them, flush toilets do not seem to be the paragons of civilized hygiene that they are touted, but are environmentally damaging, wasteful plumbing fixtures with lots of problems.

# Conventional Urinals

Urinals in public buildings have not solved the splash problem, either. Aiming directly at a vertical wall results in splashes in all directions.



Urinals with vertical walls that cause splashing



These two Kohler 'Steward' waterless urinals are a significant improvement and are nearly splash-free (according to the manufacturer).

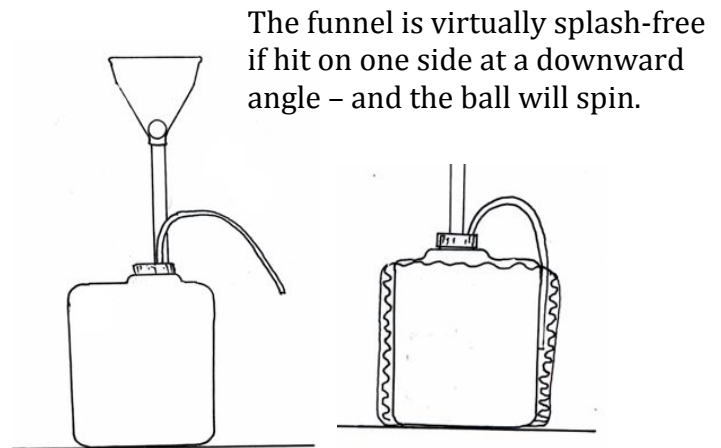


## Build A Better Urine Trap, and the World Will Beat a Path To Your Door.

Clearly a toilet bowl at knee level is a poor target for a standing urinator. What is needed are better designed urinals, with the opening closer to the point of origin of the urine stream, and urinals that not only use no water, but that also recover nutrients normally flushed away.

One example is the “Cubie” urinal, a masterpiece of form, function and economy. Designed by Abraham Noe-Hays of the Rich Earth Institute, the Cubie is designed for the easy collection of urine, and is made from a recycled plastic container, a funnel and a ping-pong ball.

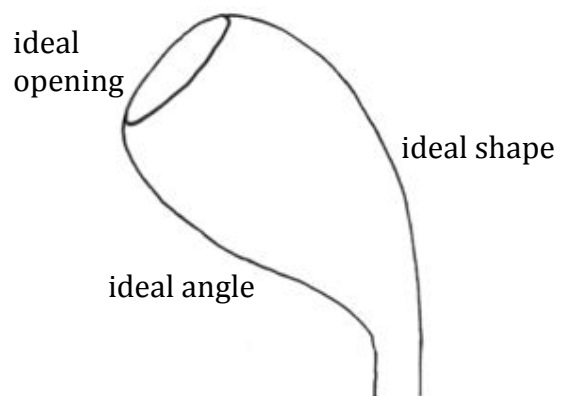
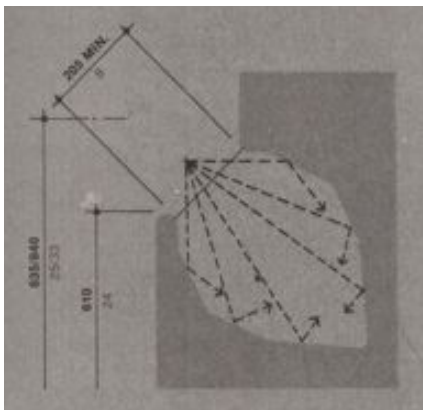
### The Cubie



When urine goes in, air comes out the tube.  
Cloth improves appearance & diffuses air slowly.

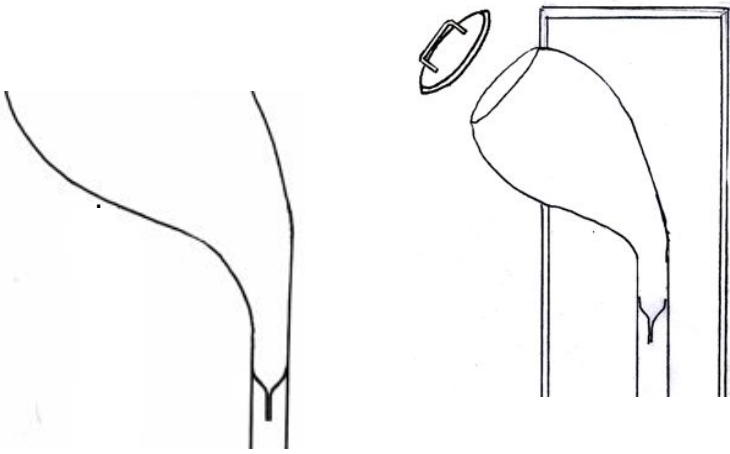
### The Uri

The Uri is a urinal based on the ideal shape to prevent splashing. The ideal opening is an 8-inch circle, positioned 24 inches above the floor. The opening and container are angled down wards 45 degrees, and the shape creates only small impact angles, eliminating back-splash. The opening protrudes at the bottom, to be straddled by the user and is more likely to catch the last few shaken drops.



1976 . Alexander Kira. The Bathroom





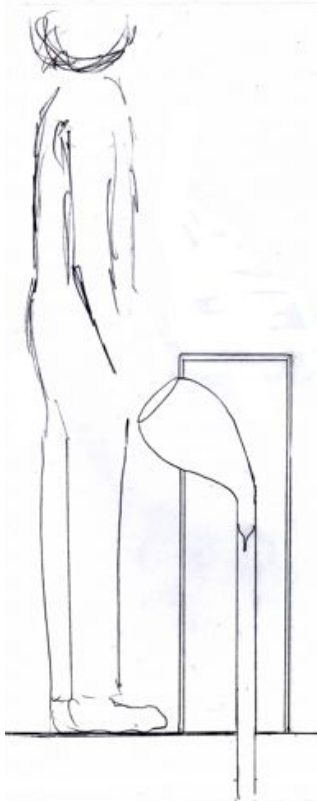
At the bottom of the ideal shape is a **one-way valve**, which allows urine to go down, but does not allow air or odors to go up.



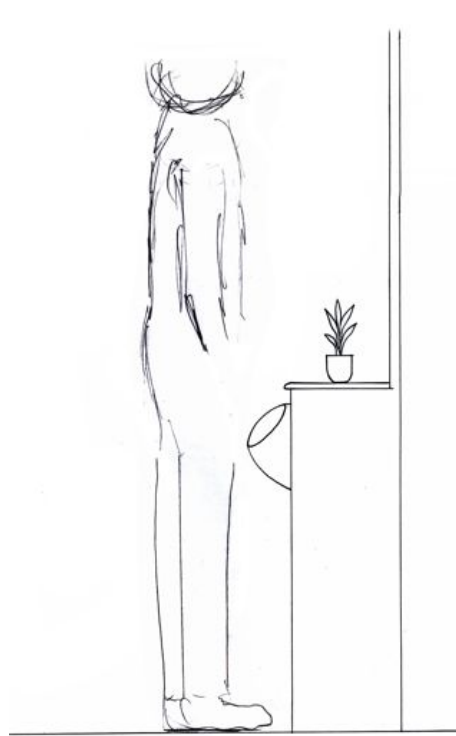
One-way silicone curtain valve  
 [ [www.addicom.net](http://www.addicom.net) ]

Typical Locations For the Uri

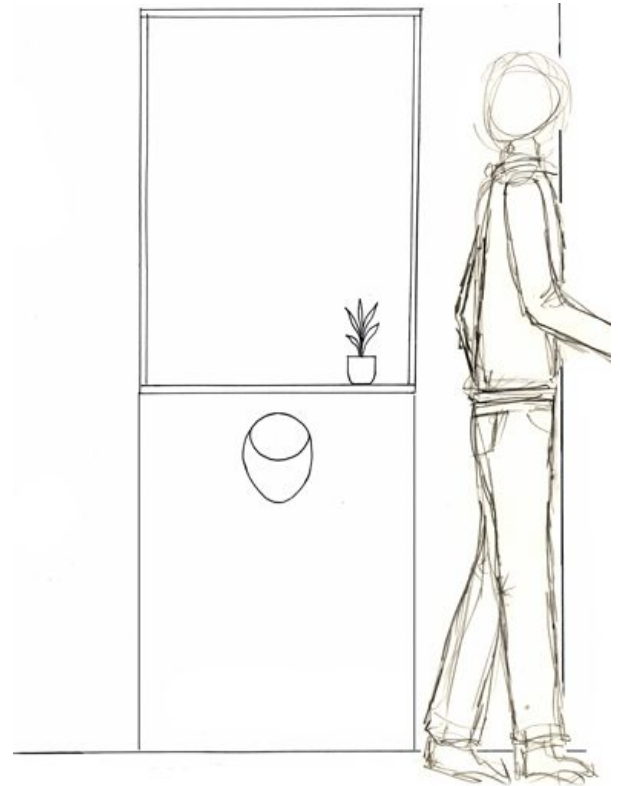
- A. Stand-alone, stationary fixture
- B. Recessed in a wall
- C. Stand-alone movable fixture

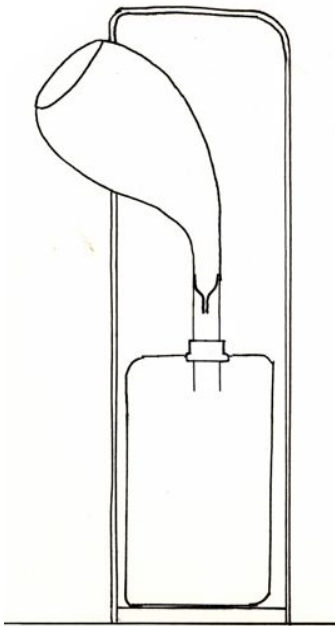


A. Stand-alone, stationary fixture.  
 The urine tube goes down into the floor to a container or drain at a lower level.

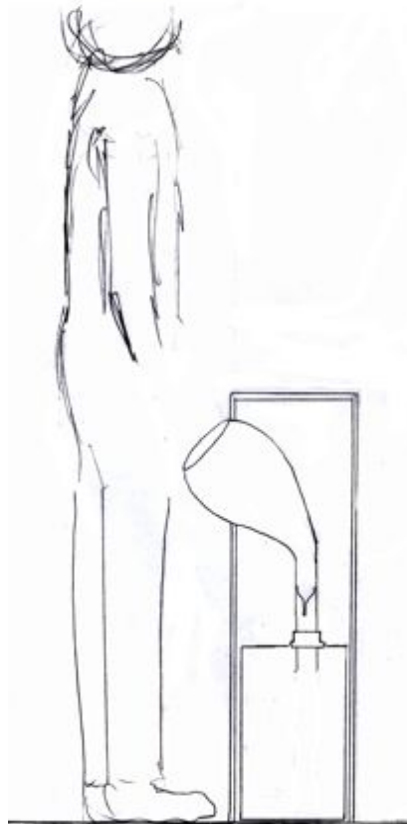


B. Recessed in a wall

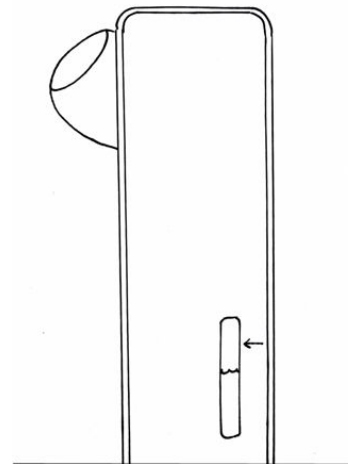




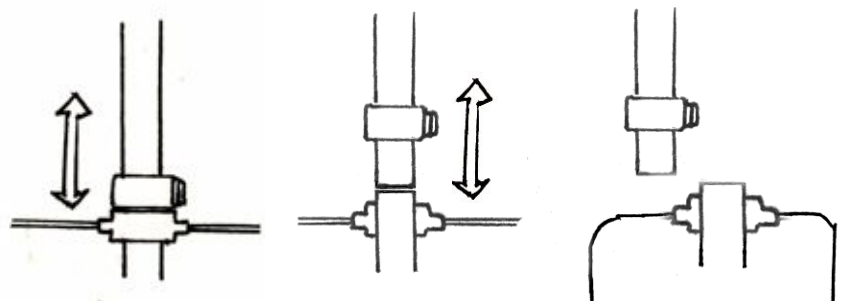
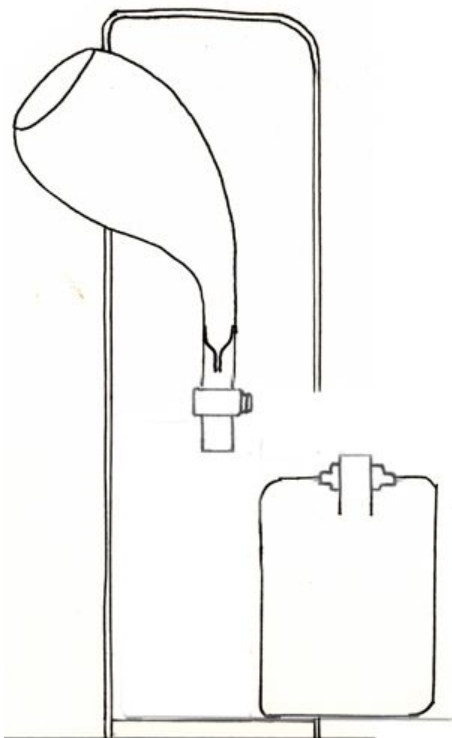
C. Stand-alone, movable fixture.  
The movable Uri has a small tank instead of a fixed pipe. The tank is periodically emptied and returned.



An average adult would fill a 5 gallon container in about 2 weeks.



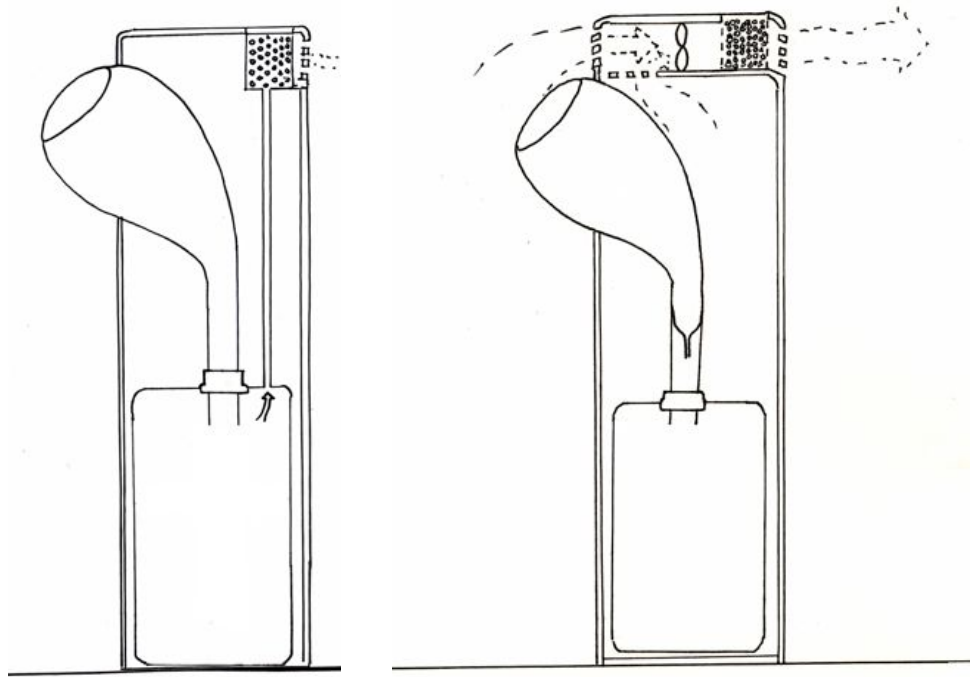
Clear window to see level of urine in tank



Tank is disconnected, emptied and returned.

## Other Optional Features:

- A. Purification of vent air
- B. Hand crank pump
- C. Wheels
- D. Scales

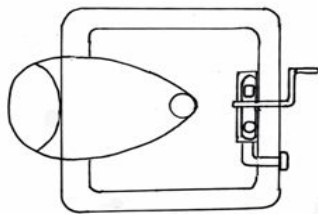


A. The vent air can be cleaned by activated charcoal to remove odors, either passively or with an electric fan.

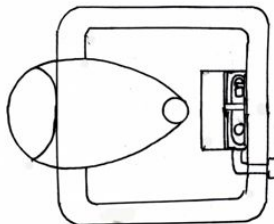
B. A hand crank pump can be used to pump the liquid out



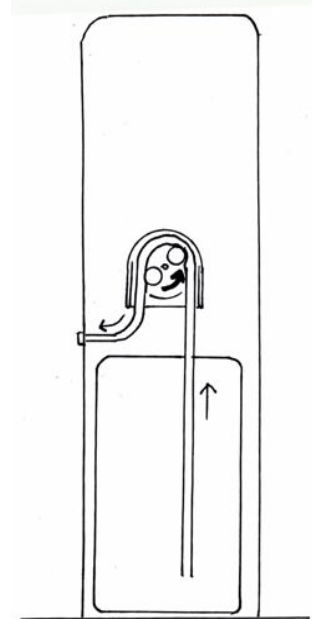
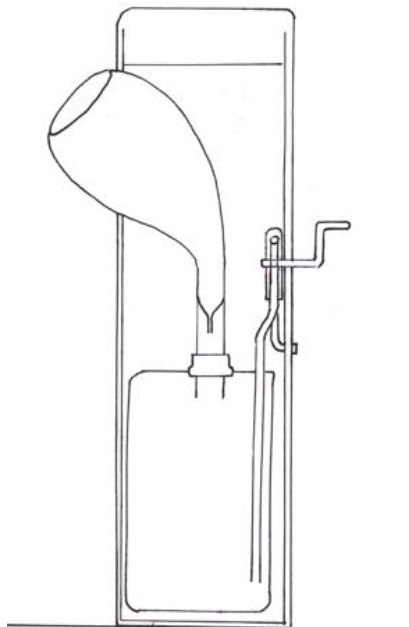
Peristaltic pump - urine only contacts silicone tubing



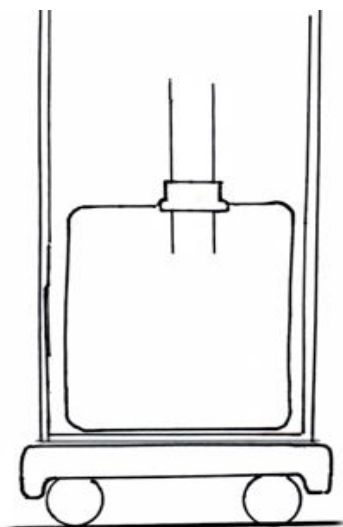
Hand pump



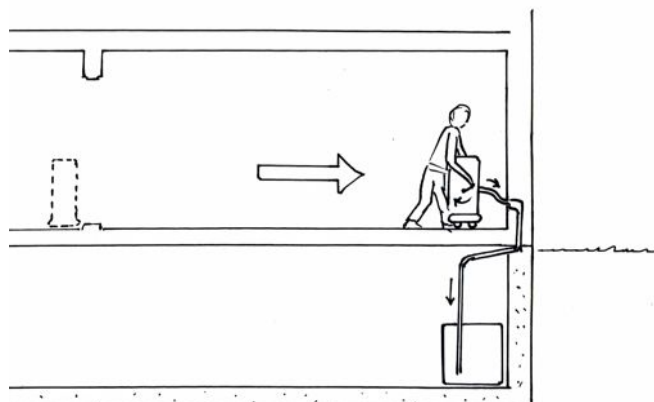
Motorized pump



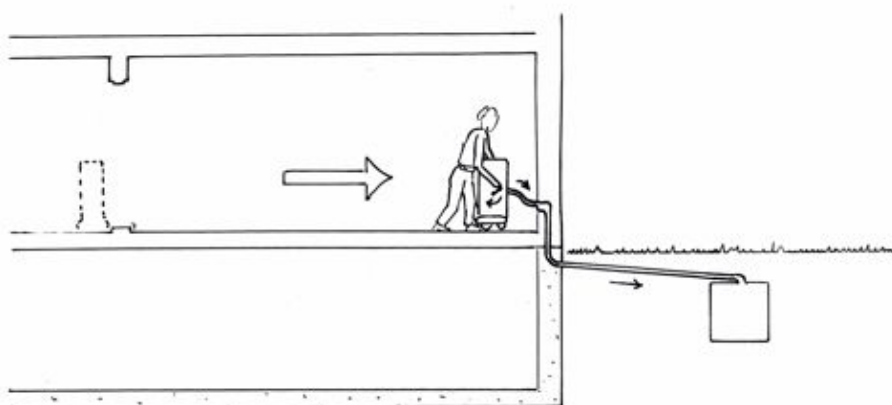




C. Wheels allow the Uri to be rolled from room to room for use, or rolled to a location for pumping out.



Uri on wheels rolled to wall pipe, pumped to tank in basement

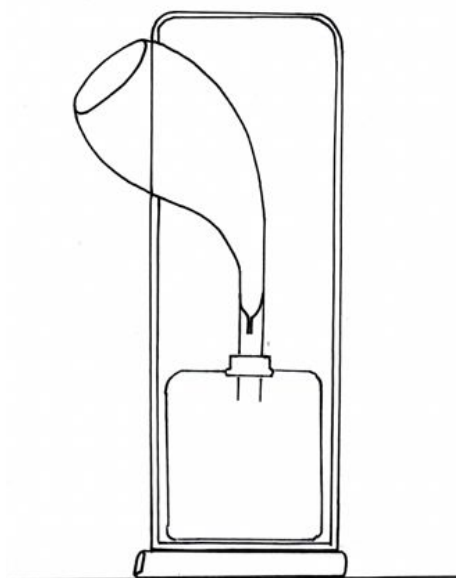


Uri on wheels rolled to wall pipe, pumped to buried tank

D. Scales show weight of liquid collected. Electronic scales continually weigh the liquid and signals when a certain weight (and thus a certain volume) is reached.

It can signal by ringing, flashing a light, or sending a message to a phone.

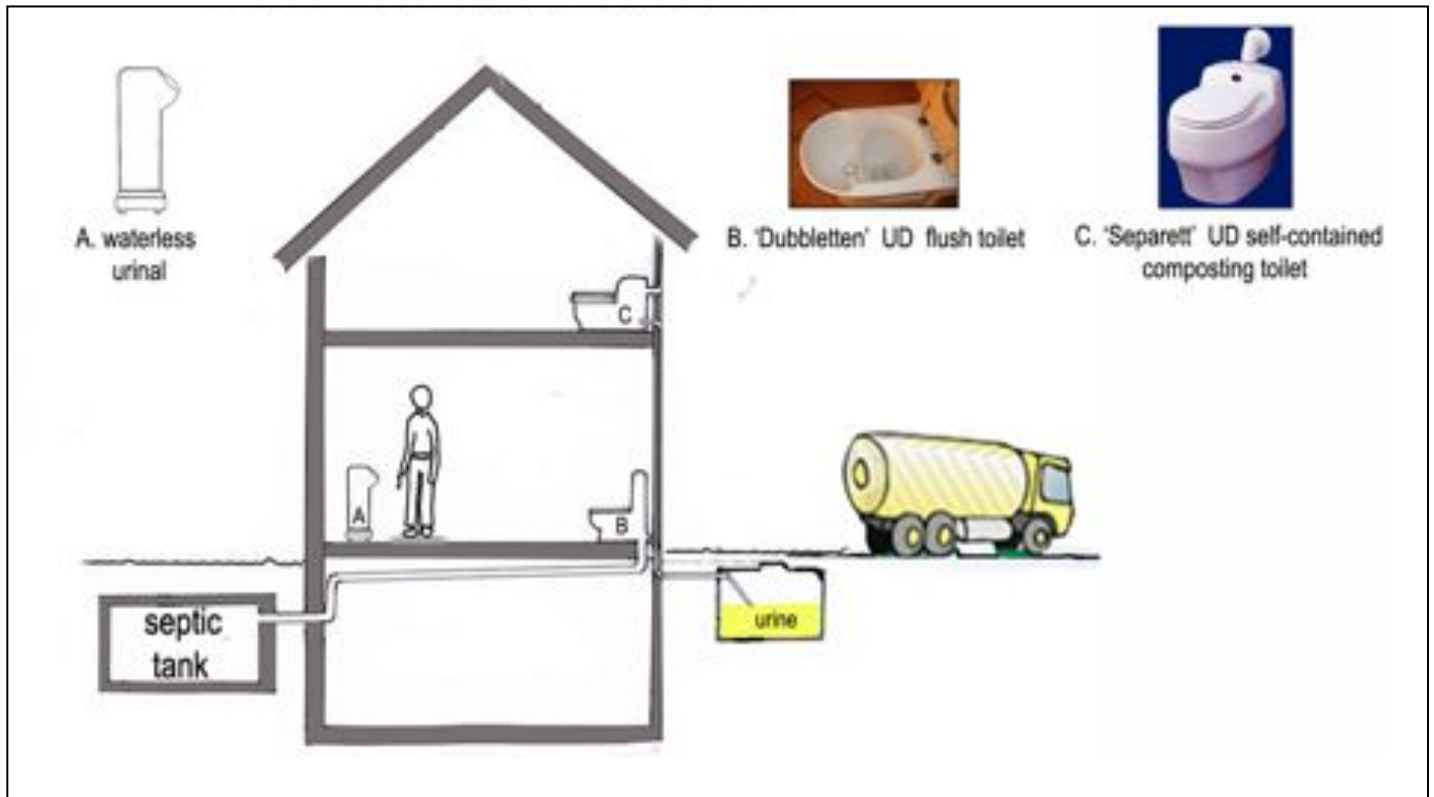
It can also wirelessly call a service company for pick-up.



electronic scale

# Urine Recovery and Nutrient Recycling

Urine contains most of the nitrogen and phosphorus from the food we eat, nutrients that are valuable fertilizer for agricultural crops and food production.



Urine can be made safe for use by:

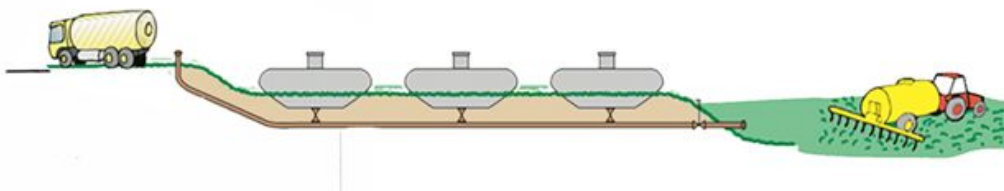
- 1) 6 months storage or
- 2) heating to 131 degrees F for 3 days or
- 3) heating to 176 degrees F for 3 minutes (such as in a solar pasteurizer)

It then qualifies as a "Class A bio-solid product" :  
 "...without detectable levels of pathogens that can be applied... as a fertilizer to gardens, food and feed crops and rangelands."

*One urine application (1:1) directly to hayfields in the spring yielded 5.8 times more hay than the untreated field.*

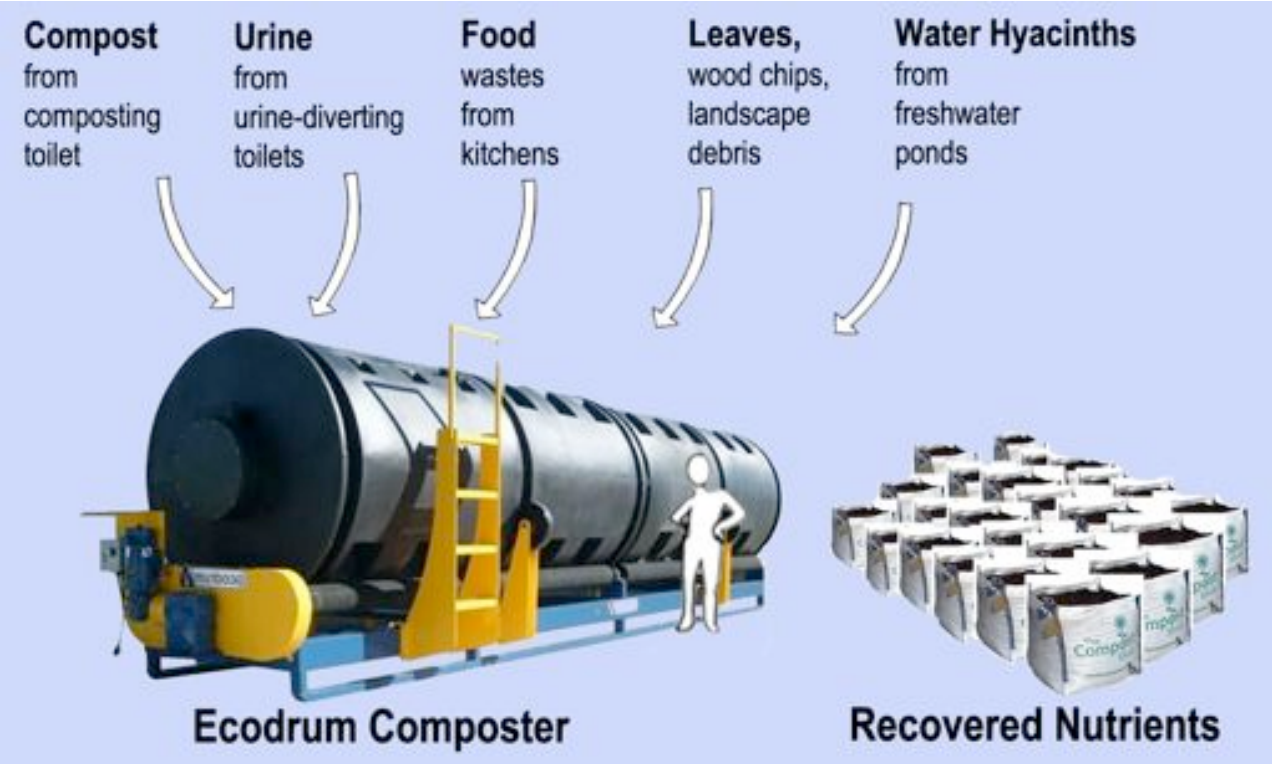


[www.richearthinstitute.org](http://www.richearthinstitute.org)

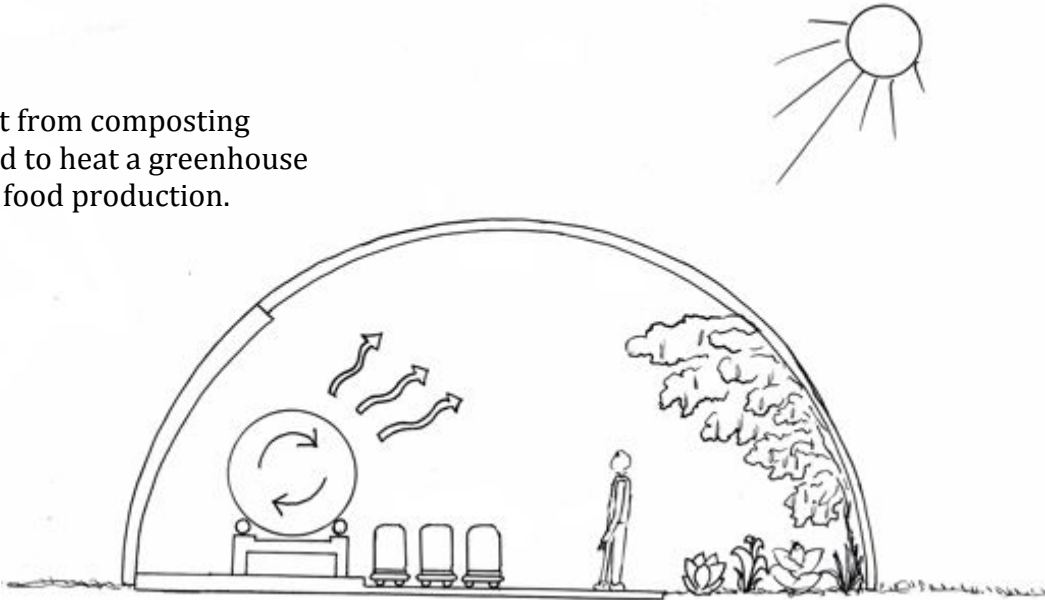


# Composting with Other Organic Materials

Urine can be composted with a wide range of other organic materials, becoming hot enough, long enough, to deactivate pathogens and produce a safe “Class A bio-solids product”. This compost too is “...without detectable levels of pathogens ... that can be applied... as a fertilizer to gardens, food and feed crops and rangelands.”

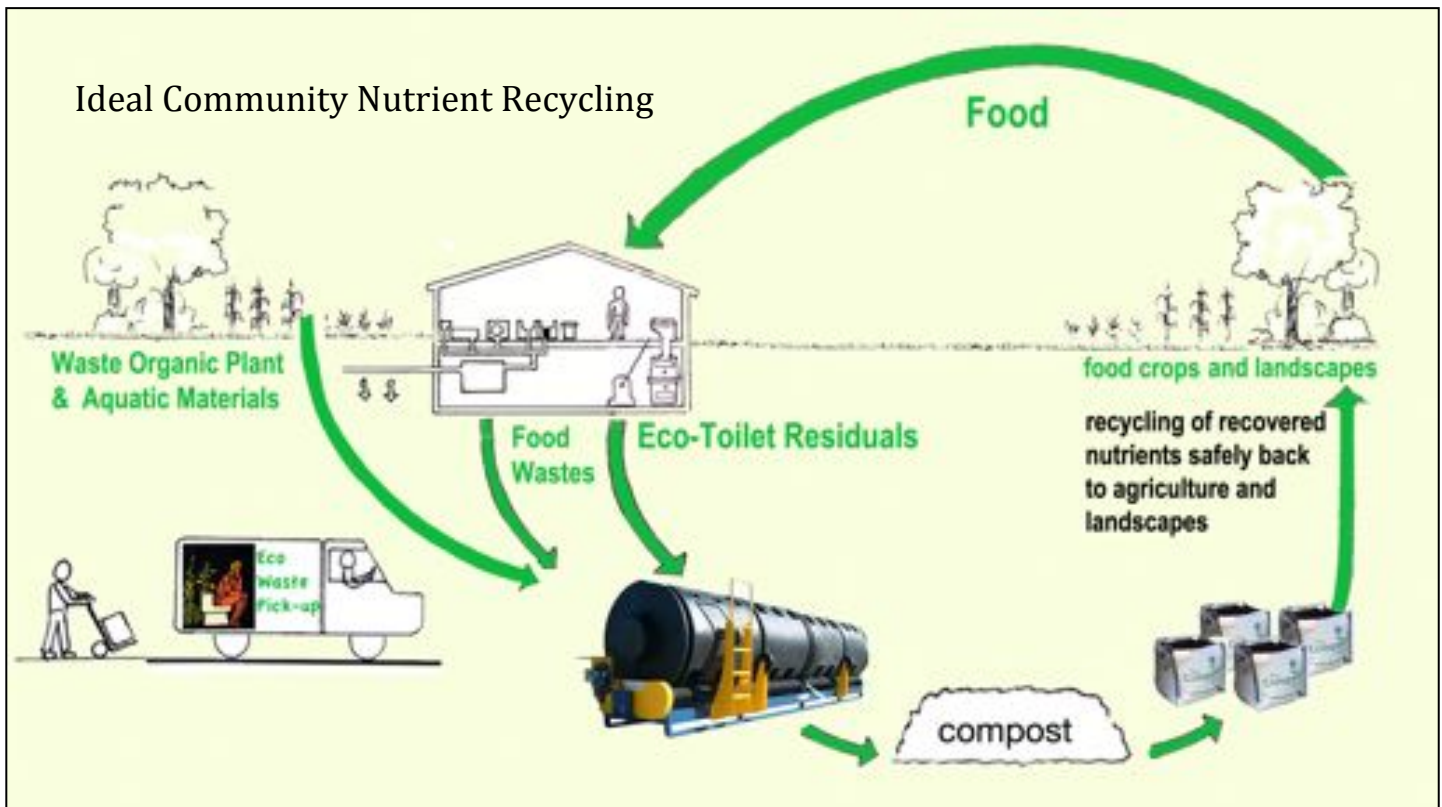
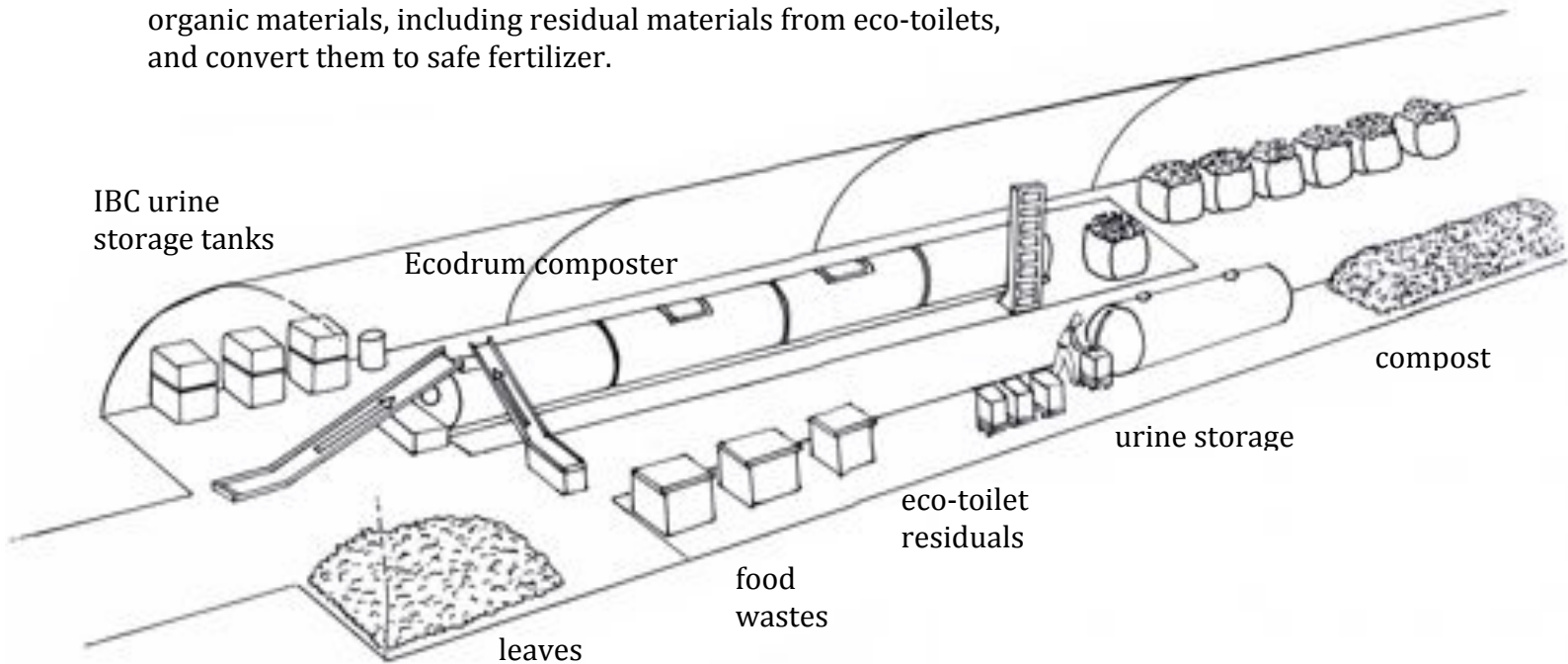


Waste heat from composting can be used to heat a greenhouse for winter food production.



# Nutrient Recovery 'Treatment Works'

In a better world, recycling services would collect all waste organic materials, including residual materials from eco-toilets, and convert them to safe fertilizer.





## **Man-Up to Cape Cod's Nitrogen Problem (and to improved sanitation in every bathroom)**

Research on toilet use strongly suggests “... men favor the standing position almost universally.” But as we have seen, using a flush toilet for a urinal almost always results in “...substantial sanitary problems...” Advanced designs of urinals could improve hygiene in the home, reduce bathroom cleaning, conserve water, and recover valuable nutrients.

On Cape Cod, where managing nitrogen is a high-priority, men should consider the strategy of micro-managing their nitrogen, at the personal level. Urine contains about 80% of the nitrogen from a house. So at least 40% of that nitrogen is produced by men.

So imagine if all the men in a particular watershed used nitrogen-recovering urinals. Immediately 40% of the nitrogen previously going into the groundwater would be removed and would no longer pollute freshwater ponds and coastal estuaries. The computer models used for Cape Cod wastewater planning could be used to show the beneficial effects and reduced need for other, more expensive measures (such as centralized or decentralized sewerage and I/A septic systems).

Imagine also the long-term environmental benefits of recovering and recycling the nutrients as valuable products, instead of wasting them into the air or into the oceans.

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# References

## "Splash Lab"

[www.splashlab.byu.edu](http://www.splashlab.byu.edu) Brigham Young University.

## Splashes from flush toilet

1975. Gerba, Wallis, and Melnick University of Arizona

"Microbiological Hazards of Household Toilets: Droplet Production and the Fate of Residual Organisms" *Appl Microbiol.* 1975 August; 30(2): 229–237.

## Urinal optimization

1976. Alexander Kira. *The Bathroom*, Viking Press, NY, NY  
see chapter "Design Criteria for Urination"

## One-way curtain valve

Addicom (Pty) Ltd

Johannesburg South Africa Addicom (Pty) Ltd

[www.addicom.net](http://www.addicom.net)

## Abraham Noe-Hays 'Cubie' urinal

Rich Earth Institute 44 Fuller Drive, Brattleboro, VT 05301, U.S.A.

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

## Ecodrum composter

Tri-Form Poly, Inc., PO Box 299 Pembina, North Dakota 58271

[www.ecodrumcomposter.com](http://www.ecodrumcomposter.com)

## Uri's, solar greenhouse, Treatment Works

Earle Barnhart [capecodalchemists@gmail.com](mailto:capecodalchemists@gmail.com)

[www.thegreencenter.net](http://www.thegreencenter.net)

## Website for Eco-Toilet information

Cape Cod Eco-Toilet Center

[www.capecodecotoiletcenter.com](http://www.capecodecotoiletcenter.com)

## Eco-toilet Information Center

Cape Cod Eco-Toilet Center

Alchemy Farm, 233 Hatchville Road, East Falmouth, MA 02536

**The Green Center, Inc.** 233 Hatchville Road, East Falmouth, MA 02536

[www.thegreencenter.net](http://www.thegreencenter.net)

*"Among our major tasks is the creation of ecologically derived human support systems – renewable energy, agriculture, aquaculture, housing and landscapes. The strategies we research emphasize a minimal reliance on fossil fuels and operate on a scale accessible to individuals, families, and small groups. It is our belief that ecological and social transformations must take place at the lowest functional levels of society if humankind is to direct its course towards a greener, saner world."*

**The Green Center**