

Composting Toilets in Butte County

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Background

Composting toilets use a biological process in which various types of organisms degrade human waste under controlled conditions to a humus-like end product. Within the composting toilet, the processes taking place require a balance of environmental factors such as temperature, moisture, pH, aeration and the ratio of carbon to nitrogen:

- Compost temperature must be maintained above 130°F for three days for composting to proceed effectively and kill pathogenic organisms. At lower temperatures, bacterial activity is inhibited, the composting process slows, and pathogens may not be destroyed.
- Moisture must be maintained between 40-60% for best results. All organisms require water, but too much moisture in the compost pile may create anaerobic conditions. On the other hand, very low water content will retard microbial activity.
- Normally, there is no need to influence the pH of a composting toilet. The ideal pH range for most bacteria is from 6 to 7.5. Fresh human excreta are slightly acid (below 6) but after a few days in compost pile the pH usually begins to rise to the optimum range.
- Proper mixing, porosity and maintenance of aerobic conditions are necessary for rapid decomposition and for the destruction of pathogenic organisms. Under anaerobic conditions, the decomposition is slower, heat given off is only a fraction of that from aerobic conditions, and foul-smelling gases are released.
- To achieve rapid decomposition, the optimum range for the carbon/nitrogen balance is 20:1 to 30:1. Urine is especially rich in nitrogen. It may be necessary at times to add high carbon materials like sawdust, grass and kitchen wastes to keep the carbon/nitrogen ratio in the optimum range. Manufacturers of composting toilet systems often recommend such materials and provide instructions on how often to use them; they may even sell pre-packaged bulking agents.

(Source: Massachusetts Department of Environmental Protection, "Using Composting Toilets and Graywater Systems in Massachusetts," April 2005)

There are a variety of types and uses for composting toilets. Small units are designed for travel trailers and boats, where urine is contained separately from feces and must be dumped periodically. Larger units are designed with separate composting chambers that can be installed beneath the floor of the house. Composting toilets are used at trail

heads in recreation areas. Some are designed to discharge small amounts of liquids, while others are designed to evaporate all liquids.

The following units are some examples of the variety of composting units available:

This unit is called Nature's Head and is designed for small campers and boats, with the urine container periodically emptied into an approved sewer system. Approximate cost: \$850



This is the Sun Mar Excel unit has a 115 V fan and a heating unit. A recessed handle in front allows the internal drum holding the waste to be rotated manually. There is a liquid drain. Approximate cost: \$ 1,800



The Sun Mar Centrex 3000 is recommended by the manufacturer for "very heavy cottage or medium residential use." These units use a heater and fan. There is a liquid drain. The model 3000 AF uses a dry flush for water savings. Approximate cost: \$2,500



Issues

Introduction of residential use of composting toilets raises a number of issues. These issues are described as follows:

➤ Selection

Selection of the appropriate composting toilet for the intended use is critical. Selection of the appropriate unit is based on usage (seasonal, year-round), energy source (generator, solar, electricity, no power), duration that external power is available, number of uses per day, number of people served, etc. These choices rely on manufacturer's recommendations. Third-party certification, such as that which is provided by the National Sanitation Foundation (NSF), is therefore important.

➤ Operation and Maintenance

Composting toilets typically require daily maintenance to assure they are working optimally. Therefore, user education is important to assure the units are not overused and that proper temperature, moisture level, aeration, and carbon-nitrogen ratio are maintained.

➤ Graywater

Composting toilets do not eliminate the need for an approved septic system to treat and disperse sink, laundry, bathing, and other non-toilet wastes. In addition, many composting toilets produce small quantities of their own liquid wastes. Studies have shown that graywater contains the same types of pathogens as toilet wastes, although often in much lower concentrations.

➤ Health Concerns

Composting toilets have been shown to be capable of deactivating and/or killing pathogens through the internal processes that take place. Due to external conditions or operational irregularities, the conditions in the unit may not always be optimal for pathogen reduction and improper handling and disposal of the product could adversely impact public health.

➤ Future Ownership

Properties may change ownership. One family that is fully educated on how to operate and maintain their composting toilet and is highly motivated to do so, may be replaced by another family that does not share the previous owners' expertise and values.

Findings and Recommendations

Based on the research presented in this paper, the Environmental Health Division of Butte County Public Health Department offers the following findings and recommendations:

1. Composting toilets are a diverse set of products that are gaining increased national attention as part of the “green” and “sustainable” movement.
2. Composting toilets are not a low-cost alternative to the conventional septic tank and drainfield system. Composting toilets suitable for residential use will cost approximately \$2,000 and can only be used in conjunction with a septic system for graywater. The reduction in size of the graywater system will likely not offset the cost of the composting toilet(s).
3. Under our current wastewater ordinance, use of alternative technology is limited and provision is not made for the introduction of composting toilets.
4. Under the proposed wastewater ordinance, new technology would be reviewed by the wastewater advisory committee, and recommended standards and conditions for its use would be proposed to the Board of Supervisors for inclusion in the On-Site Wastewater Manual by Board of Supervisors Resolution.
5. If the Board of Supervisors directs Environmental Health to provide interim requirements for the use of composting toilets, the requirements should, at a minimum, address the following issues:
 - Careful selection of the appropriate product, including third-party certification by NSF;
 - Inspection of the installation by the appropriate county department;
 - Approved septic system for graywater and assurance that the parcel can support a larger septic system to handle the parcel’s full wastewater load, should the composting unit fail or should future users opt for a conventional water-carried toilet;
 - Deed restriction to inform future property owners of their responsibility for maintenance of the system and health risks associated with waste handling;
 - End product handling and disposal requirements;
 - User education and certification; and
 - Non-transferable Operating Permit.