Owner's Manual

SeptiTech®

Wastewater Pretreatment Systems

Thank You

Thank you for purchasing a SeptiTech® wastewater treatment system. We appreciate the trust you have placed in our company and its technology.

How SeptiTech® Pretreatment Works

SeptiTech technology relies on a re-circulating trickling filter to treat septic wastewater to a very clean state before it is discharged to a leach field or other disposal method. A trickling filter depends on living microorganisms that naturally exist in the environment to consume waste in sewage. Because the SeptiTech® system relies on these living microorganisms to perform waste reduction and treatment, it is energy efficient and environmentally friendly.

The treatment system is composed of three major components: a septic tank, a SeptiTech® processor and a disposal field. Wastewater first flows from the house to the septic tank where solids settle to the bottom and are subjected to anaerobic (without oxygen) treatment. Liquid effluent from the septic tank then flows to the SeptiTech® biological trickling filter processor where processing takes place.

During processing, wastewater is sprayed over and trickles through the "filter media" again and again. The filter media consists of small, high surface area beads contained in a mesh pillow. The beads provide an extremely high amount of surface area per cubic foot of filter media, giving a vast area inside the processor for millions of colonies of microbes to grow, reproduce and consume waste. Microbes are fast acting in consuming the sugars, starches and organic matter in the waste. Microbes also require oxygen to live, and fresh air from the outside is introduced during the re-circulation process. Dead microbes are washed out of the media pillows and into the bottom of the processor where they are pumped back to the septic tank. This pump back process also assists with the de-nitrification process and helps to remove harmful nutrients in the form of nitrogen compounds such as nitrates, nitrites, ammonium and ammonia.

After treatment by microorganisms in the media, the effluent flows to a decant chamber and is then pumped to the leach field where it is dispersed to the soil in even, frequent and measured doses to maximize the absorptive surface area in the leach field (or soaker hose).

Treated water discharged from the processor is clear, odorless and extremely low on pollutant measures such as bio-chemical oxygen demand (BOD), total suspended solids (TSS) and has reduced levels of nitrogen compounds. As a result, the leach field serves more as a mechanism to release water back into the environment hydraulically than as part of the treatment process. The treated water does not have sufficient organic matter to cause the formation of a biological slime layer that is typically the cause of septic leach field failure. Consequently, your SeptiTech system will insure the long-term health of your leach field. Figure 1 below provides a schematic view of how the treatment system works in conjunction with the other components of the septic system.
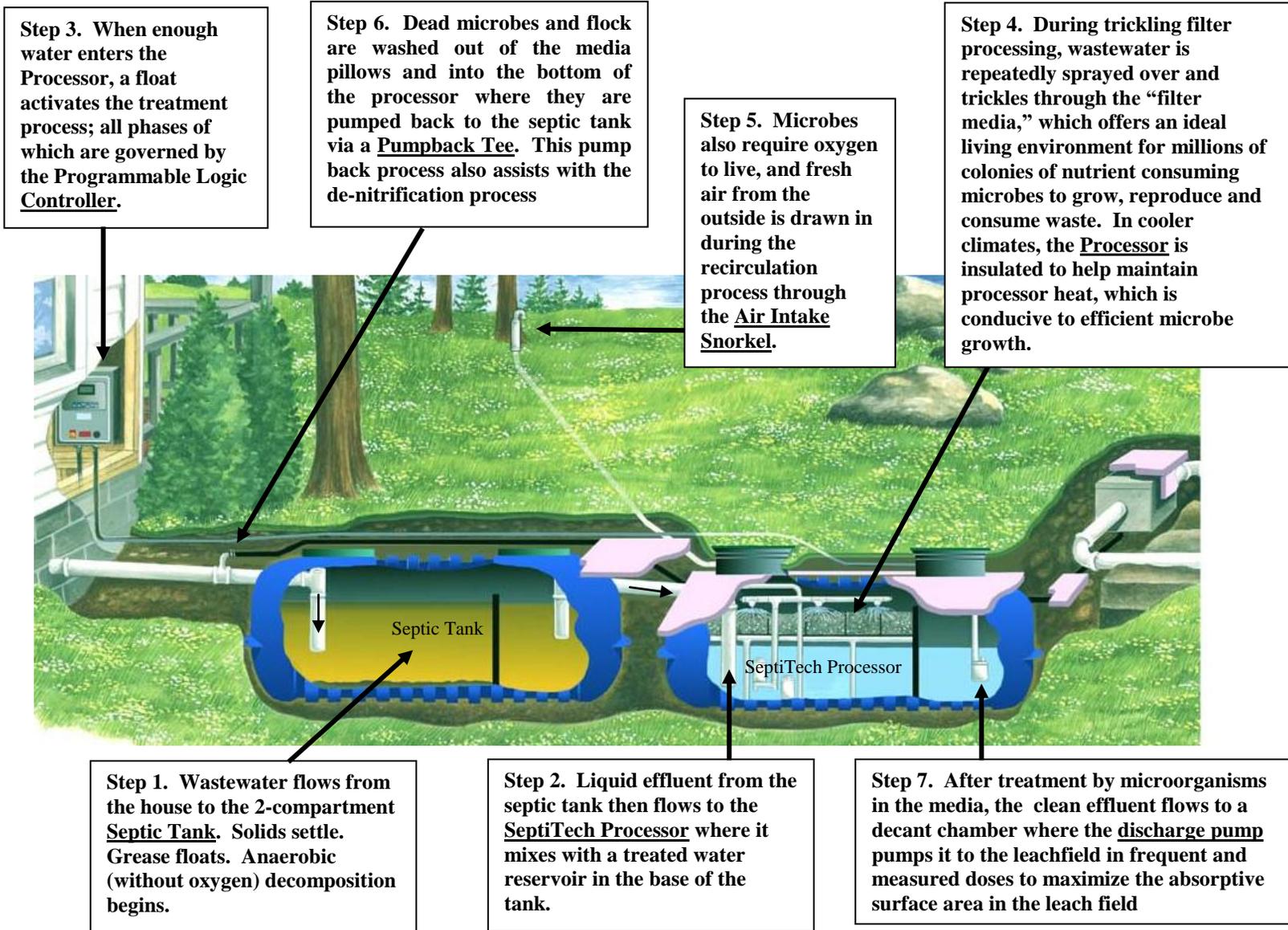
Step 3. When enough water enters the Processor, a float activates the treatment process; all phases of which are governed by the Programmable Logic Controller.

Step 6. Dead microbes and flock are washed out of the media pillows and into the bottom of the processor where they are pumped back to the septic tank via a <u>Pumpback Tee</u>. This pump back process also assists with the de-nitrification process

Step 5. Microbes also require oxygen to live, and fresh air from the outside is drawn in during the recirculation process through the <u>Air Intake Snorkel</u>.

Step 4. During trickling filter processing, wastewater is repeatedly sprayed over and trickles through the "filter media," which offers an ideal living environment for millions of colonies of nutrient consuming microbes to grow, reproduce and consume waste. In cooler climates, the <u>Processor</u> is insulated to help maintain processor heat, which is conducive to efficient microbe growth.

Septic Tank

SeptiTech Processor

Step 1. Wastewater flows from the house to the 2-compartment <u>Septic Tank</u>. Solids settle. Grease floats. Anaerobic (without oxygen) decomposition begins.

Step 2. Liquid effluent from the septic tank then flows to the <u>SeptiTech Processor</u> where it mixes with a treated water reservoir in the base of the tank.

Step 7. After treatment by microorganisms in the media, the clean effluent flows to a decant chamber where the <u>discharge pump</u> pumps it to the leachfield in frequent and measured doses to maximize the absorptive surface area in the leach field

Figure 1: SeptiTech Treatment System Flow Schematic

System Use

The SeptiTech wastewater pretreatment system is designed to treat domestic sanitary wastewater that is produced from residential homes. However, the SeptiTech system is not designed to accept full strength wastewater. Rather, the wastewater must first pass through a two-compartment primary septic tank (sized in accordance with local codes) and an effluent filter (such as a Zabel or Polylok filter) prior to entry into the processor. The primary septic tank is required in order to reduce as many solids and grease as possible.

The SeptiTech system treats the wastewater using a biological process, which takes advantage of bacteria in the wastewater to consume pollutants. Therefore, there are limitations to the types of wastes and constituents that can be treated using the system. Because the SeptiTech system uses bacteria, substances that are meant to kill bacteria that are found in typical households must be used in moderation.

- **Laundry Detergents:** Laundry detergents that are low in phosphates, nitrates and chlorine such as Arm and Hammer laundry detergent are recommended. Such detergents are gentle to your clothing, as well as the septic treatment system and disposal field.

- **Bleach:** Minimize the use chlorine bleach. Use bleach sparingly and don't do multiple loads of laundry that requires the use of bleach back-to-back. Instead, spread its use over time so the bacteria in the treatment system are not depleted.

- **Soaps & Cleansers:** Minimize the use of antibacterial soaps and cleansers. There are a lot of products on the market that include "antibacterial" chemicals within them such as hand soaps, laundry detergents, dish soap, among others. Antibacterial products kill bacteria, and therefore, are not good to be using with septic systems which relies on bacteria to work properly.

- **Trash:** Please keep sanitary napkins, wipes, cigarette butts, paper towels, coffee grounds, cooking greases and oils as well as paints, petroleum products and other non-biodegradable materials out of the system.

- **Additives:** Please do not use toilet tablets of any kind (the tablets that turn the water blue or green) or other products such as Drain-O. These products deplete or degrade bacterial action. Never use septic tank additives of any kind (such as Rid-X).

- **Grease:** Never dispose of grease down the drain. Grease will only congeal and coat drain piping, which could lead to clogging, and will also deplete or degrade bacterial action. Rather, dispose of grease into the trash after it has cooled.

- **Leaks:** Please be sure that leaky faucets or running toilets are repaired. Excess water flow will hamper treatment and increase operational costs.

- **Garbage Disposals:** Garbage disposals are not recommended due to the increase in amount of solids and organic loading that are added to the system.

- **Septic Tank Maintenance:** Remember, all septic systems, SeptiTech included, require the septic tank be pumped on a regular basis. Pumping frequency depends on water use volume and average organic strength of wastewater. A typical pumping schedule for a residential house may be once every two or three years.

Alarms

Alarm control loops are provided in the control logic to alert the operator or SeptiTech to abnormal events or conditions in the process tanks or in the control system. In the event that an alarm condition is detected by the control system, the following actions are triggered:

- Activation of audible alarm horn located on the front of the control panel
- Activation of alarm light located on the front of the control panel
- Activation of *optional (if installed)* auto-dialer, which will dial up to four (4) pre-programmed phone numbers and report that an alarm condition has occurred for the SeptiTech treatment system.

When there is an alarm condition, a fault flash code utilizing the red reset button on the front of the control panel is activated. When there is an alarm, the control panel will signal the fault through an audible horn and through a red light. In order to silence the alarm, the owner/operator must push the red reset button. This will silence the horn and start the flash code sequence. The owner/operator must count the number of times the red reset button flashes. There will be a delay at the beginning of each flashing sequence. For example, a low float fault will have 2 flashes. The reset button will flash twice, pause, flash twice, pause, etc.

The flash code will continue to flash for 24-hours. If the fault condition is still present at the end of the 24-hour period, the alarm will sound again and the owner/operator will have to push the reset button to silence. If the fault condition has corrected itself, the flashing light will stop.

If the owner/operator does not want to have the light flashing for 24-hours, the flashing can be stopped by holding in the reset button for 15+ seconds. This will put the control panel into Maintenance Mode (alarm horn will sound periodically), and clear the fault condition. In order to put the system back into Auto Mode, hold the reset button in for another 15-seconds. In the case that the owner/operator walks away from the panel and forgets to put it back into Auto Mode, the control panel will go back to Auto Mode automatically after 30 minutes.

The flash codes and the associated fault condition are listed below:

Fault Flash Codes

0 - NO FAULTS
1 - HIGH FLOAT FAULT
2 - LOW FLOAT FAULT
3 - DISCHARGE PUMP FAULT
4 - RECIRCULATION PUMP FAULT
5 - RETURN PUMP FAULT (Pump Back / Denite Recycle)
6 - UV FAULT

System Operation

The SeptiTech system is a mechanical device that is comprised of two general components; the processor tank and the control panel. The processor tank is where all the mechanical devices are located and where the actual wastewater is treated. The control panel is the "brains" of the system and controls how the processor operates. In addition, the control panel also monitors the system to ensure proper performance. If there are any malfunctions to the system, the control panel will automatically alert the owner that there is a problem.

Within the control panel is a Programmable Logic Controller (PLC), which is simply a small computer. As with all computers, programming software can be loaded into the PLC that controls how a task is completed. SeptiTech has developed and loaded on to the PLC proprietary software that controls when the pumps run, how long they run, and what the water levels are within the tank. At the same time, the PLC is constantly monitoring system performance and ensuring that the pumps are running when they are supposed to and that the water level in the tank is not too high or low.

If the system is under the manufacturer's warranty, any service related inquiries due to an alarm condition will be covered at no cost to the owner. At no point should a system owner attempt to service the system themselves. Service on a SeptiTech system shall be conducted only by a SeptiTech employee or representative.

Your wastewater treatment system is an important and integral part of your home. We encourage you to understand the basics of your entire system. Please do not hesitate to contact your SeptiTech service professionals should you ever have any questions, concerns or problems with your wastewater treatment system. We are available to help.

Warranty

When you purchase a SeptiTech system, the system comes standard with a 2-year manufacturer's warranty. The warranty covers any mechanical or electrical defects, and the related labor associated with repair of those defects, within the system as long as the system was installed in accordance with the manufacturer's specifications. A copy of the SeptiTech warranty is provided.

In addition, SeptiTech will provide an annual inspection on the system for the first two years as part of a normal preventative maintenance routine regardless if there have been any alarms generated or not. Further, any alarms that are generated by the control panel, SeptiTech service will respond to that alarm once the system owner alerts SeptiTech to the problem at no cost to the system owner as long as they are still under the manufacture's warranty.

At the end of the 2-year period, SeptiTech shall offer to the system owner an opportunity to extend the system warranty at an additional cost. If the system owner elects to not continue the warranty on the product, than any service related inquiries will be charged based on time and materials used. (Note: service warranty requirements differ from state to state. Please contact your local SeptiTech representative for requirements in your state).

SeptiTech® Warranty Agreement

Period of Coverage

SeptiTech® warrants each treatment unit sold to be free of defects in material, workmanship and performance for a period of two years from date of delivery. Extended Service Agreement may be available after the initial 2 year warranty.

Obligations of SeptiTech®

SeptiTech at their sole expense will service and repair the installed unit including all parts and labor that show evidence of defect or unacceptable performance for any reason when operated within design parameters, provided that all financial obligations of the owner/purchaser are in compliance with the Purchase & Sale Contract.

Exclusions

This Warranty does not apply to SeptiTech® units that have been tampered with or altered by unauthorized persons, improperly installed or have been subject to external physical damage or acts of God. Further this Warranty does not cover systems that have been flooded by external means or damage done by altered or improper wiring or overload protection. Additionally, this Warranty does not apply if the system has been operated beyond its maximum design capacity or permit, if the approved design has been altered after the fact, or if the system has been contaminated with disinfecting tablets, pipe cleaners, excessive use of bleach or other chemicals injurious to biological growth. System alarms must be called in within 24 hours. Lastly, it is imperative that the system is initially "started up" by either a SeptiTech employee or authorized representative or the warranty will not be valid.

Other Provisions

This Warranty only applies to the SeptiTech® treatment processing system and does not include any wiring, plumbing, drainage, disposal or leaching systems. SeptiTech® also reserves the right, to furnish a component part which, in its judgment, is equivalent to the company part replaced. Further, owner agrees to provide to SeptiTech® with clear access to the processor covers on a year round basis.

Under no circumstances will SeptiTech® be liable for direct or consequential damages including but not limited to lost profits, lost income, labor charges, delays in production or idle production time or habitability which results from any defects in material and/or workmanship of SeptiTech® system or units. This Warranty is expressly in lieu of any other expressed or implied warranties. Further, any implied warranties for merchantability and fitness for a particular purpose are hereby disclaimed. This Warranty provides the owner/purchaser specific legal rights. You may have other rights, which vary from state to state.

Date: _____   Job Number: _____   SeptiTech® Representative: _____
Customer Signature:_____

Intermittent Use

Your SeptiTech system uses a programmable logic controller (PLC) that is designed to automatically adjust to intermittent use situations. For instance, if the system does not receive wastewater flow for 24 hours, it will automatically begin to reduce processing time. If the no-flow pattern continues for a number of days, the system will continue to automatically adjust until it reaches "refresh" mode, during which time the system will only operate long enough to keep the biological culture alive, but uses minimal power. After an extended no flow period, the system will eventually enter a "hibernation" mode.

For seasonal situations, where there will be no flows into the system for a matter of months, and general power is turned off, SeptiTech will "start-up" or rebound with good treatment within a very short period of time once power is restored and wastewater enters the system.

* Please Note: If house or system power is turned off and then turned back on, the SeptiTech controller will sound a short alarm for a matter of approximately 10-seconds. This is normal and indicates that the PLC is booting up properly.

Use of a Generator

SeptiTech® does not recommend use of this unit with a generator as a full time power supply. However, in cases where a generator must be used in emergency situations, please follow these procedures:

     a. Turn off both SeptiTech circuit breakers at house service panel before generator power is applied.

     b. Once generator is on, turn on SeptiTech® breakers one-at-a-time at house service panel.

     c. When electrical power is restored, turn off SeptiTech breakers at house service panel before disconnecting generator and returning to house power. Then turn on SeptiTech® breakers one-at-a-time at house service panel.

SeptiTech®'s warranty requires that these procedures be followed to prevent power surges damaging PLC controller and/or mechanical components.

In the event of a system alarm during power changeover, push the reset button once to silence alarm and to reset the system. If this action does not clear alarm, call SeptiTech® service immediately.

Seasonal Use

If your SeptiTech system is installed on a seasonal home or cottage, there are some procedures that should be followed in order to protect the system during long periods of non-use. Depending on the location of your system, there are different procedures for warm weather climates and cold weather climates. If you are not comfortable performing the seasonal shut-down tasks below, please contact your service provider.
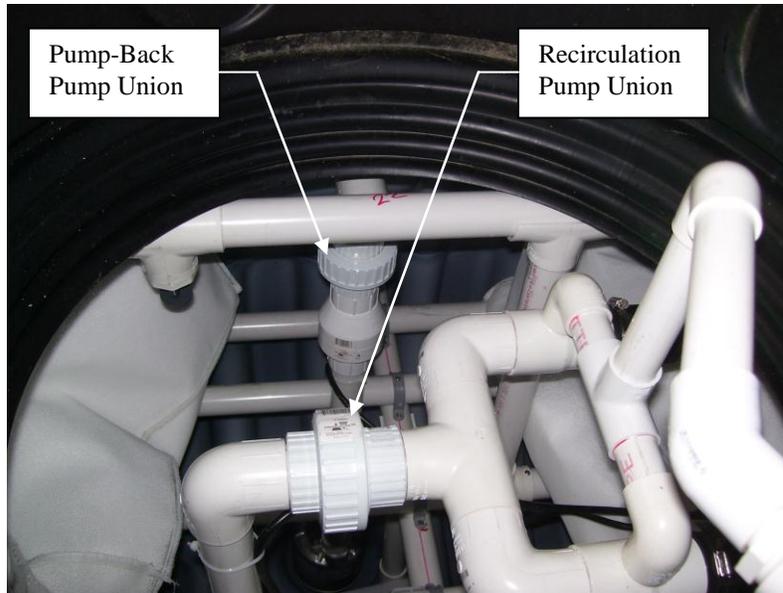
Warm Weather Climates

If your SeptiTech system is installed on a seasonal residence in a warm weather climate where temperatures do not drop below freezing (32°F) then there is very little you need to worry about when shutting down the system at the end of the season. However, it is recommended that the pumps within the system be placed above water level within the processor. The pumps within the system are as follows:

- Recirculation pump
- Solids pump-back pump
- Discharge pump

The pumps do not need to be disconnected electrically. Rather, disconnect them using the threaded union joints located on the discharge pipe of each pump.

Discharge
Pump Union

Pump-Back Pump Union

Recirculation Pump Union
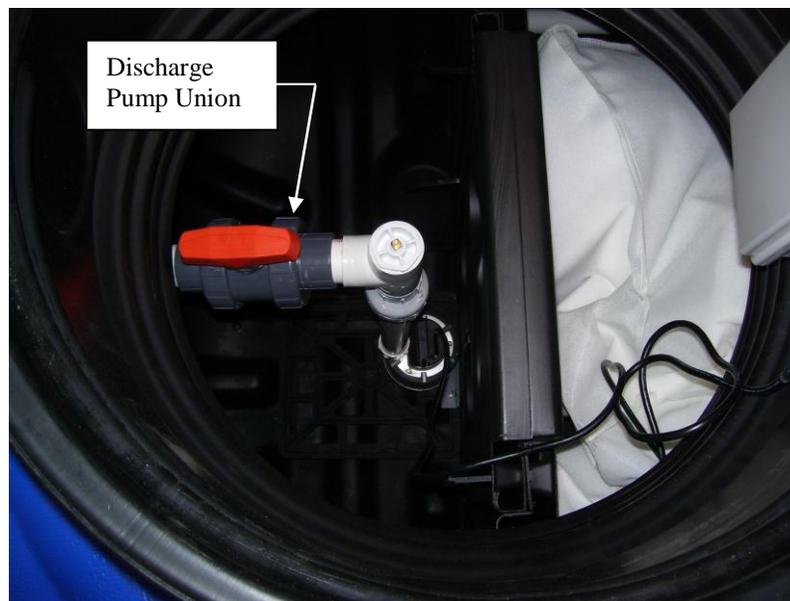
Then, carefully place the pump assembly on top of the media pillows within the processor tank such that the pumps are out of the water level within the processor. Keeping the pumps out of the water level during time of non-use will extended the life of the pumps.

Cold Weather Climates

If your SeptiTech system is installed on a seasonal residence in a cold weather climate where temperatures drop below freezing (32^oF) then there is the concern of damage due to freezing water. The following procedures outline the steps that should be made during a seasonal shutdown.

The remaining water within the processor tank should be pumped down as low as possibly using the discharge pump.

- Open the front cover of the control panel within the system in order to gain access to the control panel components.

- You will see a series of switches, one of which is labeled "DISCH"

- Push the switch into the upper or "Hand" position to engage the discharge pump. You should hear the relay activate with a "thud". Please Note: The switch will not remain in that position, you have to hold the switch in the upper position in order to keep the pump running.

- Hold the switch in the upper position for several minutes to allow the pump to discharge. Visually check the water level within the tank to see if the discharge pump has pumped as much water as it can.

- Not all of the water will be able to be removed. However, the tank should be able to be pumped down to have only 8-10 inches of water remaining in the tank.

- Once complete, make sure all switches are in the downward or "Auto" position

The system comes equipped with three (3) pumps. These pumps should be removed from the remaining water level in order to alleviate the potential for freeze damage. Remove the pumps using the procedures outline within the "Warm Weather Climate" section on the previous page.

Ultraviolet (UV) Disinfection: If your system is equipped with an Ultraviolet Disinfection system, the UV unit <u>must</u> be drained of all remaining water. Failure to drain the UV unit could result in freezing of the water breaking the sleeve, bulb or the unit housing. Freeze damage due to failure to drain the unit of remaining water will not be covered under the manufacturer's warranty.

In order to drain the UV unit, disconnect the UV unit from the piping by separating the threaded union on the piping assembly and one on the ball valve. Once the UV unit has been disconnected from the piping, it will be held in place by either an aluminum bracket (concrete tanks only) or a 4-inch pipe clamp secured to the plastic baffle wall (plastic tanks only). Units installed in concrete can be removed with the aluminum bracket still in place. Units installed in plastic tanks must have the 4-inch pipe clamp removed prior to pulling the UV unit out of the tank. Once the UV unit is free from the tank, tip the unit upside down in order to drain any remaining water. Store the UV unit in a dry secure area during shutdown.

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