Enviro™
GUARD
Wastewater Treatment Systems

OPERATION, MAINTENANCE & TROUBLE-SHOOTING GUIDE

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CONSOLIDATED
Time Tested Wastewater Solutions!

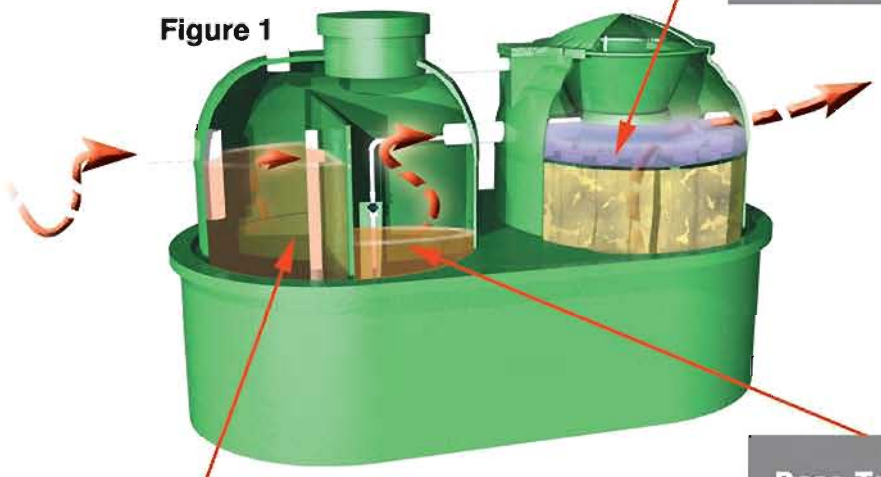
Enviro-Guard™ Wastewater Treatment System

BASIC OPERATION & MAINTENANCE REQUIREMENTS

The Enviro-Guard is a unique wastewater treatment system that combines primary treatment, flow equalization and secondary treatment by both fixed-growth and suspended-growth processes, and positive, no by-pass filtration within a single three-compartment vessel. This combination provides maximum wastewater treatment efficiency with a minimum of operation and maintenance requirements. When operated and maintained in accordance with the manufacturer's recommendations, the Enviro-Guard should provide continuous satisfactory wastewater treatment. The Enviro-Guard is shown in Figure 1.

The three compartments are a trash tank, dosing tank, and treatment tank. The trash tank has a capacity of 490 gallons. The dosing tank has a capacity of 525 gallons. Within the dosing tank is a dosing pump that is operated by a dosing timer. The timer is set to provide 48 doses of 15 gallons each. Dosing occurs at 30-minute intervals over 24 hours. The treatment tank has a rated treatment capacity of 750 gallons per day.

Figure 1



Treatment Tank (750 Gal. Per Day)

Wastewater treatment occurs by two distinct but related aerobic processes. First, the treatment tank is engineered to continuously mix and aerate effluent from the dosing tank. Continuous mixing and aeration promote efficient and prompt oxidation of the wastewater. This condition allows for the development of dense, floating microbial colonies that consume the organic material in the wastewater. Other colonies grow on the engineered filtration media suspended in the tank. These bacteria capture, retain, and consume residual organic material as water passes through the media. Based on certification tests, Enviro-Guard removes over 98 percent of the organic material in the wastewater.

Dose Tank (525 Gal. Cap.)

Receives partially treated wastewater and holds it for treatment. This tank contains an effluent pump, engineering piping, and associated controls, all of which control the frequency, interval, volume, and rate of wastewater transfer to the treatment tank. Control is essential to maximizing the efficiency of the wastewater treatment process.

Trash Tank (490 Gal. Cap.)

Receives, mixes, and clarifies incoming wastewater. Engineered to allow inert solid material ("grit") to fall to the bottom of the tank while fats, oil, grease, and "scum" float to the surface. An engineered effluent discharge system allows clarified wastewater only to leave the tank.

Enviro-Guard™ Wastewater Treatment System

As with all wastewater treatment systems, the Enviro-Guard requires maintenance. Much of this maintenance consists of "sight and smell" observations that confirm proper operation. Periodically, the tanks will have to be pumped to remove inert solids. Filters will need to be cleaned or replaced when attached biological growth prevents the movement of water. Pumps and aerators will require service or replacement over time.

Figure 2 provides Enviro-Guard Details

Figure 2

Enviro-Guard Components and Materials

Enviro-Guard Basin, Partitions, Domes, and Lids:
- Fiberglass-Reinforced Resin

Dosing Pump:
- Cast Iron, 1/3 hp Effluent Pump, 3450 rpm with 3/4-inch solids handling. 120 Volt AC, 60 Hz, 1.80 amps.

Aerator:
- Cast Iron, Stainless Steel, 1/6 HP 1550 RPM Motor With Thermal Overload Protection 120 Volt AC, 60 Hz, 1.8 amps

Filter Tubes:
- Felted Polyester Fabric

Tube Expanders:
- Slotted and Drilled Polyethylene Pipe

Alarm System:
- Low voltage (12 volt DC) sensors signal to the control box. The flashing light (audible indicator) alerts the owner to loss of air supply or high water level in the tank.

The following is a description of the normal maintenance required to insure continuous satisfactory operation of the Enviro-Guard Wastewater Treatment System:

ASSEMBLY AND INSTALLATION

Assembly and installation should proceed in accordance with the "Enviro-Guard Manual for Assembly and Installation." This manual also contains vital information that can be used in conjunction with operation and maintenance. A thorough understanding of assembly and installation is essential to service the Enviro-Guard.

START UP:

Allow six-to-eight weeks for sufficient bacteria to provide proper treatment in the Enviro-Guard. During this period, there may be sudsing due to laundry wastes. Sudsing can be reduced by limiting the volume of laundry washed daily and by using a low-sudsing detergent. In situations where excessive laundry water is expected, "seed" the Enviro-Guard with "mixed liquor" from another unit. To prevent short-term hydraulic overloads, spread out laundry washing.

PUMPING EXCESS SOLIDS:

Periodic pumping is necessary to remove excess bacteria and other solids. For a typical single-family dwelling, the Enviro-Guard will require pumping at 2-4 year intervals. As a part of the six-month servicing, maintenance personnel will evaluate the solids level within the system. They will advise the customer when his or her Enviro-Guard should be pumped.

DOSING PUMP CLEANING AND REPLACEMENT:

Dosing pumps will provide years of trouble-free operation. When the system is serviced, the dosing pump will be inspected. Debris on its housing and impeller will be removed before the pump is put back into service. The original pump has a two-year warranty; replacement pumps have a one-year warranty.

FILTER CLEANING:

Filters should be cleaned whenever an Enviro-Guard is pumped. Filters may need to be laundered if the aerator is shut off for extended periods or grease, soap, residue, or solids plug them. Maintenance personnel will evaluate and recommend whether cleaning or laundering is appropriate.

AERATOR CLEANING REPLACEMENT:

The average life expectancy of the aerator is 3-4 years. When the treatment tank is serviced, the aerator will be inspected for debris that may inhibit the impeller. Debris will be removed before the aerator is put back into service. Replacement aerators have a two-year warranty.

ALARM:

Enviro-Guard alarm systems indicate a need for service. The Enviro-Guard service representative should be notified as soon as the alarm is activated so that he or she can diagnose the nature of the issue and take appropriate action. The original alarm has a two-year warranty; replacement alarms have a one-year warranty.

SERVICE CONTRACT:

Enviro-Guard systems require periodic maintenance. With the purchase of an Enviro-Guard, the owner receives a two-year service contract, which provides a warranty on all parts service, including a minimum of two inspections of the unit each year. After the initial two years of operation, owners are urged to maintain their service contracts to insure regular inspection and service of the Enviro-Guard system. NOTE: The warranty does not include misuse or abuse of the system.

REPLACEMENT PARTS/SERVICE:

Contact the service prefessional or manufacturer listed on your alarm panel for the name of the closest sales/service representative.

SUMMARY OF MAINTENANCE REQUIREMENTS

Listed in Table 1 are typical maintenance periods for residential occupancies. Due to differences in wastewater strength, user habits, and flow, additional treatment facilities and/or increased maintenance may be required. Please check with your Enviro-Guard representative to discuss individual wastewater treatment needs.

Table 1—Summary of Maintenance Requirements for Residential Installations

Activity	Frequency/Duration
Start up	6-8 Weeks
Pumping	2-4 years
Filter cleaning	2-4 years
Aerator replacement	3-4 years
Inspection Frequency	6 Months

EQUIPMENT & MATERIAL ESSENTIAL FOR SERVICING ENVIRO-GUARD UNITS

The following are recommended tools and accessories to complete maintenance activities. This list is not exhaustive. The necessary tools and accessories will vary with each installation.

- 100' garden hose with spray nozzle
- 100' extension cord
- 1/3 hp submersible pump
- Utility pump with 1/2" - 5/8" garden hose on inlet and outlet
- Sample collection jars (1 quart capacity)
- Regular and Channel Lock Pliers
- Caulking gun with Silicone Caulk
- Volt/Ohm/Amp Meter
- Hammer
- Electrical tape and wire nuts
- Knife
- Screwdriver
- Replacement parts
- Rags
- Gasket and Adhesive
- Flexible Pump Hoses

SERVICING PROCEDURES

The Following are recommended servicing activities and sequence for typical residential occupancies. This listing is neither exhaustive nor absolute. Activities and their sequencing will vary with each installation.

Note: During all service procedures, be sure to observe good hygiene practices, including wearing gloves and eye protection. Wash hands frequently. Wash exposed body parts splashed by wastewater and solids.

Step 1 Layout garden hose, wiping cloths, tools, electrical tape, utility pumps, and extension cord.

Step 2 Turn off electrical power to Enviro-Guard.

Step 3 Remove lid to Treatment Tank. Check surge bowl for signs of high water or foaming. Check the area around the Enviro-Guard for signs of overflow, such as mixed liquor residue.

Step 4 Wash the inside of the lid and surge bowl of the Treatment Tank.

Step 5 Remove the surge bowl and check the gasket on both the bottom and top. If it is loose, re-glue it; if it is damaged, replace it with new gasket material.

Step 6 Inspect the filters for possible plugging by running water into the center chamber and check for a quick, noticeable rise in the water level inside of the tower. If filters are plugged, follow procedures outlined under "Filter Cleaning".

Step 7 Collect a sample of the mixed liquor for a settleable solids test.

Step 8 Using the utility pump, vacuum the top of the weir to remove accumulated solids. Follow procedures outlined in this manual under "Cleaning the Hanger Plate and Weir: Procedure". Check for sludge build-up in the bottom of the filter bags. If the solid accumulation on top of the weir is excessive (greater than 1/2" thick) or appears to noticeably be more concentrated in one area, check for a torn filter(s), improper placement of clips, thin filter material, or a gap between the hanger plate and the ring on the top of the filter. Make appropriate corrections.

Step 9 Remove aerator and eliminate any accumulation of foreign material wrapped around impeller.

Step 10 Replace aerator and check the intake tube to insure that it does not have any blockage. Check to ensure the clear plastic tube is not twisted or kinked. Kinks in the hose will cut off aeration to the treatment tank and allow septic conditions to develop. The plastic line on the pressure switch unit must not kink.

Step 11 Reinstall the surge bowl. Make sure that the flat surface of the surge bowl is placed next to the electrical box and that the black marking stripes align properly.

Step 12 Close the lid to the Treatment Tank. Make sure the lid is properly secured with a tamper-proof bolt, padlock, or other suitable locking device.

Step 13 Open the access lid to the trash tank and dosing tank. Check the area around the lid for signs of high water or overflow.

Step 14 Unscrew the union and remove the dosing pump for inspection. Check the piping for signs of blockages, and check the pump for debris and blockages. Check electrical connections for cracks in the wiring. Remove debris from the float switch, impeller, and impellor housing.

Step 15 Reinstall the dosing pump and check it for proper operation.

Step 16 Check the Trash Tank for excess accumulation of solids and "scum." Check the outlet tee for evidence of blockage. Pump excess solids and "scum" from the Trash Trap, and remove debris from the outlet tee.

Step 17 Close the lid to the trash tank and pump tank. Make sure the lid is properly secured with a tamper-proof bold, padlock, or other suitable locking device.

Step 18 Remove the lid from the observation port and inspect the inlet tee for blockages and debris. Remove blockages and debris. Replace and secure the lid.

Step 19 Restore the electrical power to the Enviro-Guard.

Step 20 Test the alarm system.

Step 21 Check the settleable solids after an appropriate time, up to 30 minutes, to determine if the Enviro-Guard should be pumped. Advise homeowner accordingly.

Step 22 Be sure to leave the owner a notice of the service call. Include in the notice the date and time of the service, a listing of the services provided, the results of inspections, a summary of any discussions with the owner, and a listing of recommendations and/or requirements regarding the system.

PUMPING

Microorganisms present in the wastewater use soluble organic material as a food source, converting it into more microorganisms (biomass), water, and carbon dioxide. As the colony matures, the number of microorganisms increase until they exceed the supply of organic material to maintain them. Starvation will result, and the organisms will begin to die. As they are metabolized, new organisms are formed. Metabolized organisms reduce the overall solids (or "sludge") volume.

There will be a gradual increase in solids due to the accumulation of inert remains of dead organisms and non-degradable material in the wastewater. As the solids increase, the mixed liquor becomes thicker, reducing the scouring effect on the filters. Periodically, these solids must be pumped from the Enviro-Guard to prevent filter plugging and maintain adequate aeration.

PUMPING FREQUENCY

The rate of solids accumulation—and the need for pumping—is dependent upon the quantity and strength of wastewater entering the Enviro-Guard. Generally, the greater the organic loading, the more frequently the Enviro-Guard will be pumped. Normally, residential systems should be pumped every 2-4 years. Enviro-Guards serving commercial occupancies may need to be pumped every 1-2 years, depending on the flow, organic loading, and solids concentration.

When routine service is provided, the settleable solids will be measured. This test, as detailed below, is conducted by removing a sample of mixed liquor and allowing it to settle for 30 minutes. During this time, the solids—including microorganisms and inert material—will settle out of the water. When the solids portion of the mixed liquor exceeds 50 percent of the sample, the treatment tank should be pumped.

DETERMINING PUMPING FREQUENCY

Trained service personnel will help owners establish a pumping frequency by performing a 30-minute settleable solids test of the mixed liquor during semi-annual service:

Procedure

1. Mark a quart jar into 10 equal portions
2. While aerator is running, fill the jar with mixed liquor suspended solids by lowering the jar into the center aeration chamber.
3. Measure the percent of the volume occupied by the sludge after it has settled for 30 minutes.

The optimum level of settleable solids is normally between five and 50 percent. The treatment tank should be pumped whenever the settled sludge exceeds 50 percent of the volume.

PROCEDURE FOR PUMPING THE ENVIRO-GUARD

1. Shut off the Enviro-Guard and allow solids to settle for 30 minutes.
2. Remove access cover to the treatment tank and the surge bowl.
3. Lower the hose into the center aeration chamber. Care should be taken to avoid knocking or damaging the aerator, air intake tubing or power cord.
4. Pump solids from the bottom. If the filters are not removed, be sure to hose down the filters and the bottom of the hanger plate.
5. It is only necessary to remove solids. If liquid is removed, pump down the treatment tank no deeper than the top of the aerator. This depth of water will allow sufficient seed material for start-up and will protect the aerator from overheating.
6. Remove the access lid to the trash tank and pump tank. Pump only solids from the pump tank. Pump the entire contents of the trash tank.
7. In areas with a high water table, immediately refill all tanks of the Enviro-Guard with clear water to prevent shifting or flotation.
8. Replace lids and restart the Enviro-Guard.

FILTER CLEANING

Under normal operating conditions, the filters in the Enviro-Guard do not require manual cleaning or backwashing during each servicing. The depth of the bacterial buildup surfaces is limited by the constant scouring from the aeration and sloughing.

The biomat that develops on the surface of the filter enhances filtration. Therefore, cleaning of the filters is not recommended unless actual plugging is occurring. The following conditions may cause plugging of the filters to occur:

1. Excess buildup of solids in the Enviro-Guard. Under normal conditions, Enviro-Guard units normally take several years to build up.
2. Extended septic conditions. Normally, the filters will not plug unless septic conditions exist for a period more than 7-10 days.
3. Excessive grease entering the Enviro-Guard. This may become a problem at a food service facility or in a home with a garbage disposal.
4. Hydraulic overload. Excessive flow into the Enviro-Guard will result in excessive solids being forced into the filters.
5. Organic overload. Excessive organic loading will result in septic conditions and/or excessive solids production, either of which can cause the filters to clog.
6. Filamentous Bacteria. Filamentous bacteria can predominate during periods of light organic loading or if toxic conditions exist in the treatment tank. These bacteria will stick to the filter socks and form a slime layer that blocks the flow of water through the filters.

CLEANING PROCEDURE DURING ROUTINE PUMPING

1. Pump the Treatment Tank.
2. Remove spring ring retainer from filter.
3. Without removing the filters, grasp the filter by the ring at the top and move it up and down in the weir to scrape off the accumulated solids and biomat.
4. Check the interior of the filter. If there is an accumulation of sludge in the bottom, remove the filter and pour the sludge into the Treatment Tank.
5. Replace the filter in weir and push back in place. Replace the spring ring retainer.
6. If the water fills up the filter as fast as it is being pushed down through the weir, no further cleaning is required. Follow the same procedure with the remaining filters.
7. If the above procedure does not adequately cleanse the filters, or if the plugging resulted from other causes, perform the following procedures:

a. Replace the existing filters with a clean set.
b. Launder the old filters on gentle cycle and allow them to air dry (do not use a heated dryer as this will damage filters). Add bleach with the detergent (or during the rinse cycle) to enhance the cleaning of the filters and provide personal health protection.

8. Add water to the Treatment Tank, if necessary to address high groundwater conditions.

Hydraulic or organic overloads should be considered if filters plug in less than 12 months or shortly after the Enviro-Guard goes into operation. Contact the Enviro-Guard distributor or factory representative for assistance in these cases.

CLEANING THE HANGER FILTER PLATE AND WEIR

Often, "pin floc" (less than 0.03 inches in diameter) forms as a result of over-oxidation of the sludge. Pin floc is observed in units with low hydraulic loads and long retention times, which allow digestion of the bacterial cells to occur. These fine, mostly inert, solids may pass through the filter fabric, especially if an inadequate biomat has formed on the filter surface. Pin floc may occur in new units though hydraulic surges (laundry, showers, etc.), which force small particles through the filters.

Pin floc usually settles to the bottom of the filters. However, some of the particles may be carried upward through the filters and settle on the upper surface of the hanger filter plate. Periodic removal of pin floc from the hanger plate and insides of the filters prevents solids from being carried over the weir.

PROCEDURE:

1. Pump the settled solids off the top of the hanger plate using a 1/2-inch garden hose for an intake and discharge. Pump the settled solids back into the treatment tank.
2. Pump out settled sludge in the bottom of the filters. Use a four-foot section of PVC pipe attached to the end of the intake hose. If there is no access to a pump, remove the filter and pour the sludge into the treatment tank. If surface discharge of the effluent is used, plug the 4-inch effluent pipe until cleaning is completed.

CLEANING FREQUENCY:

The hanger plate and weir should be cleaned during each six-month servicing. Sludge should be removed from the interior of the filters whenever it exceeds 6 inches in depth or if clumps of floc float at the top of the filter (approximately once every 12 months).

It is not advisable to remove or clean the filters more than necessary. Unnecessary cleaning will wear or damage filters and expanders.

AERATOR REPLACEMENT

PROCEDURE:

1. Turn off the electricity.
2. Remove the three wire nuts and disconnect the aerator electrical cord from the main power cable.
3. Loosen the pressure fitting in the center tower and gently pull the power cord through so that the aerator is free.
4. Grasp the air intake tube and raise the aerator until the upper union (located in the middle of the air intake tube) is visible.
5. Disconnect the sensor (upper) portion of the intake and lay it back on the hanger plate. The aerator is now free and can be removed from the Treatment Tank.
6. Change aerators and replace in the Treatment Tank by following the above procedure in reverse.

ALARM REPLACEMENT

Alarm replacement must be done by a certified technician or licenced electrician.

SAMPLE COLLECTION

The Enviro-Guard Wastewater Treatment System produces an effluent exceeding the performance requirements of NSF Standard 40 (Class I) for aerobic treatment plants: 30 day average of less than 25 mg/L CBOD5 and 30 mg/L TSS, respectively. (CBOD5 and TSS are indicators of treatment efficiency) Health agencies may require periodic sampling to confirm this performance. If this is necessary, the following procedure should be followed.

Sample collection is a precise art. Care must be taken to get reliable, uncontaminated samples.

1. Provide a suitable port on the outlet of the Enviro-Guard (see Fig. 2). The port should be at least six inches in diameter, with a minimum depth of eight inches below the effluent line.
2. Using a clean cloth, wipe the interior of the effluent line, where it enters the sampling port, to remove any debris that may have accumulated.
3. Activate the dosing pump to generate a flow through the treatment tank. Allow the flow to continue for approximately one minute to flush the line.
4. Shut off the water and dip the water out of the sampling port. Discard this water.
5. Turn on the water and collect a sample as effluent flows into the sampling port. Do not collect water that has accumulated in the sampling port. Take care to avoid catching dirt or other debris while collecting the sample.