CLEARSTREAM®

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Aerobic Treatment Unit

Technical Manual

Manufactured By:

***Clearstream Wastewater Systems*, Inc.**

Extended Air Suspended Growth Wastewater Treatment System

Chapter 1: Introduction

Clearstream Wastewater Systems produces one of the finest aerobic treatment units in the world. Our system converts the sewage from a residence of business into a clear, odorless liquid. This high degree of treatment is accomplished at a remarkably low monthly operating cost. Over the years, the system has been continuously improved to simplify how it works and make maintenance as easy and inexpensive as possible. We promise to provide complete engineered environmental solutions using the latest technology and best products. We will provide the best technical assistance and customer service available.

Our aerobic treatment units have been tested and listed under NSF International Standard 40 Class 1 requirements. One of our model lines (-D for denitrifying) have also been demonstrated to significantly reduce total nitrogen and are listed under NSF International Standard 245 requirements. The following manual will explain the differences and similarities of each system.

We are eager to assist you with any questions or issues. Please contact Clearstream at 1-800-586-3656 to request assistance.

Chapter 2: Process Description

The Clearstream Wastewater Treatment System operates in the extended aeration mode of the activated sludge process. Wastewater enters the trash tank compartment through a 4" diameter Schedule 40 PVC inlet pipe. This anaerobic chamber allows larger solids to settle somewhat before the wastewater enters the aeration chamber. Wastewater is then mixed throughout the aeration chamber by releasing compressed air near the bottom of the chamber through a fine bubble diffuser. The rising air bubbles transfer oxygen to the wastewater which allows aerobic organisms to thrive and ultimately decompose the incoming waste matter.

The turbulence caused by the rising air bubbles also creates a mixing pattern which keeps the sludge in suspension. As incoming wastewater enters the aeration chamber, existing "mixed liquor" from the aeration chamber is displaced into the bottom of the cone-shaped clarifier. The clarifier chamber allows the water to still so that suspended solids in the "mixed liquor" can settle back into the aeration chamber for further biological breakdown.

The remaining clear water in the upper zone of the clarifier chamber is continuously discharged by gravity through the surge control weir and out the 4" diameter Schedule 40 PVC outlet pipe to the pump chamber. The final effluent is then discharged by submersible pump or by gravity to the appropriate disposal system. When disinfection is required before final discharge, appropriate disinfection options are available

When properly loaded and maintained, the aforementioned process allows the Clearstream Wastewater Treatment System to provide years of satisfactory service for the consumer. Clearstream Models N/NC*and G/GC* systems meet the performance requirements of NSF Standard 40 Class I with a 30-day average of $\leq$25 mg/l CBOD and $\leq$30 mg/l TSS. Models D/DC* and DA/DAC* systems meet the performance requirements of NSF Standard 40, 245, and 350 with a 30-day average of $\leq$25mg/l CBOD, $\leq$30mg/l TSS and $\leq$20 TN.

*NC systems use a concrete tank

Model 600 N in fiberglass

Model 600 NC in concrete

Chapter 3: Performance Summary

Clearstream Aerobic Treatment Units have been extensively tested and sampled through Third-party verification programs; and field sampling projects. In the real world Clearstream systems have demonstrated their effective treatment of residential, commercial and process wastewater. The system allows the design engineer to achieve the mandated discharge requirements by selecting the appropriate Aerobic Treatment Unit model based upon the anticipated influent wastewater strength. The following charts outline some of the results.

Aerobic Treatment Unit Performance Summaries

NSF Standard 40 Testing

Testing Overview: The Clearstream Aerobic Treatment Unit was tested under the provisions of NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems. Composite sampling was conducted over a 6-month period of time and included various stress tests including vacation stress, wash day stress and others.

Provider: Gulf Coast Testing, LLC Test Center (Third Party)

Location: Baton Rouge, Louisiana

Date: May 2012 – Nov 2012

Daily Flow: 500 gpd

Results:

	CBOD5 (mg/L)	TSS (mg/L)
Mean	6	9
Median	6	9
Standard Deviation	3	4
# of Samples	118	118

Residential Field Study, Livingston, TX

Testing overview: The Clearstream Aerobic Treatment Unit was field sampled by staff of the Trinity River Authority for seven years. Units were grab sampled. One hundred and fifty seven residences were sampled. Some residences were sampled only once. Others were repeatedly sampled up to 16 times during the study. A total of 399 sample events were collected. The purpose of the study was to ensure that the water reservoir the homes surrounded was adequately protected from degradation by the installed aerobic treatment units.

Provider: Trinity River Authority (Third Party)

Location: Livingston, Texas

Date: June, 1991 to June, 1998

Daily Flow: 500 gpd

Results:

	CBOD5 (mg/L)	TSS (mg/L)	Fecal coliform* (#/100mL)
Mean	5.75	9.95	98.9
Median	5.0	9.17	50.12
Standard Deviation	3.34	5.08	13
# of replicates	157	157	105

* Log transferred data returned to original units

NSF Standard 245 Testing

Testing Overview: The Clearstream Denitrifying Aerobic Treatment Unit (-D models) was tested under the provision of NSF/ANSI Standard 245 for Residential Wastewater Treatment Systems. Composite sampling was conducted over a 6-month period of time and included various stress tests including vacation stress, wash day stress and others.

Provider: Gulf Coast Testing, LLC Test Center (Third Party)

Location: Baton Rouge, Louisiana

Date: May 2012 – Nov 2012

Daily Flow: 500 gpd

Results:

	CBOD5 (mg/L)	TSS (mg/L)	TKN (mg/L)
Mean	*Infl 278* *Effl 4*	*Infl 258* *Effl 7*	*Infl 42* *Effl 19*
Median	*Infl 282* *Effl 4*	*Infl 261* *Effl 7* 4 to 5800	*Infl 42* *Effl 19*
Standard Deviation	*Infl 32* *Effl 1*	*Infl 24* *Effl 9*	*Infl 5* *Effl 2*
# of Samples	118	118	76

Chapter 4: Inspection

Clearstream Aerobic Treatment Units are pre-engineered systems that are shipped to the installer with most of the components pre-assembled. This approach makes inspection of the system relatively straightforward. A checklist is provided to ensure that the important aspects of the system are inspections and to record what the inspection results were.

Inspection checklist

	Pass	Fail
Septic/ recirculation tank		
Risers to grade?	_____	_____
Watertight?	_____	_____
Structurally sound?	_____	_____
Filled w/ water to prevent floating?	_____	_____
Place pump on 'hand' (if present)		
Is pump activated?	_____	_____
Place pump on 'auto'		
Can alarm be activated?	_____	_____
Visual alarm?	_____	_____
Audio alarm?	_____	_____
Aerobic Treatment Tank		
Air compressor attached?	_____	_____
Air vent installed?	_____	_____
Fine bubbles present?	_____	_____
Recirculation device (if present)		
Level?	_____	_____
Does flow split evenly?	_____	_____

Chapter 5: System Installation

Section 5.01: Single Family Residential

The following information provides an overview of the necessary steps to successfully install a Residential Clearstream System.

Septic/Dosing Tank

Before installation of the Clearstream Treatment Tank, first install a pretreatment tank (septic tank) with a volume of not less than 50% of the gallon per day rating of the Clearstream Unit. Pretreatment tanks shall comply with minimum sizing specifications outlined in the Clearstream specifications section. The tank should be installed level and on a stable base to reduce the possibility of settling. It shall be constructed so as to not allow infiltration or exfiltration. It shall be installed to allow gravity flow into the tank. The inlet and outlet shall be sealed and rendered watertight. Please follow the guidelines and practices as required by the local regulatory authority.

Backfill the excavation using a soil material that will settle well around the tanks. Do not use large rocks or heavy clay. Place the material around the tanks in layers, tamping and watering each layer. Note: The tank must be filled to the outlet/overflow with water after installation to prevent hydrostatic displacement (floating of tanks).

Offloading/Unpacking Instructions

All compressors are packaged to prevent damage during shipping and handling.

Please be careful during shipping or handling of the linear or rotary vane compressors they are fragile and can be damaged if dropped from only a short distance. If dropped hard enough the cast aluminum housing may be damaged and render the compressor useless.

The most common issue resulting from a linear compressor being handled inappropriately is the safety bolt being broken. Clearstream provides a spare bolt in the control panel of each new system for this reason. Please refer to the linear repair manual for replacement instructions if needed.

The rotary vane compressor is made up of an electrical motor and pump which are manufactured with very close tolerances. If the pump end is dropped it may cause a change in those tolerances and damage to vanes or the rotor. These damages may not be able to be repaired thus rendering the compressor useless. If the motor end is dropped it may damage the external fan and fan guard and may be replaced if damaged. Also the bearings in the motor may be damaged if dropped rendering the compressor useless.

All control panels are packaged to prevent damage during shipping and handling.

Clearstream control panels are fragile and should be handled as such during shipping and handling. All control panels have circuit breakers, lights and electrical connections and many have relays and timers that are all fragile. Components may be replaced if damaged but if the panel enclosure its self is damaged the panel may be rendered useless.

A custom lifting harness (Part Number P1910) is offered for a nominal fee. All Clearstream fiberglass models should be lifted using the Clearstream lifting harness for loading and unloading the units in a safe method. Lifting eyes are located on each model for use with the lifting harness.

Damage may occur if care is not given to the site where units are stored for inventory or installed. Make sure not to set units on any uneven surfaces such as large rocks, clay or any material or debris that may puncture the bottom of the tank causing serious damage to the tanks structural and water tight integrity.

Never allow anyone to be under or near a tank while loading, unloading or installing during a lift. Doing so could result in serious injury or even death.

CLEARSTREAM TANK INSTALLATION

1. Prepare an excavation having minimum dimensions of at least one (1) foot larger than the dimensions of the tank. Make sure the depth of the excavation is deep enough to allow gravity flow to the inlet of the system and that the excavation bottom is level. Never install the Clearstream tank deeper than a depth that will require more than a maximum of 18 inches of riser depth. The access cover shall always be above final grade after tank installation. In applications where more than the maximum 18 inches of riser is required, install a lift pump upstream of the Clearstream tank in order to pump the pretreatment tank effluent to the Clearstream tank at normal grade. In these special applications where a lift pump is required, contact Clearstream for more details as to pump size, maximum dosages and maximum flow rates.

2. Set the Clearstream tank in a prepared excavation that has a solid, level bottom that will eliminate tank settling. The excavation bottom should have no rocks or sharp objects present.

3. When lowering the concrete tank into the prepared excavation use a spreader bar. Only spreader bars and other lifting devices, that have been designed and tested for lifting Clearstream concrete tanks, should be used. Never lift concrete Clearstream tanks unless they are empty of all liquids.

4. Make sure the inlet 4” Sch. 40 PVC pipe is aligned properly to incoming sewage line.

5. For the Clearstream Unit to function properly, the tank must be level. To properly level the tank, lay a three (3) foot level across the tank in several directions. Shift the tank in the hole, as necessary, to make the tank level in all directions. The tank may be slightly out of level, but it should not be out of level enough to cause tank malfunctions.

6. Fill the tank with water, checking periodically to make sure the tank remains level.

7. Connect the 4” Sch. 40 PVC Clearstream inlet pipe to the incoming sewage line. Make sure the incoming sewage pipe is level with or higher than the inlet pipe to the Clearstream Unit. The Clearstream Unit should only be connected to a plumbing system from a wastewater source which has been properly trapped and vented in compliance with State and Local plumbing codes.

8. Back fill the excavation in layers with back fill material that will settle properly around the tank. Tamp the back fill material as each layer is placed around the tank. If necessary, use water to help settle the soil around the tank. Special care should be taken to either tamp soil under where inlet and outlet pipes are bridging the excavation or use some other method of supporting pipes across the excavation. Do not back fill with heavy clay or large rocks.

9. Before completing the back fill, be sure the electrical conduit from the tank to the Control Panel has been laid underground.

10. For below normal grade installations a Clearstream 20-inch diameter riser may be used. In no case shall more than 18 inches of additional riser depth be used on a Clearstream Unit to bring the access covers above final grade. All risers must be sealed with silicone to prevent groundwater intrusion before back fill is completed.

11. Before leaving excavation site, be sure to securely fasten the Clearstream access covers in place with the tamper resistant bolt(s). Tighten bolts firmly to keep unauthorized personnel from gaining access to the inside of tank.

CLEARSTREAM AERATOR AND CONTROL PANEL INSTALLATION

1. Mount one of the Clearstream Control Panel Model series CS-114 in a location that can be easily noticed by the occupants.

2. Wire 115 Volt, 60Hz power from an electrical disconnect to Clearstream Control Panel. Wire from Control Panel to Clearstream Tank electrical junction box through conduit. Use wiring diagram provided for each version of the Clearstream Control Panel Model series. All electrical wiring should be installed by a qualified person in compliance with applicable section of the National Electrical Code or other more stringent local codes.

3. Install Aerator Model CS-103 as close as practical to the tank, but in no case greater than one hundred (100) feet away (50' on 1500 G.P.D. unit). Run 3/4" Sch. 40 PVC air line from aerator connector to airline connection at Clearstream tank. Be careful to back fill underground airline in manner which will not cause airline to leak. Aerator must be installed in a location that is dry, non-dusty, and highly ventilated.

4. Turn power on at electrical disconnect and check for proper system operation.

REPLACEMENT PARTS

Replacement parts are available to Authorized Dealers by placing an order with Clearstream Wastewater Systems, Inc. by phone 1-800-586-3656 or by fax 409-755-6500. Home owners and Retail customers can purchase replacement parts online at www.clearstreamparts.com.

COMPLIANCE WITH LAWS

The Clearstream Unit must never be installed without first obtaining all permits and approval from the local regulatory body. In areas that do not have local control over environmental activities, all applicable State and Federal environmental codes must be adhered to as well. Only properly licensed and trained individuals should install Clearstream equipment.

START UP PROCEDURES

Initial Start up

1. Please read all instructions in this owner's manual prior to use of your Clearstream Aerobic System. Please call your dealer for specific information concerning your complete on-site wastewater system. Should you have any questions please call, fax or write Clearstream Wastewater Systems.

2. Before using any plumbing (toilet, dishwasher, faucets etc.) you should locate the electrical breaker in the main breaker box that provides power to the Clearstream control panel. Move it to the on position if it is off. The Clearstream standard control panel has two breakers inside and both must be in the on position. If the system does not come on when the main breaker is turned on DO NOT open the Clearstream control panel. Electrical shock hazard which could result in serious injury or death, **call your dealer to inspect panel**.

3. The air compressor is designed to operate continuously. Please make a visual inspection to insure that the air compressor is operating by inspecting control panel for audible or visual alarm. The compressor is not running when light is illuminated.

4. The treatment plant should be filled with tap water prior to use. Your Dealer ordinarily performs this task during installation. When the power is turned on initially you may get a high water level alarm consisting of a red alarm light and an audible alarm. To silence this alarm simply trip the silence switch at the control panel, the light will remain on until the water returns to a normal level.

5. Your Clearstream has a particular type of disposal field depending on your local and state code. As the operator of your system you should know somewhat of how this part of your on-site wastewater system will do its job. Please contact your Dealer if you need information concerning the disposal system.

RE-START UP PROCEDURES

Causes of Anaerobic Conditions

When the Clearstream is shut down for an extended period of time the aerobic system will turn anaerobic (become septic). Typical causes of anaerobic conditions are homeowners moving, foreclosures, vacation homes left until next summer etc…

Other causes are airline leaks from settling of the soil around the tanks that can shift and cause breakage of PVC fittings and pipes that are external and internal of the plant. Accidents from children playing and lawn equipment bumping the air airline at the compressor are reasons for an aerobic system to become septic. The usual scenario is the installer gets a call after the fact that the system has failed and the owner is experiencing odor problems.

Maintenance Company Qualifications

Most State laws require that a septic system installer license or wastewater treatment plant operator license must be held by at least one person in the maintenance company, and certified by Clearstream as an authorized service company to perform any required service.

Steps 1 through 7 below should be performed by an authorized service company please call Clearstream Wastewater Systems at 800-586-3656 for the nearest authorized service company to you.

Re-Start Up Procedures

1. Inspect the control panel and main power supply for condition and proper electrical connections. Use of a lockout tag out procedure is highly recommended during inspection of the electrical and mechanical components.

2. Aerator inspections, most situations where the aerobic system has set idle for a long period of time (months or years) the aerator needs to be thoroughly inspected. Both the linear and rotary aerators have an intake filter the linear intake filter is under the top mounted cover and can be serviced by removing a single screw in the top of the housing. The rotary compressor air filters are easily accessible for service by removing the top plate from the filter body and removing them from filter body at the intake on top of the aerator. Check for missing felts that must be on the filter body to prevent dust and debris from entering the intake and plugging the internal muffler felt. Our rotary vane compressor has two end caps these end caps are sealed with O-rings and hold a muffler on each end cap. At this time make a visual inspection to the O-rings for cracks and signs of air leaks and replace them if necessary. These mufflers may be plugged or deteriorated and may need replacement.

3. If a rotary aerator has set idle for several months the motor may hum for a moment when power is first turned on and then trip the breaker, if this happens (Make certain that electrical power to the system is turned off) place a medium size screwdriver through the ventilation grill on the end of the motor and gently attempt to rotate the motor and free the vanes. This must be done before electrical power is turned on.

4. Proper airflow is crucial to the operation of your Clearstream therefore an inspection by visual or audible means for the airflow to the aeration chamber is a must. Use of a Clearstream model A2800 Air Tester is recommended. Clearstream has a diffuser system that can get plugged when not in used for extended periods. During normal operation the diffuser system has a constant air flow which keeps the aerobic bacteria supplied with oxygen, but once the system is shut down the bacteria will plug the diffuser. Replacement of the diffuser speeds up the return of aerobic bacteria to the Clearstream and prevents damage to the aerator from back pressure and overheating.

5. Have all tanks completely pumped out and immediately start refilling through trash tank until the treatment plant is full to the outlet weir.

6. Power up the control panel and observe aerator for proper audible condition. All systems vary, but the motor may sound overloaded for a few seconds until the water is pushed out of the line and the Clearstream is operating properly. Inspect the alarms both the aerator alarm and high water alarm. Both the visual and audible devices for each of these conditions should be in working order.

7. Your Clearstream is now ready for use. If you have not read the operating instructions, please do so before proceeding.

Section 5.02 Commercial or Multi-Family Residential

The following information provides an overview of the necessary steps to successfully install a Commercial or Multi-family Clearstream Aerobic Treatment System.

Septic/Dosing Tank
The tanks should be installed level and on a stable base to reduce the possibility of settling. It shall be constructed so as to not allow infiltration or exfiltration. It shall be installed to allow gravity flow into the tank. The inlet and outlet shall be sealed and rendered watertight. Please follow the guidelines and practices as required by the local regulatory authority and the tank manufacturer.

Backfill the excavation using a soil material that will settle well around the tanks. Do not use large rocks or heavy clay. Place the material around the tanks in layers, tamping and watering each layer. Follow the backfilling procedures as outlined by the tank manufacturer

NOTE: tank must be filled to the outlet/overflow with water after installation to prevent hydrostatic displacement (floating of tanks).

System Design
The Clearstream model selected to treat commercial or multifamily residential should be based on the hydraulic or the organic load anticipated, choosing whichever parameter results in the *largest* system. The pounds of BOD that can be successfully treated by each of the Clearstream models is found in the System Specifications section of this manual.

Chapter 6: Operation and Maintenance

In the event you experience a problem with your Clearstream Aerobic Wastewater Treatment System or if service is required, you may reference the Clearstream Control Panel Cover for the name, address and phone number of a local service person that can provide service for your Clearstream Unit. After the expiration of your initial two year service policy provided by the system installer, you may obtain a continuing service policy on a yearly basis which will include terms comparable to the initial service policy from a local service person that is trained and certified by Clearstream.

In order for the Clearstream System to function at optimum performance levels, the system will require periodic service. The normally expected service that is associated with the system includes:

1. Repair or replace aerator	2 to 10 years
2. Clean filters on aerator	6 mos. to 2 years
3. Break up scum in clarifier	6 mos. to 2 years
4. Pump sludge from aeration tank	2 to 5 years*
5. Pump sludge from pretreatment tank	2 to 5 years*
6. Check aeration diffusers	annually
7. Check surge control weir	6 mos.

* Any sludge removed from pretreatment tank or Clearstream Unit must be disposed of according to all state, local, and federal regulatory requirements.

To remove solids from pretreatment tank drop pump hose through access opening on top of tank all the way through to the bottom of the tank. Pump out the whole tank volume, then fill the tank back up with water immediately. To remove solids from aeration chamber, drop hose through access opening in tank all the way to the bottom of the tank. Pump only 1/2 of the total tank volume and fill tank back up with water immediately.

To determine if all system components are functioning properly, look and/or listen to see if the visual/audio alarm system is illuminated or making a buzzing sound. If the alarm is activated, then either the aerator has thrown its breaker or the high level float inside the clarifier is indicating a high water level condition. Verification of either condition can be made by visually monitoring the pushbutton breaker to see if it is in the out position indicating it has been thrown and opening the access opening to the treatment unit to see if the water level inside the clarifier is at alarm level. After inspection of the clarifier, be sure to securely fasten the access cover back in place and tighten the tamper resistant bolt or bolts firmly.

To determine if the system has the desirable "mixed liquor" and effluent characteristics, first remove the access cover. Monitor for odors coming from the tank. If the odor is a sweet or a musty smell, the system is operating in a desirable aerobic condition. If the odor is foul or smells like a rotten egg, then the system is operating in an undesirable anaerobic condition. Visually monitor the "mixed liquor" for color. If the color is a brownish color, then it is operating in a desirable aerobic condition. If it is grey or black in color, it is operating in an undesirable anaerobic condition. The system effluent should be clear with very few noticeable light brown solids suspended in the effluent. The effluent should not be dark or turbid in color or clear with great numbers of light brown suspended solids noticeable. After inspection of the system's interior, be sure to securely fasten the access cover back in place and tighten the tamper resistant bolt or bolts firmly.

In the event the alarm panel light and buzzer activated call your local servicing dealer whose name, address, and phone number should be affixed to the face of the panel.

To collect effluent samples from a system, a sample port must be added downstream of the effluent discharge. The sample port should be installed so that effluent cannot remain below the discharge water line and build up solids. A sample bottle should be capable of being lowered into the port on a string and laid on its side in the direct flow line of the discharge and removed when full of effluent.

The expected effluent from the system should be less than 25 mg/l CBOD and less than 30mg/l TSS with a PH range of 6-9.

For the first two (2) years from the date of installation, your local servicing dealer (from whom you purchased your Clearstream System) will make periodic inspections of your system to make sure it is functioning properly. The dealer will perform necessary maintenance to the system at no charge unless the required maintenance is not warranty related. Pumping of the system is not included. After the first two (2) years, the dealer will offer a continuing service policy for a nominal annual fee. The two (2) year service policy and the continuing service policy are minimum requirements of the NSF International. If local service requirements are greater than those of NSF, or if the local regulations require others to perform the service on these units, Clearstream's limited warranty will still be honored.

For the Clearstream Aerobic Wastewater Treatment Unit to function properly it must be used for the treatment of domestic wastewater from residences or other waste flows with similar loading characteristics. Typical domestic wastewater consists of the flow from toilets, lavatories, sinks, bathtubs/showers, and washing machines. To prevent malfunctions of your Clearstream Unit, the following guidelines should be followed:

1. Any sewage system, whether aerobic or septic, should not have inorganic materials (plastics, cigarette butts, throwaway diapers, feminine napkins, condoms, etc.), that the bacteria cannot consume, discharged into the system.

2. Large amounts of harsh chemicals, oil, grease, high sudsing detergents, discharge from water softeners, disinfectants or any other chemical or substance that kills bacteria should not be discharged into the system.

3. Excessive use of water, over the design flow of the system, or organic overloading in excess of design parameters will cause the system not to perform to its fullest capabilities.

4. The proper operation of this or any other sewage treatment system depends upon the proper organic loading and the life of the micro-organisms inside the system. Clearstream is not responsible for the in-field operation of a system, other than the mechanical and structural workings of the system itself. Field abuse and overloading of the system can only be cured by the user of the system.

5. When wastewater discharge, into a Clearstream Unit, is seasonal or intermittent to a point that the owner wishes to turn off the electricity (for more than three (3) months) to the aerator, the aerator inlet and outlet should be sealed to keep out moisture until the unit is ready to be restarted.

Chapter 8: Troubleshooting Guide

When the audio/visual alarm in the Unit Control Panel is activated it means that either the aerator's circuit breaker has tripped off or the water level in the Unit has exceeded its normal levels. If the on-site system is equipped with an effluent water pump in a third tank called the "pump tank" the alarm being activated could also mean that the water level in this tank is above the normal level. The audio portion of the alarm may be silenced by pushing the Alarm Silence pushbutton that is mounted on the left side panel of the Unit Control Panel. The visual portion of the alarm can only be turned off by correcting the problem that activated it.

If you do have to call your Installer please check your records for the age of the plant, previous service history, and serial numbers of the treatment unit and the Aerator. If your serial numbers are not recorded in your records you can find them on the data plates on the lid of the treatment plant and the Aerator itself. When calling the installer give a complete description of the problem you are experiencing now and the information that you retrieved from your records.

WHAT YOU CAN DO BEFORE CALLING YOUR CLEARSTREAM INSTALLER:

1. If the aerator on your system has stopped, there is a 7.5-amp circuit breaker mounted in the left side panel of the Unit Control Panel which protects the aerator. Push this circuit breaker to restart the aerator. If after pushing the circuit breaker, the aerator does not restart, then you will need to call your Installer so that he can diagnose the problem.

2. If you can hear your aerator running, then your alarm has been activated due to a high water level in the Clearstream Unit or the "pump tank", if so equipped. The most likely reason that you will experience a high water level alarm is that you have exceeded the system's designed daily flow rate due to washing many loads of laundry, having many house guests, etc. If the system is equipped with a "night spray system" for treated effluent discharge you can silence the alarm and wait for the pump to clear the excess water at which time the alarm will terminate. Our Unit Control Panel is equipped with an automatic over-ride which will energize the pump even though it is not the normal time at night for the system to spray. You will have an alarm each time the normal water level is exceeded, so in the event of party with many house guests, the alarm may be activated more than one time.

3. If your system does not begin to spray upon alarm then the effluent pump may have tripped its circuit breaker. You will find a 20-amp circuit breaker located on the left side panel of the Unit Control Panel which protects the effluent pump. Push this circuit breaker to restart the effluent pump. If the effluent pump does not restart, then you will need to call your Installer so that he can diagnose the problem.

   If there has not been an excessive use of water caused by having a party in your home, washing many loads of laundry, etc., and there is no other explanation for an excessive amount of water being put into the system, such as leaking faucets or commodes, then the relay that controls when your system will spray may not be set properly or is malfunctioning. You will need to call your Installer so that he can check your control panel for a possible problem.

4. If you do not have a "pump tank" then the high water level alarm in the Clearstream can be due to a build-up of undigested organics, a "sludge layer", on the surface of the clarifier. This "sludge layer" can hold the alarm float up causing a false alarm to sound. You will need to call your Installer to service the Clearstream Unit by stirring the "sludge layer" causing the undigested organics to settle back into the aeration portion of the Unit where they will finish their digestion cycle, thus de-activating your alarm.

5. If the alarm is not due to a "sludge layer", the surge control weir installed in the center of the Clearstream Unit could be plugged up due to excessive water use which will push undigested organics up into the clarifier portion of the Unit. You will need to call your installer so that he can clean this weir by removing it straight up from the PVC tee in which it is installed. Once the weir is removed from the system its slots can be cleaned. If this does not alleviate the high water problem then your installer should check the Chlorinator which will either be installed inside the "pump tank" or in-line, with an inspection cap that is above grade, for a blockage.

Chapter 9: Safety

As raw wastewater may and usually does contain some level of unsafe microorganisms, proper respect and care must be given to safety. When coming into contact with raw sewage, do not fear the contact, but do take proper precautions to avoid potential danger.

Follow these safety precautions whenever exposed to wastewater:
* Always wash with soap and water after handling any contaminated item. The use of good bactericide soap is strongly recommended.
* Wear disposable rubber gloves when handling wastewater-contaminated items or chlorine tablets.
* Always dispose of scum, rags, trash, debris, or soiled material in a proper waste container.
* If a wastewater spill or leak occurs in a yard, flush area with plenty of clean water and disinfect. If a spill or leak occurs in the house, clean with a dilute solution of bleach.
* Protect any injury, wound, open cut, etc. from exposure to wastewater.
* If an illness or disease is suspected of coming from exposure to sewage, get proper medical attention immediately.
* Report all accidents relating to sewage exposure to the proper supervisory personnel.

Follow these safety precautions when performing any excavation or construction work:
* Follow all construction safety procedures during installation.
* Follow electrical safety procedures during installation.
* Fill all holes and depressions in and around the installation area; remove and dispose of all debris from construction/installation.

Chapter 10: Warranty

Clearstream Wastewater Systems, Inc. warrants each Clearstream Aerobic Wastewater Treatment System to be free from defects in material and workmanship for a period of two (2) years from the date of installation to the original retail consumer when properly registered with Clearstream by filing a signed Installation Sheet within fourteen (14) days after installation. Clearstream's sole obligation under this warranty is as follows: Clearstream shall fulfill this warranty by repairing or exchanging any component part, F.O.B. Factory, that shows evidence of defects, provided said component part has been paid for, warrantee has notified Clearstream of the defect complained of and the component is returned through an authorized Purchaser, transportation prepaid. There is no informal dispute settlement available under this LIMITED WARRANTY. No warranty is made as to the field performance of any system. This LIMITED WARRANTY applies only to the parts manufactured by Clearstream and does not include any portion of the plumbing, drainage, disposal system or installation of the systems. Site specific designs of treatment and disposal systems, including treatment plant and disposal system sizing is not the responsibility of Clearstream and is not covered by this LIMITED WARRANTY. Accessories supplied by Clearstream, but manufactured by others, are warranted only to the extent of and by the terms and conditions of the original manufacturer's warranty. In no event shall Clearstream be responsible for delay or damages of any kind or character resulting from, or caused directly or indirectly by, defective component or materials manufactured by others. Recommendations for special applications will be based on the best available expertise of Clearstream and published industry information. Such recommendations do not constitute a warranty of satisfactory performance. The LIMITED WARRANTY extends to the original retail consumer of the product. As herein, original retail consumer is defined as the purchaser who first has the plant installed, or in the case of a system designed for non-permanent installation, the purchaser who first uses the system. It is the purchaser's, or any sub-vendee's, obligation to make known to any other consumer the terms and conditions of this warranty. This warranty is a LIMITED WARRANTY and no claim of any nature shall be made against Clearstream unless and until the original retail consumer, or his legal representative, notifies Clearstream in writing of the defect complained of and delivers the product and/or defective part(s), freight prepaid, to Clearstream or an authorized service station. Clearstream reserves the right to revise, change, or modify the construction and design of the Clearstream Aerobic Treatment System, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in equipment previously sold. Clearstream also reserves the right, in making replacements of component parts under this warranty, to furnish a component which, in its judgment is equivalent to the part replaced. To the extent that the LIMITED WARRANTY statements herein are inconsistent with the locality where Purchaser used the Clearstream system, the warranties shall be deemed to be modified consistent with such local law. Under such local law, certain limitations may not apply. For example, some states in the United States and some jurisdictions outside the United States may: (i) preclude the disclaimers and limitations of these warranties from limiting the rights of a consumer; (ii) otherwise restrict the ability of a manufacturer to make such disclaimers or to impose such limitations; or (iii) grant the consumer additional legal rights, specify the duration of implied warranties which the manufacturer cannot disclaim, or prohibit limitations on how long an implied warranty lasts. In no event and under no legal theory, including without limitation, tort, contract, or strict product liability, shall Clearstream or any of its suppliers be liable to the other party for any indirect, special, incidental, or consequential damages of any kind, including without limitation, damages for loss of goodwill, or any other kind of commercial damage, even if the other party has advised Clearstream of the possibility of such damages.

TWO YEAR INITIAL SERVICE POLICY

Date_____ Our firm, _____, will inspect and service your Clearstream System for the first two years from the date of installation. There will be ___2*__ inspections made each year for this initial two-year period. Effluent quality inspection will include a visual inspection for color, turbidity, sludge build up, scum overflow, and odor. Mechanical and electrical inspection and service include: inspecting aerator, air filter, and alarm panel and replacing or repairing any component not found to be functioning correctly**.

Upon expiration of this policy, our firm will offer a continuing service policy on a yearly basis to cover labor for normal maintenance and repairs on a year by year basis.

Violations of warranty include: shutting off the electric current to the system for more than 24 hours, disconnecting the alarm system, restricting ventilation to the aerator, overloading the system above its rated capacity, or introducing excessive amounts of harmful matter into the system, or any other form of unusual abuse.

*NSF/ANSI Requires a minimum of 2 inspections per year. However, some local regulatory agencies may require more inspections per year depending on the size, location & application of the system. Consult your local regulatory agency for more information.

**The owner shall be notified in writing about improper system operations that cannot be remedied at the time of inspection.

THIS POLICY DOES NOT INCLUDE PUMPING SLUDGE FROM UNIT IF NECESSARY.

Service Dealer: _____

Owner: _____

System Specifications

A. ***Primary, Recirculation and Dosing Tanks***
B. ***Primary Tank Gravity Effluent Filter Assembly***
C. ***Septic Tank Effluent Pump (STEP) Assembly***
D. ***Suspended Growth Aerobic Treatment Unit***

Throughout this document you may find the term “or approved equal”. For this project this term “approved equal” shall mean equal in the judgment of the engineer of record for the project.

Should the bidder seek approval of a product other than the brand or brands named in this specification, they shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the bidder shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.

A. ***Primary, Recirculation and Dosing Tanks***

The manufacturer shall provide the structural design and certification to the engineer for review. The design shall be in accordance with accepted engineering practice.

1. ***General Guidelines:***

a. All tanks must be structurally sound and watertight. The tanks shall be warranted from the manufacturer for defects in material and workmanship for a period of one year from date of installation. Manufacturer’s warranty statement must be submitted prior to approval.

b. The tanks shall be manufactured and furnished with minimum access openings as determined by the design engineer for the instal- lation of and access to required components. Access openings shall be manufactured and installed in the tanks during the time of tank construction.

c. The tanks shall be equipped with the required inlet and outlet piping as specified by the design engineer. Inlet and outlet tees as required shall penetrate to a distance below the bottom of the maximum scum level of the tank. The inlet tees shall allow for the proper ventilation of the tank back through the structure served.

d. All tanks shall be capable of and undergo a static hydraulic test upon installation to determine water-tightness. Test shall be conduct- ed by completely filling the tanks with water for a 24 hour period then examining the tank for differential. Tanks failing to maintain the static level shall be disqualified.

e. All tanks shall be installed per the manufacturer’s written instructions

f. Tanks shall be sized in accordance with the sizing criteria found in the published Clearstream, Inc. ATU Technical Manual. These minimum sizing criteria must be met but may be enlarged as desired.

2. ***Concrete Tanks:***

a. The tank manufacturer shall submit written documentation to the design engineer regarding all manufacturing processes including material used and dimensional drawings of the proposed tank.

b. All tanks shall be allowed to properly cure before transport.

c. Manufacturer is responsible for delivering tanks in sound condition.

3. ***Fiberglass Tanks:***

a. The tank manufacturer shall submit written documentation to the design engineer regarding all manufacturing processes including material used and dimensional drawings of the proposed tank.

b. Manufacturer is responsible for delivering tanks in sound condition.

4. ***Risers and Lids:***

a. Access openings in all tanks shall be equipped with appropriately sized Tuff-Tite, Inc. Risers.

b. Risers shall be constructed of ribbed PVC or Polyethylene material. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 inch for each foot of riser.

c. Risers shall be attached to the tanks following the manufacturer’s written instructions. The riser to tank attachment shall render the joint watertight and structurally sound.

d. Risers shall extend above finished grade to allow for easy access and ensure positive drainage away from the access point.

e. Each access point or riser shall be covered using a Tuff Tite, Inc. lid. Lids shall have a green surface and be constructed

of fiberglass, polyethylene, PVC or other thermoplastic material. Lids shall be waterproof, corrosion resis- tant and UV resistant. Lids shall be securely fastened to access points and risers utilizing tamper resistant stainless steel fasteners. Fasteners shall not be easily removed through the use of standard commonly found tools.

f. All risers and lids shall be installed according the manufacturer's instructions and shall carry a minimum 1 year manufacturer's warranty.

B. ***Primary Tank Gravity Effluent Filter Assembly:***

Systems incorporating a gravity effluent filter into the design shall utilize the following guidelines.

1. ***Risers and Lids:***

a. Access openings in the tanks shall be equipped with appropriately sized Tuff Tite, Inc. Risers.

b. Risers shall be constructed of ribbed PVC or Polyethylene material. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 inch.

c. Risers shall be attached to the tanks following the manufacturer's written instructions. The riser to tank attachment shall render the joint watertight and structurally sound.

d. Risers shall extend above finished grade to allow for easy access and ensure positive drainage away from the access point.

e. Each access point or riser shall be covered using a Tuff Tite, Inc. lid. Lids shall have a green surface and be constructed of fiberglass, polyethylene, PVC or other thermoplastic material. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be securely fastened to access points and risers utilizing tamper resistant stainless steel fasteners. Fasteners shall not be easily removed through the use of standard commonly found tools.

f. All risers and lids shall be installed according the manufacturer's instructions and shall carry a minimum 1 year manufacturer's warranty.

2. ***Effluent Filter:***

a. Effluent filter shall be installed on the outlet of the tank.

b. Filter shall provide filtration down to a level not greater than 1/16".

c. Filter shall be constructed so that by-pass of the filter during high water is not possible

d. Filter shall be sized based on the manufacturer's recommendations for the proposed daily design flow. Multiple filters may be in- stalled in series to meet the design flow requirement.

e. Effluent filter shall have a handle installed and brought close to grade for ease of servicing.

f. Filter shall be constructed of non-corrosive materials.

g. Filters utilizing a stacked disc design or slots shall be preferred.

h. Filters shall be sized and installed so that the entrance into the filtering device can be placed at the optimum clear zone level of the tank.

3. ***Effluent Filter Alarm:***

a. High water alarms connected to the effluent filter shall be a Clearstream high water alarm.

b. The alarm float shall install directly into the filter assembly through a twist lock action.

c. The alarm float shall be a vertical reed type switch specifically designed for use with effluent filters.

d. Standard alarm type floats attached to the filter case shall not be permitted.

e. Filter alarm may be installed as a standalone device or the alarm float may be wired directly through other existing control panel structures, provided the control panel has been so designed.

f. Filter alarm shall be UL listed and meet all local requirements with regard to audible and visual requirements.

C. ***Septic Tank Effluent Pump (STEP) Assembly:***

Systems incorporating a STEP system into the design shall utilize the following guidelines. The STEP Assembly Specification may be utilized in Recirculation and/or Dosing Tanks

1. ***Risers and Lids:***

a. Access openings in the tanks shall be equipped with appropriately sized Tuff Tite, Inc. Risers.

b. Risers shall be constructed of ribbed PVC or Polyethylene material. Risers shall be capable of withstand- ing a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2 inch.

c. Risers shall be attached to the tanks following the manufacturer's written instructions. The riser to tank attachment shall render the joint watertight and structurally sound.

d. Risers shall extend above finished grade to allow for easy access and ensure positive drainage away from the access point.

e. Each access point or riser shall be covered using a Tuff Tite, Inc. lid. Lids shall have a green surface and be constructed of fiberglass, polyethylene, PVC or other thermoplastic material. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be securely fastened to access points and risers utilizing tamper resistant stainless steel fasteners. Fasteners shall not be easily removed through the use of standard commonly found tools.

f. All risers and lids shall be installed according the manufacturer's instructions and shall carry a minimum 1 year manufacturer's warranty.

2. ***Filtered Pump Vault:***

a. One or more filtered pump vaults shall be sized and installed into the outlet side of the tank in according to the design plans.

b. Filtered pump vault shall have a minimum effective screen area of 146 linear feet.

c. Filtered pump vault shall be manufactured of polyethylene and be a minimum of 14" in diameter.

d. Vault shall hang suspended in the access opening and extend into the tank the appropriate length to place the filter panels in the clear zone or at a sufficient depth to draw the tank down to the maximum level. In no event shall the bottom of the vault be closer than 6" of the tank bottom.

e. Vault shall incorporate removable filter panels for ease of servicing. Filtering device must be removable without disturbing other com- ponents contained inside the vault. .

f. Vault shall be rated and certified to not materially disturb the solids in the tank up to a flow of 90 gpm.

3. ***Pumps:***

a. One or more Clearstream, Inc. pumps shall be installed inside the filtered pump sized according to the design plans.

b. Pumps shall be manufactured by a reputable manufacture having at least 10 years-experience.

c. Pumps shall be UL and CSA listed.

d. Pump performance, horsepower and electrical requirements shall be according to the design plans and shall be verified for compat- ibility with the manufacturer.

e. Pumps shall include a minimum of 10 feet of power cord.

f. Pumps shall be provided with a 2-year non-prorated warranty.

4. ***Float Tree:***

a. Each filtered pump vault housing one or more pumps shall be equipped with a Clearstream, Inc. float tree to facilitate the placement and adjustment of control floats.

b. The float tree shall be attached to the filtered vault sidewall and shall be provided by the vault manufacturer.

c. The float tree length shall match the length of the designed filtered vault.

d. The number and exact location of float attachment devices shall be in accordance with the design plans.

e. The floats must be adjustable and adjustments should be accomplished without the need for removing the filtered vault.

f. The float tree shall be constructed of PVC or other non-corrosive materials.

5. ***Junction/Splice Box:***

a. A splice box shall be installed inside the riser(s) of any and all access openings containing electrical equipment.

b. All splice boxes shall be UL listed and approved for use in wet conditions.

c. The splice box shall be sized based upon the total number of pumps and floats contained in the particular access opening or filtered vault.

d. One cord grip shall be installed in the box for each pump or float wire. Cord grips shall incorporate a twist lock mechanism to secure the cord into the box and prevent the entrance of gases and/or liquid into the box itself.

e. The splice shall be mounted to the side of the riser and solvent welded to the appropriate sized electrical conduit.

f. The conduit penetration through the riser should be sealed utilizing an appropriately sized grommet.

6. ***Pump Discharge Assembly:***

a. One or more Clearstream, Inc. discharge assemblies shall be connected to the pumps. The discharge as- semblies shall be configured and sized according to the design plans.

b. Discharge assembly shall include true unions for disconnecting and removable of the pump.

c. Discharge assembly may include a check valve as per design plans.

d. Discharge assembly shall be constructed of PVC material.

e. Discharge assembly shall include all fittings and piping required to successfully install the pumps with the exception of straight pipe lengths.

f. The discharge penetration through the riser should be sealed utilizing an appropriately sized grommet.

7. ***Control Panel:***

a. A Clearstream, Inc. control panel shall be installed according to the design plans.

b. Control panels shall be sized and follow the theory of operation as specified on the design plans based on the number of pumps and pumping sequence.

c. Control Panels shall be listed per UL 508.

d. Controls Panels shall be warranted to be free from defects in material and workmanship for period of not less than three years. Pan- els shall be field repairable without the use of soldering irons.

e. Panels shall be installed per the manufacturer's instructions

f. Panels shall be located near the pump system if possible and shall be securely attached to an exterior wall or post. Panels shall be installed at a height that provides ease of access. Panel shall be installed so that line of sight is achieved for the visual alarm or within audible distance for the alarm sound.

g. Panels should include the following minimum requirements.

1. Motor-Start Contactors

2. Separate control and pump circuits.

3. HOA toggle switches for all pumps and or electrical valves

4. Audible alarms of not less than 80 dB with silence switch...

5. Visual alarm beacon.

6. NEMA 4x rated panel enclosure.

7. Elapsed time meters for each pump.

8. Event counter

9. Timed or Demand Dose control settings per design plans.

h. Optional components may include intrinsically safe relays, heaters, remote telemetry, generator plugs, auto-dialers, pump run lights, pressure transducers, current sensors and other equipment as per the design plan.

D. ***Suspended Growth Aerobic Treatment Unit:***

Systems incorporating a Clearstream Wastewater System, Inc. Suspended Growth Aerobic Treatment unit into the design shall utilize the following guidelines.

Model 500N, G, D, DA

Treatment Capacity	500 G.P.D.
BOD Loading	1.25lbs. BOD
Aerator (Model CS-103E)	2.4 scfm
Control Panel (Model CS-114A, AP, AT, AN)	Raintight
Electrical	115v./60Hz/3.8amps/151watts

Model 600N, G, D, DA

Treatment Capacity	600 G.P.D.
BOD Loading	1.5 lbs. BOD
Aerator (Model CS-103E6)	2.8 scfm
Control Panel (Model CS-114B, BP, BT, BN)	Raintight
Electrical	115v./60Hz/3.8amps/157watts

Model 750N, G, D, DA

Treatment Capacity	750 G.P.D.
BOD Loading	1.85lbs.BOD
Aerator (Model CS-103F)	3.6 scfm
Control Panel (Model CS-114C, CP, CT, CN)	Raintight
Electrical	115v./60Hz/4.7amps/195watts

Model 800N, G, D, DA

Treatment Capacity	800 G.P.D.
BOD Loading	1.96lbs.BOD
Aerator (Model CS-103F)	3.6 scfm
Control Panel (Model CS-114C, CP, CT, CN)	Raintight
Electrical	115v./60Hz/4.7amps/195watts

Model 1000N, G, D, DA

Treatment Capacity	1000G.P.D.
BOD Loading	2.5 lbs. BOD
Aerator (Model CS-103G)	4.8 scfm
Control Panel (Model CS-114D, DP, DT, DN)	Raintight
Electrical	115v./60Hz/4.7 amps/220 watts

Model 1500N, G, D, DA

Treatment Capacity	1500G.P.D.
BOD Loading	3.75lbs.BOD
Aerator (Model CS-103H)	7.2 scfm
Control Panel (Model CS-114E, EP, ET, EN)	Raintight
Electrical	115v./60Hz/6.5amps/425watts

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