

ECOLOGICAL TANKS, INC.

Makers of

AQUA  SAFE® and AQUA AIRE®

Advanced Wastewater Treatment Systems

SUBSURFACE EFFLUENT DRIP DISTRIBUTION SYSTEMS

Owner's Manual

"Copyright Notice"

No part of this publication may be reproduced, stored in any retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Ecological Tanks, Inc.

Ecological Tanks, Inc.
2247 Hwy 151 North
Downsville, LA 71234

(318) 644-0397

www.etiaquasafe.com

TABLE OF CONTENTS

INTRODUCTION 3

 DIAGRAM 1 - Typical Dripfield Layout & System Components 4

SYSTEM COMPONENTS

 1. ETI DRIPLINES 4

 2. Drip Logic® Controls..... 4

 3. Pumps and Pump tanks..... 5

 4. Filters 5

 5. Supply & Return Lines 5

 6. Pressure Regulator 5

 7. Air Release 5

 8. Zone Valves 5

 9. Check Valves 5

 10. ETI Headworks Unit..... 5

 11. Vegetative Cover 5

SYSTEM MAINTENANCE

 Routine and Preventative Maintenance 6

 Homeowners' Guide for Care and Maintenance of a Drip Distribution System 7

 Trouble Shooting Guide 8

 Owner's Maintenance Agreement 10

 Limited Warranty 11

INTRODUCTION

Ecological Tanks, Inc. assembles subsurface drip distribution (dispersal) systems for use with highly treated wastewater using Geoflow, Inc.'s WASTEFLOW® dripline and Netafim USA's BIOLINE® dripline. ETI's Drip Distribution Systems are subsurface onsite sewage disposal systems designed for use with the Aqua Safe® and Aqua Aire® aerobic treatment systems, or other wastewater treatment systems with similar effluent quality. The heart of the system consists of small diameter tubing with evenly spaced emitters for micro-dosing the effluent disposal field. Small doses of effluent are dispersed in the root zone at regular intervals during the day. The system employs uniform distribution, dosing and resting cycles, shallow placement in the soil, and vegetation for evapo-transpiration. These features optimize soil absorption of treated wastewater and minimize soil saturation between doses. Drip distribution systems are effective over a wide range of soil and site conditions, and landscape positions.

Advantages of drip distribution systems for the disposal of treated wastewater include:

- Minimal lot excavation and soil disturbance for drip field installation.
- Reduced human or animal contact and associated health risks.
- Reduced ponding and run-off potential of treated wastewater.
- Water re-use for landscape irrigation.
- Tackles high water tables, tight soils, steep slopes, obstacles, and other limitations.
- Nutrient uptake by vegetation and reduced pollution.
- Warranty protection and maintenance agreement.
- Logically controlled for consistent, reliable operation.

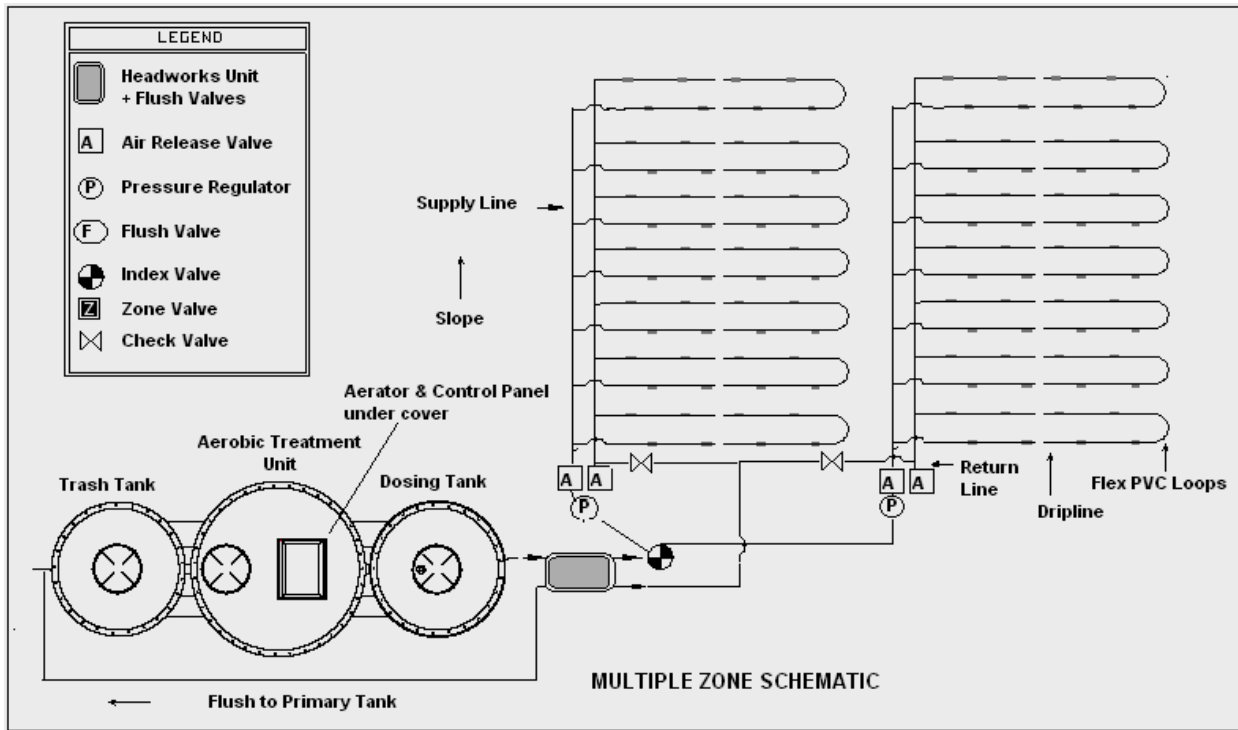
To assist designers, regulators, and installers, a package of pre-engineered drip distribution systems is included in this manual. Designers may use these pre-engineered systems to save time, or custom design a drip distribution system for specific soil and site conditions. The pre-engineered systems may facilitate easier local approval for a range of conditions that are detailed on page 18. The pre-engineered drip zones are to be used without modification and replicated to meet minimum area requirements of state or local regulations. A complete set of supporting calculations is available for inspection.

This manual and the pre-engineered drip distribution systems contained herein were developed with the aid of guidance presented in "Wastewater Subsurface Drip Distribution: Peer Reviewed Guidelines for Design, Operation, and Maintenance, EPRI, Palo Alto, CA, and Tennessee Valley Authority, Chattanooga, TN: 2004. 1007406."

NOTES

- WASTEFLOW® is a registered trademark of A. I. Innovations.
- BIOLINE is a registered trademark of Netafim USA
- Always follow your State and Local Regulations for onsite wastewater disposal.

DIAGRAM 1: TYPICAL DRIPFIELD LAYOUT



Subsurface Drip Distribution System for Onsite Wastewater Reuse and Dispersal

SYSTEM COMPONENTS

ETI subsurface drip distribution systems contain the following components (See Diagram 1 above):

1. ETI DRIPLINES (See Appendix 1 for details)

Four types of dripline are provided by Ecological Tanks, Inc. under this manual, as follows:

ETI DRIPLINE 130 is a non-pressure compensating dripline with turbulent-flow emitters rated at 1.30 gph at 20 psi, manufactured by Geoflow, Inc. as WASTEFLOW Classic;

ETI DRIPLINE 102 is a pressure compensating dripline with turbulent-flow emitters, rated at 1.02 gph, and manufactured by Geoflow, Inc. as WASTEFLOW PC 1.02;

ETI DRIPLINE 62 is a pressure-compensating dripline with self-flushing, filtered emitters rated at 0.62 gph, and manufactured by Netafim USA as BIOLINE Dripper Line; and

ETI DRIPLINE 53 is a pressure-compensating dripline with turbulent-flow emitters, rated at 0.53 gph, manufactured by Geoflow, Inc. as WASTEFLOW PC 0.53;

All four driplines are ½-inch flexible tubing with evenly-spaced emitters which disperse effluent uniformly throughout the effluent disposal field. They are connected to PVC supply and return lines with special fittings. Standard emitter and line spacing is 24-inches. Other spacings may be necessary for soils with very low or high permeability. A single dripline, from supply to return line, is called a lateral. A lateral may be looped to form multiple 'runs' to fit in the available space. Driplines have no joints that may pull apart during installation and are ideal for tractor mounted burying machines. It is sold in 500 and 1,000-foot rolls. It is protected against root intrusion and bacterial growth for maximum longevity.

2. DRIP LOGIC® CONTROL PANEL (See Appendix 5)

The Model 218 Drip Logic Control Panel is designed to control and monitor the aerobic treatment unit,
November 2005

the pump and floats, and the drip distribution system in all modes of operation. Model 217 is similar to that described above, but is used for manual control of flushing functions, where permitted.

3. PUMPS AND PUMP TANKS (See Appendix 11 for details)

ETI supplies the pump for each drip distribution system. Recommended pump tank capacity is at least one day's sewage flow above the high water float. Check your state or local regulations.

4. FILTERS (See Appendix 3 for details)

ETI drip distribution systems use specially-sized Screen (Spin Clean) Filters or Disc Filters in the headworks units to remove solids 100 microns or larger from the treated effluent. Screen filters are flushed at set intervals to remove buildup.

5. SUPPLY AND RETURN LINES (supplied locally)

The supply line carries treated effluent from the dosing tank to the drip field. Rigid PVC Schedule 40 pipe is sized to achieve recommended flushing velocities between 2 and 5 feet per second (fps). Pipe sizes may vary as a result. The ends of the dripline are connected to PVC supply & return lines with special lockslip fittings. Return lines are needed to flush each drip zone at regular intervals. The return line is directed to the pretreatment tank through the headworks unit. A check valve must be placed on the return line of each zone (2 or more) to prevent water from one zone entering another during the flush cycle.

6. PRESSURE REGULATOR (See Appendix 8 for details)

Pressure regulators fix the inlet pressure at a given rate and immediately precede each drip zone. Under normal operating conditions, pressure in the drip lines must be between 10 and 45 psi. For ETI Dripline130 the inlet pressure is set with a 20 psi regulator. A 40 psi pressure regulator is used for all pressure-compensating driplines to protect the emitters.

7. AIR RELEASE VALVE (See Appendix 6 for details)

Air release valves are used at the highest points of each drip zone, on the supply and return lines, to prevent back siphoning or a vacuum. They allow the system to depressurize and drain after each dosing and flushing cycle. Air release valves are fitted with Schrader valves.

8. ZONE VALVES (See Appendix 7 for details)

Automated multiple-zone dosing is done using mechanical index valves plumbed sequentially to 2-6 zones, or by a solenoid valve on each supply line, wired to the control panel, for 2 or more zones. Index valves must be installed higher than the supply line and headworks unit for proper operation. Individual zone solenoid valves should be used when the number of zones exceeds six (6).

9. CHECK VALVES (See Appendix 10 for details)

Check valves are placed on the return line of each zone (2 or more) for individual zone flushing and to separate zones during the dosing cycle. When slope exceeds 5%, check valves may be required on the supply lines to minimize drain back or accumulation at lower elevations. Check your state or local regulations.

10. ETI HEADWORKS UNIT (See Appendix 2 for details)

The ETI Headworks Units are pre-assembled for installation into the riser of the pump tank supplied by ETI, or in a separate cover box. Automatic and manual models are available; check your state or local regulations for use. Headworks units are placed within 30 feet of the pump and ahead of the zone valve.

11. VEGETATIVE COVER

A good vegetative cover is essential for evapotranspiration of soil moisture and to reduce soil erosion. Each installation must be seeded and mulched, or sodded, after construction, unless the existing grass cover is undisturbed.

SYSTEM MAINTENANCE

To ensure years of trouble free service from a drip distribution system it must receive regular maintenance. Drip distribution systems are designed to receive treated wastewater from an Aqua Safe® or Aqua Aire® aerobic treatment unit, or equivalent, for which regular maintenance is required every six (6) months, by a licensed, trained, and authorized service provider.

ROUTINE AND PREVENTATIVE MAINTENANCE

- Check control panel and all functions of advanced treatment system.
- Clean or replace filter. Should not exceed 5 psi pressure drop. The filter cartridge should be cleaned to remove all debris. If buildup is severe, soak in detergent, 50% bleach bath, or similar.
- Open the field flush valve and flush the field for 5 minutes by activating the pump in "manual" mode. Close the flush valve. On solenoid valves the manual bleed lever should be left in the 'Off' position and the dial on top should be free spinning. Clockwise rotation closes the valve.
- With the pump in the "manual" mode, check pressures in the drip field and Headworks Unit using a Schrader valve located on the air vent or by reading the pressure gauges provided. The pressure should agree with initial installation readings. On systems with manual flush valves, close the field flush valve completely and then open slightly while avoiding excessive pressure loss or until design pressure is achieved. This will allow the field to drain after each dose.
- Check air release valves for proper operation. They should seal completely after the pump is activated. If water is ponded or leaking, remove the valve cap, press down on ball, & clear away debris. Use latex gloves. Check flush valves.
- Check zone indexing valve (or individual zone valves) to ensure that all ports are operative and that the valve is self-draining. Zones are designed to be dosed in sequence.
- Turn off the pump and reset the control panel to "auto" mode.
- Visually check and report the condition of the drip field for wet spots.
- Effluent samples may be collected for periodic testing of effluent quality. Consult laboratory for proper sampling techniques.
- Record the pump counter, flow meter, pressure gauge readings, field conditions, parts replaced or repaired, and other work performed, below. Compare with original readings. Adjustments should be made to restore all features to design specifications.

DRIP SYSTEM FIELD MEASUREMENTS

Pressure (psi) Dose - Filter ___; Headworks unit ___; Zone 1 ___; Zone 2 ___; Zone 3 ___; Zone 4 ___; Zone 5 ___; Zone 6 ___

Flush - Filter ___; Headworks unit ___; Zone 1 ___; Zone 2 ___; Zone 3 ___; Zone 4 ___; Zone 5 ___; Zone 6 ___

Flow Meter (g) _____ (record all digits) Date: _____

List parts replaced, repaired, & observations: _____

Owner's Name _____ Address _____

City _____ State _____ Zip _____ Serial # _____ Model # _____

Service Provider _____ Contract# _____ Phone # _____ License# _____

Company Name _____ Service Date _____ Next Service _____ Signed _____

HOME OWNER'S GUIDE FOR MAINTAINING A DRIP DISTRIBUTION SYSTEM

A drip distribution system is installed on your property for dispersal of treated wastewater. The system uses 1/2" diameter drip tubing installed 6-12 inches below grade. It is designed to carefully dispose of the effluent into the root zone of your lawn. The system will work for many years if regular maintenance is done twice a year, along with the following:

Do

- Continue the maintenance contract for semi-annual inspections and maintenance by a licensed service provider trained and authorized by Ecological Tanks, Inc.
- Maintain all plumbing fixtures to prevent excess water from entering the system. Add a drop of food coloring to your commode tank. If color appears in the bowl, repair the leak.
- Divert all downspouts, roof water, or run-off from up slope away from all tanks and the drip field.
- Maintain healthy grass cover over the drip field to enhance evapotranspiration, and to minimize soil erosion.
- Contact your service company if a high water alarm or other malfunction should occur. In the event of a high water alarm, reduce your water consumption where possible until the problem is corrected.
- Have your tanks pumped when recommended by the service provider.
- Contact your service provider if you notice wet areas over the drip field. In most cases, this may be caused by a loose fitting and can be easily repaired.
- Keep good records of all service calls, repairs, tank pumpings, or other work performed on your system, together with the permit, and engineering plans.

Don't

- Allow utility lines, cables, lawn irrigation systems, storm drains, French drains, swimming pool, or similar items to be installed near the drip field or other parts of the system. (Check engineering plans approved for your system).
- Drive cars, trucks, or other equipment heavier than conventional lawn mowers over the drip field area, or over any tanks or valve boxes.
- Dig, excavate, pave, or disturb the soil or lawn over the drip field or tanks.
- Dispose of paints, cleaners, solvents, motor oil, bleach, prescription drugs, additives or enzymes, grease, or similar materials through your house plumbing system.
- Use additives of any kind which may disrupt the chemistry of the advanced treatment system installed with your drip field.

TROUBLE SHOOTING GUIDE:	
Symptom:	High water alarm activates periodically (1-2 times/week). During other times the water level in the pump chamber is at a normal level.
Possible cause:	Peak water usage (frequently laundry day) causing temporary high water.
Remedy 1:	Space out wash loads evenly over a 7-day period.
Remedy 2:	Set timer to activate the pump more frequently. Be sure to not exceed the total design flow. To avoid this, reduce the duration of each dose.
Remedy 3:	Provide a larger pump tank to accommodate the peak flow periods.
Symptom:	High water alarm activates during or shortly after periods of heavy rainfall.
Possible cause:	Infiltration of ground/surface water into system.
Remedy:	Identify sources of infiltration (tank seams, pipe connections, risers, etc). Repair.
Symptom:	High water alarm activates intermittently, including times when it is not raining or when laundry is not being done.
Possible cause:	A toilet or other plumbing fixture may be leaking sporadically but not continuously. Check water meter readings for 1-2 weeks to determine if water usage is unusually high for the number of occupants and their lifestyle. Also determine if water usage is within design range.
Remedy:	Identify and repair all leaking fixtures.
Symptom:	High water alarm activates continuously on a new installation (less than 3 months of operation). Inspection of the filter indicates it is plugged with a gray colored growth. Water usage is normal.
Possible cause:	Slow start-up of treatment plant with increased nutrient in effluent causing a biological growth on the filter. This is typical of lightly loaded treatment plants that receive a high percentage of gray water (i.e., from showers and laundry).
Remedy:	Remove and clean filter cartridge in a bleach solution. Advise owner of proper loading and waste strength for advanced treatment system.
Symptom:	Water surfaces continuously in isolated spots, each one foot or more in diameter.
Possible cause:	Damaged drip line or a loose connection is allowing water be discharged under pressure and therefore at a much greater volume than intended.
Remedy:	Dig up drip line. Activate pump and locate leak. Repair as required.
Possible cause:	If water is at base of slope, can be caused by low-head drainage.
Remedy:	Install check valves and air vents in the manifolds to redistribute water in the system after pump is turned off. This is not advised for freezing climates where manifold drainage is required.
Possible cause:	Area of drip field was inadequately sized and is too small.
Remedy:	Provide additional soil analysis to verify sizing and enlarge as required.
Symptom:	A portion of the drip field closest to the supply line is saturated while the rest of the field is dry.
Possible cause:	Insufficient pump pressure. Check pressure at the return line for 10 psi or 15psi for PC.
Remedy 1:	Check filter and pump intake for build up & clean as required.
Remedy 2:	Leaks in the system may result in a loss of pressure. Check for water leaks in connections and fittings or wet spots in the field. Also check air vents to insure they are closing properly. Repair as necessary.

TROUBLE SHOOTING GUIDE: Continued	
Remedy 3:	Pump is worn or improperly sized. Pressure at supply line is less than design. Verify pressure requirements of system and replace pump if undersized. As an alternative, the drip field may need to be divided into two or more zones.
Possible cause:	The duration of each dose is too short to allow the drip field to pressurize before the pump shuts off (or runs for only a brief time before turning off).
Remedy:	Increase the pump run time and decrease the frequency of doses. Always calculate (or observe during field operation) how long the system takes to fully pressurize and add this time to the design Dose-On time.
Possible cause:	Air release valves not fully closed after pump is activated. Ball may be stuck, or debris may be preventing complete seal.
Remedy:	Open & check air release valves; remove any debris or buildup; ensure ball is free and clear. Reactivate pump to ensure proper function.
Symptom:	High water alarm begins to activate continuously after a long period (1-2 years) of normal operation. Inspection of the filter indicates it is plugged with a heavy accumulation of sludge.
Possible cause:	A buildup of solids in the pump tank carried over from the treatment plant.
Remedy:	Replace the filter cartridge with a clean cartridge. Check the pump tank and if an accumulation of solids is noted, pump the tanks. Also, check the operation of the treatment plant to insure it is operating properly.
Symptom:	Water surfaces at several spots in drip field during dosing. Installation is recent, less than 6 months, and the soil is a moderate to heavy clay.
Possible cause:	Smearing of the soil may have occurred during installation of drip line. Also, the "cut" resulting from the installation may allow a path for the water to surface during dosing.
Remedy:	In most cases the sod will compact naturally around the drip line and surfacing will diminish and ultimately cease. To help, compress soil lightly over driplines; reduce the duration of each dose and increase the number of doses/day. Also, it will help to seed the area to encourage the development of a good root zone.
Symptom:	Entire area of drip field is wet, soft and spongy & appears totally saturated with water. Situation occurs during dry season when there is little rainfall.
Possible cause:	Water being discharged to drip field exceeds design. Excess water may be a result of infiltration, plumbing leaks or excessive water usage.
Remedy:	Check water meter, flow meter, & control panel to determine water usage. Check for leaks or infiltration & repair required. Reduce water usage by installing water saving fixtures, or enlarge drip field.
Symptom:	Valve will not open manually
Remedy:	Check water supply and master or gate valves to insure they are open. Check that the valve is installed with the arrow pointing downstream. Check that the flow control is fully open, counterclockwise. Turn off water supply. Remove the solenoid and check for debris blocking the exhaust port. Remove the cover. Check diaphragm for damage and replace, if necessary.
Symptom:	Valve will not close
Remedy:	Insure the manual bleed lever is in the Off/Closed position. Check for leaks around the flow control, solenoid or between the valve cover and body. Turn off the water supply. Remove the solenoid and check for debris or damage to the exhaust port. Remove valve cover and inspect for debris under diaphragm or debris in diaphragm ports.
Symptom:	Slow leak
Remedy:	Check for dirt or gravel embedded in the diaphragm seat. Check actuator and exhaust fitting for proper seating.
Symptom:	One drip zone is soggy or over saturated, others are dry; run-off may be visible.
Cause:	Index valve may not be rotating to dose each zone.
Remedy:	Check to ensure index valve is able to de-pressurize after pump shut off; open index valve to ensure that inner cam can rotate freely; remove any debris or build-up.

APPENDIX 13

OWNER'S MAINTENANCE AGREEMENT

Ecological Tanks, Inc. provides that a licensed, trained, and certified installer/service provider shall perform routine maintenance for the drip distribution system installed at the address indicated below for a minimum period of 2 years from the date of installation, as part of the purchase price. The treatment system and drip distribution shall be serviced at least once every six (6) months, when the following steps shall be performed:

- Check control panel and advanced treatment system for proper function.
- Check spin clean filter, & clean as needed.
- Check filter & field flush valves & manually operate.
- Check the pump flow rate & pressures in the drip distribution system.
- Check air release valves for proper operation.
- Check zone indexing valve & check valves for proper operation.
- Check condition of the drip field for wet spots.
- Check effluent quality, if necessary, (cost of samples not included in this agreement).
- Repair or replace component parts, if needed, & notify owner & manufacturer immediately.
- Record flow & pressure readings.
- Record repairs, replacements, adjustments, & other observations.
- Send of inspection report to owner, regulator, etc., as required.

The owner/purchaser is solely responsible for proper operation and routine maintenance of the drip distribution system, the advanced treatment system, and all other components of the onsite sewage system installed on owner/purchaser's property. The owner must read and follow manufacturer's instructions for system maintenance. Without continued routine, semi-annual maintenance of the onsite sewage system, beyond the term of this agreement, by a licensed, trained, and certified installer/service provider, the advanced treatment system and drip distribution system will not operate at their maximum efficiencies, and may malfunction, or fail. **The owner is advised to contact their service provider before this agreement expires and establish a new maintenance contract.**

This agreement covers the cost of two service visits per year for the initial two years; the repair or replacement of component parts of the drip distribution system, if defective; and the twelve tasks listed above. The agreement does not cover the cost of additional service visits or the repair or replacement of component parts caused by owner abuse or neglect.

<u>OWNER'S MAINTENANCE AGREEMENT</u>			
Purchaser			
Owner's Name _____			Phone _____
Physical Address _____			City _____
State _____	Zip Code _____	Serial # _____	Model # _____
Installation Date _____	Signature _____	Date _____	Expiration _____
Service Provider			
Name _____			License # _____
Company Name _____	Address _____		
City _____	State _____	Zip Code _____	Phone _____
Training/Certification Date _____	Signature _____	Date _____	

APPENDIX 14

LIMITED WARRANTY

Ecological Tanks, Inc. (hereinafter referred to as manufacturer) warrants each drip distribution system to be free from defects in workmanship and materials from the date of installation by an authorized dealer/installer for a period of one (1) year provided that the system has been installed and maintained according to manufacturer's instructions.

When properly installed and registered with the manufacturer, manufacturer's sole obligation under this limited warranty is to repair or exchange any components, F.O.B., that, in manufacturer's judgment, is defective, provided that said component part was paid for in full and returned through an authorized distributor. The warrantee must specify the nature of the defect in writing to manufacturer. The limited warranty makes no provisions for any informal dispute settlement agreement.

- (a) The limited warranty does not cover any drip distribution system that was not properly installed; damaged due to altered or improper wiring or overload protection; flooded by external means; disassembled by unauthorized person(s); covered, paved, disturbed, or modified contrary to manufacturer's instructions; or damaged by an act of nature. The limited warranty does not cover damages or defects caused by insects, rodents, or other animals to any component part of the system. The limited warranty does not cover improper design; application (other than its intended use); improper soil evaluation; or hydraulic overloading.

No warranty is made as to the field performance of any system. The limited warranty applies only to the drip distribution system itself and does not include any of the purchaser's plumbing, pre-treatment plants, or any of the house wiring.

The manufacturer reserves the right to replace any component part covered under this warranty with a component part that in manufacturer's opinion is equivalent to the part replaced. The manufacturer claims no responsibility for delays or damages caused by defective components or materials which cause due to interruption of service for repairs or replacement of component parts covered by the limited warranty.

<u>MANUFACTURER'S WARRANTY REGISTRATION CERTIFICATE</u>			
Purchaser Information			
Owner's Name _____	Phone _____		
Physical Address _____	City _____		
State _____	Zip Code _____	Serial # _____	Model # _____
Installation Date _____	Signature _____	Date _____	
Installer Information			
Installers' Name _____	License # _____		
Company Name _____	Physical Address _____		
City _____	State _____	Zip Code _____	Phone _____
Signature _____			Date _____
System Information			
Treatment System _____	Size _____ gpd	Manufacturer _____	Phone# _____
Designer _____	Address _____	City _____	Phone# _____
Service Provider _____	Address _____	City _____	Phone# _____
The original of this form shall be completed and mailed to Ecological Tanks, Inc. within 30 days of the date of installation for the warranty to be activated. A copy shall be given to the owner and installer for safe keeping.			