



# Phoenix Composting Toilet System

## Instructions for Operation and Maintenance

### February, 2006

#### **ADVANCED COMPOSTING SYSTEMS, LLC**

195 Meadows Road • Whitefish, MT 59937

Voice: 406-862-3854 • Fax: 406-862-3855

Email: [phoenix@compostingtoilet.com](mailto:phoenix@compostingtoilet.com)

Internet: <http://www.compostingtoilet.com>

#### **SUNERGY SYSTEMS, LTD**

Box 70 • Cremona, AB T0M 0R0

Phone/Fax: 403-637-3973

Email: [sunergy@compostingtoilet.com](mailto:sunergy@compostingtoilet.com)

## Table of Contents

§0.0 – Introduction	3
§0.1 – Maintenance tools provided	3
§0.2 – Maintenance tools that you provide	3
§0.3 – Log book	3
§1.0 – Hygiene	3
§2.0 – Cleaning the toilet room	4
§3.0 – Adding bulking material	4
§4.0 – Controlling moisture	4
§5.0 – Mixing the pile	4
§6.0 – Removing Trash	5
§7.0 – Maintaining ventilation	5
§8.0 – Managing the liquid end product	5
§9.0 – Removing the compost end product	5
§10.0 – Seasonal use	6
§10.1 – Deactivation	6
§10.1.1 – Warm, dry climates	6
§10.1.2 – Cold climates	6
§10.2 Reactivation	6
§11.0 – Cold weather use	7
§12.0 – Maintenance schedule summary	7
§12.1 – Weekly	7
§12.2 – Monthly	7
§12.3 – Yearly	7
§13.0 – Problems and solutions	7
§13.1 – Odor in the toilet room or tank	8
§13.2 – Tines stuck	8
§13.3 – Clogged drain	8
§13.4 – Pump/spray system won't work	8
§13.4.1 – Manual pump	8
§13.4.2 – Electric pump	9
§13.4.3 – Spray system	9
§14.0 – Ordering spare parts	10
Blow-apart drawing showing parts	10
<b>Appendix 1</b> , sample maintenance log page	following 10

## §0.0 — Introduction

These instructions describe the normal operation and maintenance requirements for the Phoenix Composting System. We explain why a particular maintenance task must be performed, not just *how* and *when*.

The Phoenix operates much like a garden compost pile, requiring adequate air, moisture, and a moderate temperature (18° C , 65° F, or higher) to support the organisms that transform wastes into a stable end-product. Maintenance requirements depend upon the amount of use the system receives and climate conditions. The quality of maintenance directly affects the quality of finished compost. Substandard maintenance will not cause irreversible damage to the Phoenix or the process, but it will ultimately require more time consuming remedial work and reduce the capacity of the system.

### §0.1 — Maintenance tools provided

The following maintenance tools have been provided:

- A *rake* for mixing the bulking material and leveling the pile.
- A *tray* for removing finished compost.
- A liquid *spray system* for moistening the compost pile.
- A *door counter* to keep track of use (public facility models only).

### §0.2 — Maintenance tools that you provide

You will need to supply:

- A standard *pointed shovel* for removing the compost .
- A *container* for storing the bulking material.
- A *container* for holding trash that is removed from the Phoenix.
- *Rubber gloves*, for standard hygiene practice.
- A *container* for storing the rake.

### §0.3 — Log book

Documenting maintenance activities and weekly use in a log book (please see Appendix A for the suggested format) will help establish an effective maintenance routine and promote consistency.

## §1.0 — Hygiene

Observe good hygiene practices while working with the compost pile. Many pathogens can be present in the composting system. Make sure that ventilation and lighting are adequate. Wear rubber gloves while raking the pile or removing compost. Moisten the top of the pile to reduce dust; wear a dust mask if necessary. When finished, thoroughly wash your hands with a disinfectant soap. Store the rake and other tools in a bucket with a strong disinfectant, such as a solution of chlorine bleach. *Use common sense.*

## §2.0 — Cleaning the toilet room

Keep the toilet and room clean. This encourages cooperation among users and reduces maintenance requirements. The toilet should be cleaned with soap and water (not disinfectant, which could harm the composting process). Clean a urinal the same way but flush it out each month with a cup of vinegar to dissolve accumulating salts. Conspicuously locate the wall plaque describing the Phoenix and its proper use, along with any additional instructions for users.

## §3.0 — Adding bulking material

Bulking material is necessary to improve drainage and aeration, and to provide extra carbon, thus creating conditions essential for composting. The right amount of bulking material gives the compost pile a crumbly, porous texture. An inadequate amount results in a wet, pudding-like texture, puddling liquid, and anaerobic conditions that generate an unpleasant odor.

The best bulking material is dry planer shavings from a white softwood such as pine. Do *not* use shavings from decay resistant woods such as cedar or redwood: this material will *reduce* the composting rate. The bulking agent must have a physical structure that resists compaction so that air voids will remain open. Do not use large wood chips, wood waste from treated lumber, or materials that form a mat, such as long grass or leaves. Dry pine shavings often are sold as bales of animal bedding.

**Determining the amount.** Add one to two gallons of bulking material through the toilet or upper access door for every 100 uses.

**Frequency of additions.** Add material at least every 500 uses. More frequent addition of bulking material reduces mixing requirements.

With some semi-public and residential systems, a bin of bulking material can be available to users for “flushing.” We supply a bin, a scoop with bead chain, and an instruction wall plaque for this situation.

## §4.0 — Controlling moisture

Moisture is necessary for the decomposition process and for the proper texture of the compost pile. A moist pile also resists ignition from cigarettes or vandalism. Check the pile’s moisture each week. If the pile is too dry, add additional liquid; if too wet, add additional bulking material. In public facilities, increase or decrease the frequency of the automatic spray system (between 3 and 8 hours). Add liquid with the pump and spray system; or add fresh water; approximately one gallon at a time. Stir the pile between doses. If the pile has dried out significantly, a small quantity (approximately one teaspoon per gallon) of wetting agent such as liquid dish soap will help the liquid to remoisten the compost.

## §5.0 — Mixing the pile

Bulking agent and waste must be thoroughly mixed to increase pile porosity so that liquids will drain and air can circulate throughout the entire pile. The compost pile often will heat up significantly when stirred. Mixing also assures a uniform, looser texture that facilitates compost removal.

Thoroughly stir the pile every 500 uses or more often. After a period of heavy use, stir more frequently to further aid decomposition. If a routine inspection reveals puddling liquid, large dry or wet clumps, or layers of wet waste, more mixing and bulking material are necessary.

A rake is provided for mixing and leveling the top of the pile. Rake the material in the rear of the tank forward, mix and then rake back. Repeat for the front of the tank. Mix approximately one foot deep. Continue until all portions of the compost pile have the same moist, crumbly texture. Rotating the upper tines in both directions will also provide some mixing and aeration. *Do not rotate lower tines; their purpose is to control compost movement to the access area after removing end product and they should be rotated only at that time. Always leave tines oriented horizontally.*

## §6.0 — Removing Trash

Removing trash from the Phoenix is important, for it can occupy valuable space and create barriers for the movement of air, liquid, and compost. Remove all cans, bottles, and large pieces of plastic.

## §7.0 — Maintaining ventilation

Inspect the ventilation system for proper operation during each visit. It is easy to feel air being sucked into the air inlet when the toilet seats are closed and, it is easy to hear the fan running. Make sure that the vent hose has not sagged and filled with water from rain or condensation. Clean the air inlet screen to remove dust and cobwebs. Clean the fan if the blades rub against the housing (a scraping sound should alert you to this).

You can gain access to the fan through the upper access door, or by removing the screws holding the fan housing to the tank. You can replace the fan in the housing by removing the 2 wing nuts and bolts and disconnecting the electrical supply wires from the terminal strip using a 1/8" straight blade screwdriver.

*Pay attention to air flow direction and electrical polarity (red = positive, black = negative) when installing a new fan.*

## §8.0 — Managing the liquid end product

The liquid end product accumulates in the liquid storage area, and/or an auxiliary storage tank. An overflow drain keeps the liquid in the Phoenix from becoming so deep that it blocks the proper flow of air. Remove accumulated liquid with the pump, or by continuous drainage to an approved disposal system. Do not try to spray all of the accumulating liquid back on the compost pile, since this could be an excessive amount, and result in an excessively wet pile.

## §9.0 — Removing the compost end product

Compost is easiest to remove after a period of little use and before a season of heavy use, since material in the bottom of the tank will be less moist

and more stabilized. Rake the top of the compost pile level. If it is within 2 inches of the bottom of the top access door, it is time to remove compost end product. The tines should be horizontal (indicated by the bolt at the end of the shaft being horizontal) to keep new material from falling into the finished compost area. Remove the lower access door and inner door. Using the rake or a standard pointed shovel, remove approximately 12 cubic feet or 12 full trays (one-third cubic meter) of material from the bottom of the Phoenix.

Make sure to remove material from the entire bottom of the tank, exposing the side and rear walls of the tank. This will assure maximum utilization of the entire tank volume, not just the front portion. After replacing the access doors, rotate the tines (lowest tines first) to move new material downward. *Leave tines in horizontal orientation (indicated by screw or bolt located on side of drive socket)*

Finished compost can be used as a fertilizer for ornamental plants. It should be buried and covered with at least six inches (15 cm) of soil.

## §10.0 — Seasonal use

If the Phoenix is used only seasonally, such as in a vacation cabin or a summertime campground, prepare it for the idle period.

### §10.1 — Deactivation

- Stir the pile and mix in additional bulking material.
- Rotate the upper tines.
- Follow the advice on the PV system controller and evaporator for seasonal use.

#### §10.1.1 — Warm, dry climates

- Cover the pile with a layer of moist bulking agent.
- Turn off the fan to avoid excessive drying.

#### §10.1.2 — Cold climates

- If the tank is going to freeze, remove as much liquid from the storage area as possible.
- Turn off the fan.
- Pull the electric pump hose out of the tank about 6 inches to lift the pump out of the liquid. Turn the pump switch to the off position.

### §10.2 Reactivation

To reactivate the Phoenix after a long idle period, such as a winter of no use:

- Inspect the pile for dryness. Remoisten and stir the pile if necessary.
- Turn on the fan.
- Reinstall the pump and turn the pump switch to the on position.
- Inspect and test other system components such as the pump, spray system and photovoltaic system.

- Follow the advice on the PV system controller and evaporator for seasonal use.
- Remove compost at this time.

### §11.0 — Cold weather use

The capacity of the Phoenix in cold or freezing conditions is limited because so little biological activity occurs. If the tank is not frozen, liquids will still filter through the pile and drain.

Add additional bulking material since there is little evaporation and the compost pile will be wetter.

If the tank is frozen, it will merely act as a storage container until Spring. As it thaws, the compost pile should be deeply stirred and aerated. Excessive accumulation of the liquid can be a problem if the liquid drain remains frozen while the tank is thawing, so remove as much liquid as possible before the tank freezes.

### §12.0 — Maintenance schedule summary

Frequency of maintenance depends upon use. The more often maintenance is performed, the easier it will be. We recommend that the following tasks be performed at least as often as indicated during the season of use:

#### §12.1 — Weekly

- Add bulking material, mix and level the pile with a rake.
- Rotate the upper tines.
- Check the pile's moisture.

#### §12.2 — Monthly

- Check the pile's moisture, and add additional bulking material or spray additional liquid.
- Check the ventilation system and clean the inlet air screen and fan if necessary.
- Lift the sags in vent hose to drain liquid to the tank.
- Check the liquid drainage system.
- Check the spray nozzles and pump.

#### §12.3 — Yearly

- Remove compost end product.
- Remove cover plate and check liquid storage area if necessary.
- Clean liquid storage area if necessary.
- Clean vent pipe and screened cap if necessary.

### §13.0 — Problems and solutions

Learning of problems that have occurred with our Phoenix toilets is both interesting and valuable. If you encounter a situation that was not covered

adequately in these instructions, or if something else is not clear, please share your experience with us. With your help, we can and will improve the Phoenix and our instructions for operating it.

### §13.1 — Odor in the toilet room or tank

This can be caused by a dead fan, by a leaky or clogged vent pipe, or by high differential wind pressures on the toilet rooms in a two-toilet installation.

- Check to see if the fan is running. Clean it if doesn't rotate easily. If it still doesn't run check the power supply for the fan.
- Check for proper draft by using smoke or your hand in front of the air inlet or a partly opened toilet seat. Clean the vent hose by disconnecting it from the fan or vent pipe.
- Lift any sag in the vent hose to see if it has trapped water. Check the vent cap and clean the screen if necessary.
- If wind pressure seems to be sucking air out of a toilet, it may be necessary to block a toilet room vent or install a second fan to pressurize the toilet room.

### §13.2 — Tines stuck

This is not a serious problem. The lower tines are used only to move compost downward after removing material from the bottom of the tank, and sometimes they can be difficult to turn. Usually during the removal process, the tines will rotate freely as the obstruction is swept downward. The tine shaft can be damaged by excessive force so do not use a "cheater bar" extension to the ratchet handle.

### §13.3 — Clogged drain

If the overflow drain is clogged, disconnect the hose from the tank and clean the hose and drain. You can also remove the lower access door and cover plate and clean the liquid storage area.

If the hose is frozen, thaw out the system so that it can drain.

### §13.4 — Pump/spray system won't work

#### §13.4.1 — Manual pump

*If pushing the pump handle in is difficult, clean the nozzles.*

*If the pump handle moves, but the pump won't pump, the diaphragm may have a hole in it or one of the check valves might not be sealing. We have a repair kit for these parts.*

Inspect the liquid storage area by removing the lower access door and cover plate. Remove small debris (peat moss or wood chips) from the liquid storage area.

**§13.4.2 — Electric pump**

Test the pump using the controller test function. Also observe the spray pattern. If the pump runs, but no liquid is being pumped, there may be no liquid in the storage area.

**§13.4.3 — Spray system**

If pushing the manual pump handle in is difficult, or if the spray pattern is not uniform, clean the spray system. The side mounted spray system pipes are not glued. They merely press together so that the left and right pipes can be removed easily by turning and pulling them from the connecting elbows. Nozzles or plugs unscrew for cleaning. Nozzles for the front mounted spray system are removed with a counterclockwise 1/4 turn. Use a pointed tool to clean the orifice.

**§ 14.0 — Ordering spare parts**

Spare parts can be identified on the following diagram.

When contacting us for parts, please supply your Phoenix serial number from the nameplate on the front of the tank. Parts will be supplied with germane installation instructions.

For further information, please contact:

*Advanced Composting Systems* • 195 Meadows Road • Whitefish, MT 59937

Phone: 406-862-3854, Fax: 406-862-3855 • phoenix@compostingtoilet.com

In Canada only: Sunergy Systems Ltd. • POB 70, Cremona, Alberta, Canada  
T0M 0R0 • Voice & fax: 403 637-3973 • sunergy@telusplanet.net

### Phoenix 201 public facility com- posting toilet system



