Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

John E. Baldacci, Governor Brenda M. Harvey, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-5674
Fax: (207) 287-5672; TTY: 1-800-606-0215

November 22, 2010

Consolidated Treatment Systems
Attn.: Jeff Coomer
1501 Commerce Center Drive
Franklin, OH 45005-1891

Subject: Product Registration, *Enviro-Guard ENV Series* Extended Aeration Wastewater Treatment Units

Dear Mr. Coomer:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

The *Enviro-Guard ENV Series* consists a three compartment fiberglass reinforced plastic tank, comprising a debris entrapment compartment, a dosing compartment, and a treatment compartment. The treatment compartment includes a submerged aerator and a series of fabric tubes which function both as solids filters and growth media for activated sludge.

According to the information you provided, the *Enviro-Guard ENV Series* has been certified by the National Sanitation Foundation (NSF) pursuant to ANSI/NSF Standard 40 for residential wastewater treatment systems. On the basis of the information submitted, the Division has determined that the *Enviro-Guard ENV Series* is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of *Enviro-Guard ENV Series*. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products. If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen
Project Manager, Webmaster
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

Maine Department of Health and Human Services
Bureau of Health
Division of Health Engineering
Wastewater and Plumbing Control Program

RECEIVED
OCT 13 2010
WASTEWATER & PLUMBING PROGRAM

APPLICATION FOR REGISTRATION OF EXPERIMENTAL SYSTEM/INNOVATIVE TECHNOLOGY OR ONSITE SEWAGE DISPOSAL SYSTEM PRODUCT

Please complete the following Sections. Please print or type.

Applicant

Company Name: Consolidated Treatment Systems, Inc
Contact Person: Jeff Coomer
Address: 1501 Commerce Center Drive
Town/City: Franklin State: OH Zip: 45005-1891
Country: USA
Telephone: 937-746-2727 e-mail: Jeff@Consolidatedtreatment.com

Product

Product Name: Enviro-Guard ENV-Series
Model: ENV-0.75, ENV-0.75 M,

Product Classification (choose one)

Primary or Secondary Treatment Unit

[ ] Septic Tank [] Extended Aerobic Treatment Unit [ ] Recirculating Aerobic Unit

[ ] Aerobic Fixed Film Unit [X] Other: Combined Extended Aeration-Fixed Film Aerobic Treatment

Effluent Filter

[ ] Septic Tank Outlet Filter [ ] Post-Tank Filter [ ] Other (specify)

Disposal Device

[ ] Gravel-less Disposal Pipe [ ] Gravel-less Disposal Bed [ ] Chamber, Plastic

[ ] Chamber, Other [ ] Other (specify) _____

Miscellaneous

[ ] Pipe [ ] Effluent Flow Distribution Device [ ] Other (specify) _____

Claim

Describe the product's features (attach additional sheets if necessary).

The Enviro-Guard ENV-Series is a specific configuration of the Multi-Flo FTB-Series, so the Enviro-Guard is a combined process wastewater treatment system intended for residential and commercial applications. The series includes completely-mixed continuous stirred extended aeration designed in accordance with generally accepted engineering principles related to extended aeration wastewater process. Additional treatment and filtration is provided by 30 closed tubes of felted polyester that provide a total of 134 ft^2 of filtration. Residual solids are captured on a four-inch deep weir plate that has a 360° weir that drains to the discharge pipe. The product contains a 525-gal primary treatment tank and 625-gal dose tank with dosing pump and control that provides 48 equal doses of 15.625 gal/dose delivered at a flow of 5 gpm. The *Enviro-Guard Engineering Manual* is attached.

Describe the product's performance (attach additional sheets if necessary).

The Enviro-Guard- is designed to provide an effluent cBOD of 25 mg/L and TSS of 30 mg/L. ANSI/NSF Standard 40 certification identifies effluent cBOD and TSS of 5 mg/L each. ANSI/NSF Standard 40 certification testing results are attached. The *Enviro-Guard Performance* paper, also attached, provides additional information on Enviro-Guard.

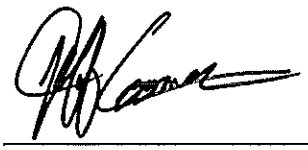
Has the product received National Sanitation Foundation or Canadian Standards Authority approval?

[ ] No [X] Yes (If "yes", enclose a copy of the certification.)

IMPORTANT NOTE!

Don't forget to enclose relevant product literature, engineering specifications, studies, and third party certifications with this application.

I, Jeff Coomer, am the [X] applicant [ ] agent for the applicant of the subject product.
Multi-Flo FTB-Series
I state that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Department to deny registration for use of the product in Maine.



[X] Signature of Applicant
[ ] Signature of Agent for Applicant

October 7, 2010
Date

CONSOLIDATED
TREATMENT SYSTEMS
www.consolidatedtreatment.com

October 7, 2010

James A. Jacobsen, Project Manager and Webmaster
Subsurface Wastewater Unit
Drinking Water Program
Division of Environmental Health
286 Water Street
Augusta , ME 04333

RECEIVED
OCT 1 8 2010
WASTEWATER &
PLUMBING PROGRAM

Dear Sir:

Subject: Product Registration for Consolidated Treatment Systems, Inc.
Multi-Flo FTB-Series
Enviro-Guard ENV-Series
Nayadic M-Series

Attached you will find product applications and supporting materials for the three wastewater treatment product lines we manufacture and market. I request that you review and approve our applications.

Consolidated Treatment Systems, Inc., (CTS) manufactures and markets three lines of wastewater treatment products intended to serve residential and commercial occupancies not connected to municipal sewers. These products, Multi-Flo, Enviro-Guard, and Nayadic, provide superior performance. Multi-Flo and Nayadic systems have been manufactured for almost 40 years. Both are designed in conformance to generally accepted wastewater engineering principles. The Enviro-Guard is a specific configuration of the Multi-Flo than contain in a single tank three compartments intended to provide primary treatment, flow equalization and secondary treatment. All of our products are certified by NSF International as conforming to ANSI/NSF Standard 40.

Our application should be complete. Feel free to contact our consulting engineer, Bennette Burks, if you have any questions, concerns, or issues. He may be reached at 804-873-5000 and can provide whatever assistance you may need. I thank you in advance for your prompt review and approval of these applications.

Sincerely,

Jeff Coomer
Vice President

PERSONAL • RELIABLE • ACCOUNTABLE
1501 Commerce Center Drive • Franklin, Ohio 45005 • 1-800-503-0163 • 937-746-2727 • Fax: 937-746-1446

NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 40 - Residential Wastewater Treatment Systems

This is the Official Listing recorded on May 25, 2005.

CONSOLIDATED TREATMENT SYSTEMS, INC.
1501 COMMERCE CENTER DRIVE
FRANKLIN, OH 45005
937-746-2727

Facility: FRANKLIN, OH

Model Number	Rated Capacity Gallons/Day	Classification
Enviro-Guard ENV-0.75	750	Class I
Enviro-Guard ENV-0.75M[2]	750	Class I
Multi-Flo FTB 0.5	500	Class I
Multi-Flo FTB 0.6	600	Class I
Multi-Flo FTB 0.6-C	600	Class I
Multi-Flo FTB 0.75	750	Class I
Multi-Flo FTB 0.75-C	750	Class I
Multi-Flo FTB 1.0	1000	Class I
Multi-Flo FTB 1.5	1500	Class I
Multi-Flo FTB 1.0-C	1000	Class I
Nayadic M-6A[1]	500	Class I
Nayadic M-8A	600	Class I
Nayadic M-1050A	800	Class I
Nayadic M-1200A	1000	Class I
Nayadic M-2000A	1500	Class I

[1] Nayadic M-6A also a component of the Tank-N-Tank system. Complete Tank-N-Tank system has not been tested by NSF. Complete Tank-N-Tank system includes Nayadic M-6A 500 gpd treatment system surrounded by a pump chamber, creating a single tank system. Tank-N-Tank System is manufactured in both fiberglass and concrete.

[2] System consists of a modular design with the pretreatment and dosing tank as separate 500 gallon tanks or as one two-compartment 1000 gallon tank.

NOTE: This company may sell products complying with all applicable requirements for Certification nationally and internationally, but has advised NSF of authorized representatives physically located in the following:

Alabama	Arizona	Arkansas	Florida	Georgia
Hawaii	Illinois	Iowa	Maine	Mississippi
Missouri	New Jersey	New Mexico	New York	Ohio
Pennsylvania	Texas	Virginia	Washington	West Virginia
Wisconsin				

Contact the Listed company directly for further product information and availability in your area.

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF International.

33220

Wastewater Treatment Unit Program Evaluation Report

Consolidated Treatment Systems, Inc.
Enviro-Guard 750 with Salcor 3G Ultraviolet Light Disinfection Unit

NSF International
789 N. Dixboro Rd.
Ann Arbor, MI 48105

Analysis of the Enviro-Guard Model 750 with Salcor 3G Ultraviolet Light Disinfection Unit for Fecal Coliform Reduction

Work completed under Contract No. 03/08/2015/060

January 2005

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without the expressed written consent of NSF International.

1.0 Introduction

The Consolidated Treatment Systems Inc. Enviro-Guard 750-gpd wastewater treatment system, Model ENV-0.75, with Salcor 3G Ultraviolet Light has been tested at the NSF International Wastewater Technology Test Facility in Waco, Texas, following the performance requirements of ANSI/NSF Standard 40-2004, *Residential Wastewater Treatment Systems*. The ANSI/NSF Standard 40 protocol is described in Section 8 of the Standard. The protocol requires a performance evaluation of six months with a 30-day influent wastewater concentration of 100-300 mg/L $CBOD_5$ and 100-350 mg/L TSS. Consolidated Treatment Systems Inc. requested that sampling and analyses be completed to evaluate the fecal coliform reduction performance of their ENV-0.75 with ultraviolet light.

Initial dosing to the ENV-0.75 began on October 28, 2003. A six-month Standard 40 test was performed from November 17, 2003, through May 14, 2004, for the purpose of determining acceptance of a design modification to the certified Multi-Flo 0.75 treatment system. The test was abbreviated in terms of influent and effluent $CBOD_5$ and TSS sampling in order to investigate the design change only. As of the date of this report, the testing for the acceptance of the design modification has been completed and accepted. The system met the Class I effluent requirements of ANSI/NSF Standard 40.

This report includes all the fecal coliform data generated during the subsequent performance evaluation that began in June 2004, along with 30-day averages of the influent BOD_5 and TSS. Please contact NSF International for additional BOD_5 and TSS data required by the ANSI/NSF Standard 40 protocol. This report does not indicate ANSI/NSF Standard 40 compliance, nor should this report be construed as an approval of the equipment.

2.0 Process Description

The wastewater treatment system under test consisted of an ENV-0.75 connected in series at the plant outlet to an ultraviolet light, described as the Salcor 3G Ultraviolet Light Disinfection Treatment Unit.

The ENV-0.75 is a combined process, equalized wastewater treatment system. It uses both an extended aeration activated sludge process and an attached growth process to achieve treatment. In this design, microorganisms suspended in a tank of water and attached to filter media remove soluble contaminants from the wastewater, utilizing them as a source of energy for growth and production of new microorganisms. The organisms flocculate and form clumps, or floc, that physically entrap particulate organic matter. The organic matter is attacked by extracellular enzymes that solubilize the solids to make them available to the microorganisms as a food source. The conversion of the organic matter from soluble to biological solids allows for removal of the organic matter by settling of the solids in the treatment process.

Wastewater flows from the outlet of the ENV-0.75 into the Salcor 3G. The ultraviolet light source is mounted in the center of an anodized aluminum frame, which divides the disinfection chamber in half. The frame seals against the inner surface of the disinfection chamber to prevent flow bypass. When fully inserted, the disinfection sub-assembly is properly located by two pins mounted near the top of the disinfection chamber. It causes the wastewater entering one side of the unit to flow vertically downward, make a 180 degree turn and then to flow vertically upward and out the other side of the unit. This flow path is designed to give the proper fluid exposure time and no short-circuiting. The ultraviolet light

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source is surrounded by a clear fused quartz tube to control lamp surface temperature. A clear Teflon film covers the quartz tube to minimize surface fouling.

When the disinfection chamber is filled with water, the ultraviolet light source operates continuously, whether or not water is flowing. The unit has an alarm that is triggered to warn the user when the UV lamp is not properly operating.

The Salcor 3G is rated at 120 Volts AC. The nominal length of the ultraviolet light is 31" (789mm). The ultraviolet light is rated at 30 watts. The ultraviolet light radiant intensity is 125 microwatts at one meter. Specifications and drawings are included in Appendix A.

3.0 Evaluation Methods

3.1 Sampling Methods

During the evaluation, all influent $CBOD_5$ and TSS samples were 24-hour composite samples, collected by automatic samplers programmed to collect samples in coordination with the charge of influent wastewater into the system. Samples were stored at 2 ± 2 °C.

Fecal Coliform grab samples were collected three days per week, during one of each of the three dosing periods defined under Section 8.2.2.1 of ANSI/NSF Standard 40-2004.

3.2 Analytical Methods

Samples collected during the evaluation for fecal coliform analyses were analyzed by Aquatech Laboratories, a subcontract lab of NSF. The analyses were completed using Standard Method 9222D.

4.0 Evaluation Results

Dosing the ENV-0.75 with Salcor 3G ultraviolet light at a rate of 750 gallons per day began on June 4, 2004. The influent $CBOD_5$ 30-day average concentrations for the UV disinfection test met the requirements of Standard 40 throughout the test. The total suspended solids were variable, one 30-day average above the requirements and two below the requirements. The standard does not consider the test invalid but rather examines the impact on the effluent quality and excludes data, if appropriate. Effluent $CBOD_5$ and TSS concentrations had no noticeable impact on the fecal coliform bacteria, so no data was excluded.

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Wastewater Treatment Unit Program Evaluation Report

Consolidated Treatment Systems, Inc.
ENV-0.75 Wastewater Treatment System

NSF International
789 N. Dixboro Rd.
Ann Arbor, MI 48105

December 2004

Evaluation Report in Support of a Design Change: Consolidated Treatment Systems, Inc. ENV-0.75 Wastewater Treatment System

Work completed under Contract No. 03/08/2015/060

December 2004

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EXECUTIVE SUMMARY

This report describes the testing protocol and results supporting the requested product design change, submitted by Consolidated Treatment Systems, Incorporated, to the Listed and Certified Multi-Flo FTB 0.75 treatment system. The ENV-0.75 incorporates a pretreatment tank followed by a pump tank which time doses the Multi-Flo FTB 0.75. The controls are set to deliver 48 doses of 15.625 gal each. The flow is limited to 5 gpm, so the pump runs for approximately 3 minutes.

Testing of the ENV-0.75 followed a partial testing protocol adapted from NSF/ANSI Standard 40. The testing protocol involved a six-month evaluation with reduced sampling (see Appendix B). A total of 56 samples were taken over the six month period for analysis of DO, pH, temperature, $CBOD_5$, TSS, VSS and settleable solids. Samples for measurement of nutrient reduction were also taken (see Appendix D).

This evaluation was conducted to determine whether the change in design and construction would impact the ability of the Multi-Flo FTB 0.75 to continue to meet the applicable requirements of the Standard. Reduced sampling was incorporated into the testing based on the established performance of the Multi-Flo 0.5 during the 1998 Standard 40 evaluation. In the 1998 evaluation, the Multi-Flo 0.5 achieved an average effluent concentration of 6 mg/L for both $CBOD_5$ and TSS. This evaluation allowed NSF to determine, through testing, whether the requested design change would negatively impact the performance of the Multi-Flo FTB 0.75 treatment system.

The performance evaluation was conducted at the NSF Wastewater Technology Test Facility in Waco, Texas, using wastewater diverted from the Waco municipal wastewater collection system. Over the course of the evaluation, the average effluent $CBOD_5$ was 5 mg/L, ranging between 2 and 30 mg/L, and the average effluent suspended solids was 5 mg/L, ranging between 2 and 26 mg/L. The effluent pH during the entire evaluation ranged between 6.0 and 7.8 within the required range of 6.0 to 9.0. The plant also met the requirements for noise levels (less than 60 dbA at a distance of 20 feet) and color, threshold odor, oily film and foam.

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1.0 PROCESS DESCRIPTION

The Consolidated Treatment Systems ENV-0.75 is a combined process, equalized wastewater treatment system. It uses both an extended aeration activated sludge process and an attached growth process to achieve treatment. In this design, microorganisms suspended in a tank of water and attached to filter media remove soluble contaminants from the wastewater, utilizing them as a source of energy for growth and production of new microorganisms. The organisms tend to be flocculent and form clumps, or floc, that physically entrap particulate organic matter. The organic matter is attacked by extracellular enzymes that solubilize the solids to make them available to the microorganisms as a food source. The conversion of the organic matter from soluble to biological solids allows for removal of the organic matter by settling of the solids in the treatment process.[2]

Extended aeration is a modification of the activated sludge process in which the microorganisms are allowed to remain in the treatment process for long periods of time. The large inventory of biological solids in the process provides a buffer for shock loading of organic matter. The long aeration period allows for the organisms in the system to consume themselves, reducing the total amount of solids produced by the treatment process. This does not eliminate the need for removal of solids from the system. Removal of solids is necessary to keep from exceeding the capacity of the solids separation process used before discharge of the treated wastewater.

The treatment tank contains 132 ft^2 of textile media. This media acts as a surface upon which dense colonies of microbes grow. These microbes provide additional aerobic treatment, act as a microbial filter to remove residual organic material and solids as water moves through the tank, and may facilitate biological denitrification.

The organisms primarily responsible for the degradation of the organic matter are aerobic bacteria. As such, the transfer of oxygen into the wastewater by an aeration system is critical to the treatment process. The aeration system also provides for the mixing of the wastewater and organisms to provide contact between the organic contaminants in the wastewater and the organisms that provide for removal of the contaminants. For this reason, an activated sludge process is referred to as a suspended growth system. Interruption of the aeration system for a long period of time, such as days, can have a serious impact on the process.

2.0 PERFORMANCE EVALUATION

2.1 Description of Plant Evaluated

The ENV-0.75 tested in this evaluation has a rated capacity of 750 gallons per day (gpd). Specifications and drawings are included in Appendix A. The plant contains three compartments: a trash tank, a dosing tank, and a treatment tank. Wastewater flows into the trash tank, which provides for the separation of heavy or floatable solids from the wastewater prior to introduction into the dosing and treatment tanks. The dosing tank serves to eliminate variations in daily flow. It contains a timer-driven pump that operates every thirty minutes. Excess flow is retained in the dosing tank and delivered to the treatment tank in intervals and rates that match the assimilation capabilities of the biological treatment process. When the pump is activated, wastewater is delivered to the treatment tank at the rate of approximately 5 gallons per minute (gpm). A cross in the discharge pipe regulates the flow to the treatment tank. This cross allows some of the flow to recycle back into the pump tank.

The treatment tank is cylindrical and provides aerobic treatment as a filtered effluent treatment process. Wastewater flows into the center of the plant and drops into the aeration chamber. An aerator at the bottom of the chamber draws air

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Enviro-Guard Performance

Consolidated Treatment Systems, Inc.
1501 Commerce Center Drive
Franklin, OH 45005
www.consolidatedtreatment.com

NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 40 - Residential Wastewater Treatment Systems

This is the Official Listing recorded on May 12, 2005.

CONSOLIDATED TREATMENT SYSTEMS, INC.
1501 COMMERCE CENTER DRIVE
FRANKLIN, OH 45005
937-746-2727

Facility: FRANKLIN, OH

Model Number	Rated Capacity Gallons/Day	Classification
Enviro-Guard ENV-0.75	750	Class I
Enviro-Guard ENV-0.75N[2]	750	Class I
Multi-Flo FTB 0.5	500	Class I
Multi-Flo FTB 0.6	600	Class I
Multi-Flo FTB 0.6-C	600	Class I
Multi-Flo FTB 0.75	750	Class I
Multi-Flo FTB 1.0	1000	Class I
Multi-Flo FTB 1.5	1500	Class I
Multi-Flo FTB 1.0-C	1000	Class I
Nayadic M-6A[1]	500	Class I
Nayadic M-8A	600	Class I
Nayadic M-1050A	800	Class I
Nayadic M-1200A	1000	Class I
Nayadic M-2000A	1500	Class I

[1] Nayadic M-6A also a component of the Tank-N-Tank system. Complete Tank-N-Tank system has not been tested by NSF. Complete Tank-N-Tank system includes Nayadic M-6A 500 gpd treatment system surrounded by a pump chamber, creating a single tank system. Tank-N-Tank System is manufactured in both fiberglass and concrete.

[2] System consists of a modular design with the pretreatment and dosing tank as separate 500 gallon tanks or as one two-compartment 1000 gallon tank.

NOTE: This company may sell products complying with all applicable requirements for Certification nationally and internationally, but has advised NSF of authorized representatives physically located in the following:

Alabama	Arizona	Arkansas	Florida	Georgia
Hawaii	Illinois	Iowa	Maine	Mississippi
Missouri	New Jersey	New Mexico	New York	Ohio
Pennsylvania	Texas	Virginia	Washington	West Virginia
Wisconsin				

Contact the Listed company directly for further product information and availability in your area.

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF International.

789 N. Dixboro Road, Ann Arbor, Michigan 48105-9723 USA
1-800-NSF-MARK 734-769-8010
www.nsf.org

Summary:

The Enviro-Guard onsite wastewater treatment system produces an effluent quality less than or equal to 5 mg/L $CBOD_5$ and TSS. Total nitrogen is reduced over 60 percent with effluent NO_3 values generally about 15 mg/L. The system is particularly suited for intermittent occupancies. An Enviro-Guard that is inactive for over seven weeks can produce effluent having less than 5 mg/L $CBOD_5$ and TSS within two days of re-activation. An optional ultraviolet light disinfection device reduces fecal coliform to less than one colony per 100 mL. The Enviro-Guard provides fixed film treatment combined with aerobic digestion and positive filtration to eliminate the possibility of bypass. The Enviro-Guard provides the highest effluent quality available in onsite wastewater treatment.

Enviro-Guard Development and Process

The Enviro-Guard series has its development in the Multi-Flo, which has been in continuous production since the early 1970's when it was designed. The series was developed by Tait Pump Company and acquired by Consolidated Treatment Systems, Inc. (CTS) in the early 1980's. CTS has manufactured the series ever since. The Multi-Flo system has been recertified by NSF International as a Class 1 System on multiple occasions without change to the initial design. The Enviro-Guard represents the evolution of the Multi-Flo concept, and is based on thirty-five years of continuous experience.

The Enviro-Guard incorporates three treatment chambers in one compact, pre-engineered unit. The patented treatment process has been specifically designed to control the consistency, frequency, interval, and rate wastewater flows through the system. The design maximizes treatment efficiency resulting in the highest quality effluent of any commercially available product.

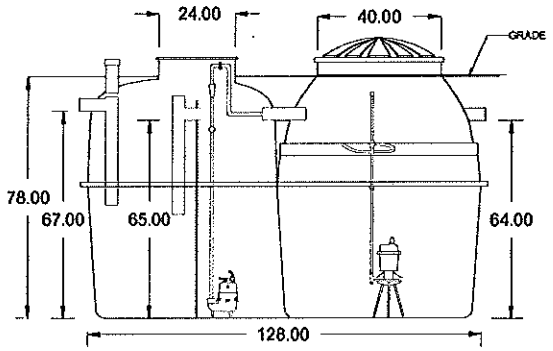


Figure 1—Enviro-Guard, Elevation View

The Enviro-Guard concept features:

- **Solids Separation**
- **Flow Equalized Dosing**
- **No Bypass, Positive Filtration**
- **Patented Fixed Film Treatment Combined with Aerobic Digestion**

Each step is instrumental in achieving treatment goals and is discussed below.

Preliminary Treatment (Solids Separation)
Wastewater first enters a 500-gallon preliminary treatment chamber. This chamber provides two functions, separation and dilution. First, the wastewater is clarified into three zones. Lighter materials, "scum," will rise to the surface while heavier materials, "grit," will sink to the bottom. The center zone of "clarified" wastewater will be relatively free from this scum and grit. Wastewater also contains dissolved materials that the preliminary treatment chamber will dilute. This produces an effluent with a relatively constant concentration of the materials dissolved in the wastewater.

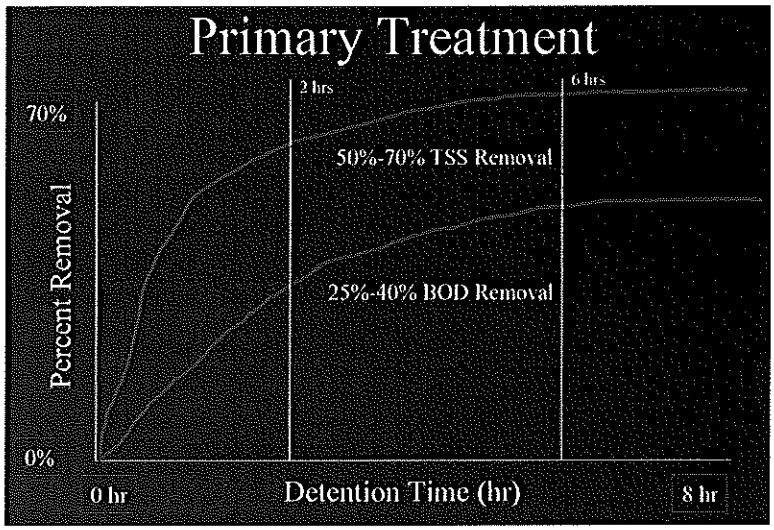


Chart 1—Primary Treatment Chamber Performance

The chamber is designed to hold two-thirds the volume of the daily flow. This volume remains constant. Field-testing has proven that this volume provides adequate time to clarify the wastewater while not providing such a long detention time that the effluent is contaminated by anaerobic treatment byproducts. [1]

As Chart 1 shows, the Primary Treatment Chamber can provide as much as 70 percent TSS removal and 40 percent BOD removal which enhances overall treatment.
The chart also documents that a design volume of 16 hours provides more than enough time to maximize primary treatment.

Flow Equalized Dosing

The Enviro-Guard uses "flow equalization" to maximize treatment efficiency. Flow equalization is a process by which the design flow is metered into the treatment tank over a 24-hour period. Effluent from the first chamber flows into a 500-gallon (nominal) dose tank where it is held until dosed into the treatment tank. This process controls the frequency, interval, volume, and rate of wastewater transfer into the treatment tank. The pump chamber receives and holds the effluent from the preliminary treatment chamber regardless of the actual flow to the Enviro-Guard. Wastewater is pumped to the treatment chamber in accordance with the engineered design. A timer controls the dosing pump inside the pump chamber. The timer activates the pump to provide 48 equal doses at 30-minute intervals. Each dose provides a two percent volume change in the treatment tank. This dosing frequency, interval, and volume—frequent micro dosing—have proven to facilitate efficient wastewater treatment.

The design also controls the dosing rate. A high dose rate could adversely affect treatment due to hydraulic overload. The Enviro-Guard doses the treatment tank at a flow of five gallons per minute. At this rate, the flow through the final treatment chamber is barely detectable. As a result, solids are not adversely driven into the fixed film filter media during final treatment.

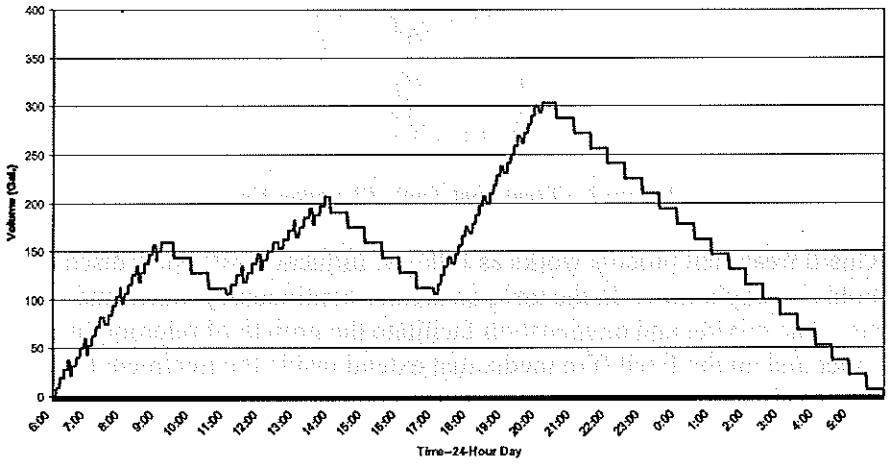


Chart 2—Dosing Chamber Volume Based on ANSI/NSF Standard 40 Testing

Chart 2 documents the optimal design of the dosing chamber. Based on ANSI/NSF Standard 40 testing, the maximum anticipated liquid volume will be about 300 gallons or two-thirds the maximum volume of the tank. The Enviro-Guard is designed for surges in excess of anticipated volumes and then doses the surges into the treatment tank at timed intervals. The Enviro-Guard is designed to protect the treatment tank while also processing wastewater to ensure the highest efficiency is maintained.

The dosing system also pre-aerates the liquid in the pump chamber. The dosing pump provides a flow in excess of five gallons per minute, approximately 30 gpm. To compensate for the additional flow, the pump piping contains a turn down "T" that discharges freely back into the dosing chamber. At each dose, approximately 80 percent of the total dose volume discharges through the "T" pre-aerating the wastewater as it discharges. Pre-aeration reduces odors,

volatizes compounds, and promotes oxidation. Thus, the dosing system provides some additional treatment to the wastewater.

Fixed Film, Positive Filtration Combined with Aerobic Digestion

The Enviro-Guard's patented treatment process combines fixed film technology with continuously stirred extended aeration. [2,3] The system contains a treatment chamber rated at 750 gpd and is designed to provide 3.6 pounds of oxygen daily to the wastewater. Treatment tank details are illustrated in Figures 2 and 3.

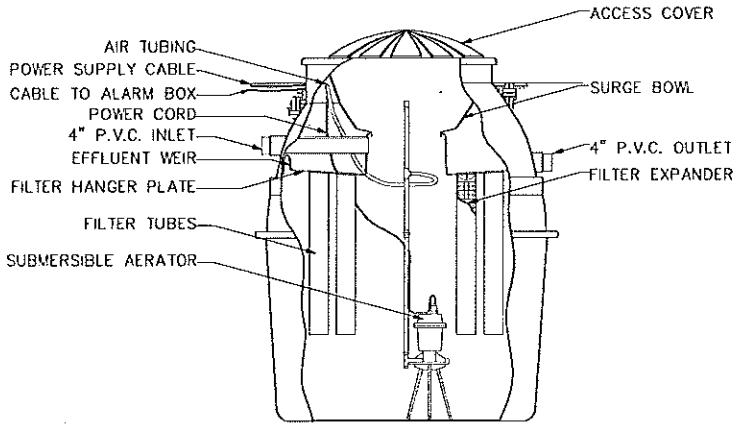


Figure 2—Treatment Tank, Elevation View

The Enviro-Guard treatment process works as follows: influent wastewater discharges into a tank designed to hold one day's flow. In the tank, an aerator continuously mixes and adds oxygen to the wastewater. The mixing and oxygenation facilitate the growth of microorganisms both in the aeration chamber and on the fixed film media that extend inside the treatment tank. These microorganisms oxidize organic material and consume pathogens in the wastewater.

The fixed film media also provide positive filtration and prevent effluent bypass. Wastewater cannot leave the tank unless and until it is filtered through the fixed film media. In the event toxic materials are poured into the Treatment Tank, the fixed film media will seal, preventing the material from leaving the treatment tank. The Enviro-Guard is the only product that provides both positive filtration and no bypass features.

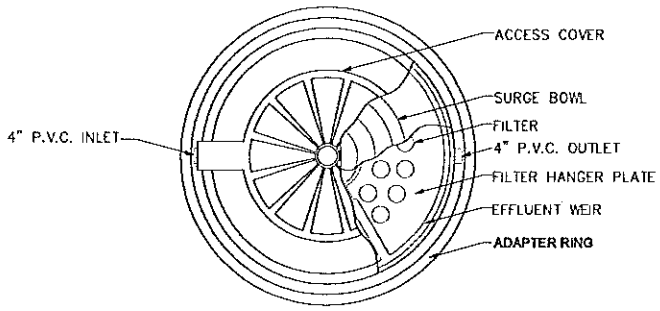


Figure 3—Treatment Tank, Plan View

Primarily, the fixed film media tubes perform two functions. First, the media filters the wastewater before discharge. The media have a nominal rating of 100 microns. This is finer than a stack of coffee filters. Second, the filters are a growth medium for additional microorganisms that provide treatment as wastewater flows through them. These microorganisms consume remaining organic material and pathogens while preventing the bypass of solids. [4] The filters provide clarification, facilitate advanced treatment, and prevent bypass. Figure 4 shows a close up of the fixed film media and no bypass feature.

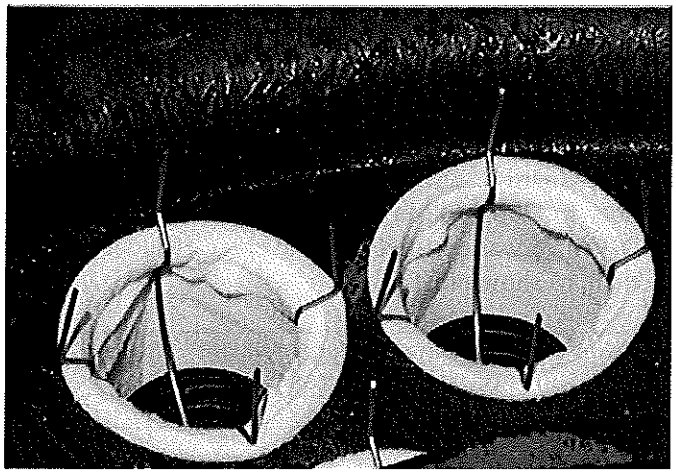


Figure 4—Fixed Film Media and No-Bypass Weir Plate

Enviro-Guard Performance at NSF International

The Enviro-Guard has been developed utilizing the thirty-five years of field data established by the Multi-Flo treatment process. The Multi-Flo produces effluent that typically has less than 10 mg/L BOD and TSS. [5] The Multi-Flo system, which is certified without the need for preliminary treatment or flow equalization, produces high-quality effluent by itself. The Enviro-Guard builds on the Multi-Flo concept to maximize treatment efficiency thus producing a cleaner effluent. Based on certification testing conducted by NSF International, the Enviro-Guard produces an effluent that is less than or equal 5 mg/L BOD and TSS. [6]

The certification test is long and intensive. In addition to dosing the system at 100 percent of its rated daily flow, the test includes stress periods that push the system to the limits of its performance. The Enviro-Guard, with its flow equalization, positive filtration, and no by-pass features, performed spectacularly.

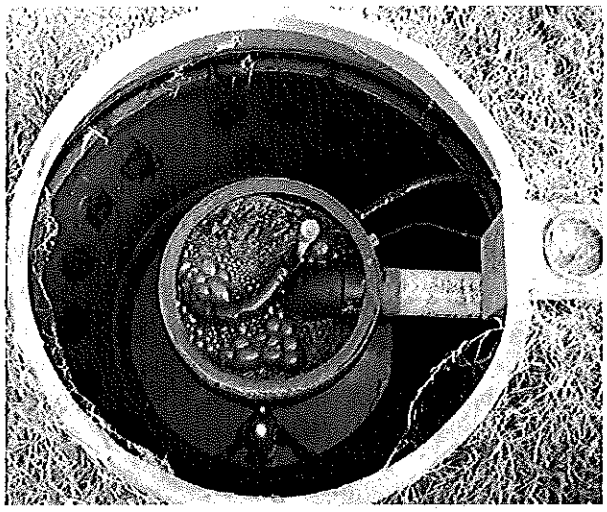


Figure 5—Enviro-Guard Treatment Tank at NSF Test Facility

Initial dosing to the Enviro-Guard began on October 28, 2003. Certification testing was performed from November 17, 2003, to May 14, 2004. The testing was successful, and the Enviro-Guard Model ENV-0.75 was certified. The average effluent BOD and TSS were reported to be 5 mg/L each, as shown in Table 1.

Table 1—Enviro-Guard Performance Under ANSI/NSF Standard 40 Testing

	BOD	TSS	TN	NO_3
Influent (mg/L)	224	219	46	0
Effluent (mg/L)	5	5	17	15
Percent Removal	98	98	63	67

The Enviro-Guard installed at the NSF International facility has been in continuous operation—at 100 percent capacity—for over 18 months. It is important to note that the unit has never been sludge wasted and has performed flawlessly with settable solids tested at over 95 percent. The uninterrupted operation documents the trouble-free design of the Enviro-Guard, and continued testing confirms that the system produces an effluent BOD and TSS of 5 mg/L or below.

As Figure 5, above shows, even at maturity, the Enviro-Guard provides the highest quality effluent. Note the condition of the weir plate. "Pin floc," which is a normal condition, rests atop the weir plate. It is important to note that the Enviro-Guard has a 360° weir which greatly reduces the velocity treated effluent is discharged from the system. This feature is unique to the entire CTS product line and prevents any "Pin floc" from being lifted off the weir plate. Above the weir plate is a three-to-four inch zone of crystal clear water. This water, which slowly pours

over the 360° weir during flow periods, has no visible solids or odors. When this effluent is tested, it has often had BOD and TSS values below detectible limits.

Total Nitrogen Removal

Historically, treatment performance has been judged in terms of BOD and TSS removal. Nutrient removal is a developing concern, and studies of nitrogen removal have been conducted to judge the extent to which the Enviro-Guard will remove nitrogen. During certification testing, the Enviro-Guard was observed to reduce total nitrogen (TN) by over 60 percent.

Nitrogen Removal Documented During Certification Testing

Nitrogen species were measured as part of the certification testing of the Enviro-Guard. The influent TN averaged 46 mg/L while the effluent TN averaged 17 mg/L. Effluent NO_3 concentrations averaged 15 mg/L (n=6). The average total nitrogen removal was 62 percent. The standard deviation and 95 percent confidence intervals were low, 2 mg/L and 3 mg/L, respectively. The Enviro-Guard provides consistently high levels of nitrogen removal and low concentrations of nitrate in the effluent.

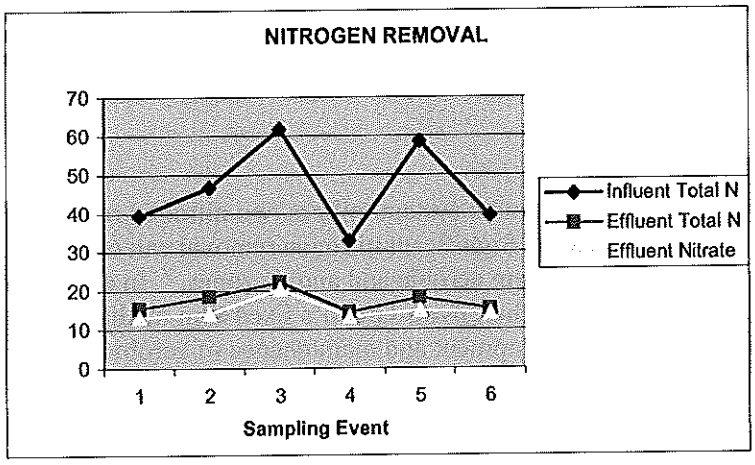


Chart 3—Total Nitrogen Removal During ANSI/NSF Standard 40 Testing

The difference between effluent nitrate is reported as either TKN or NH_3. Given the high level of BOD and TSS removal, it is unlikely that the TKN and NH_3 values wholly represent organic nitrogen and ammonia, respectively. While no specific analyses were conducted to identify these nitrogen species, the belief is that the actual compounds included "recalcitrant" nitrogen, such as chloramine, which do not degrade during wastewater treatment. [7]

Nitrogen Removal Mechanism

By combining fixed film technology with aerobic digestion the Enviro-Guard achieves over sixty percent total nitrogen reduction. The long solids retention time and floc size in Enviro-Guard system both contribute to nitrogen retention and removal. In addition the Enviro-Guard achieves some nitrogen loss through direct volatilization of nitrogen-containing substances, such as ammonia. [8]

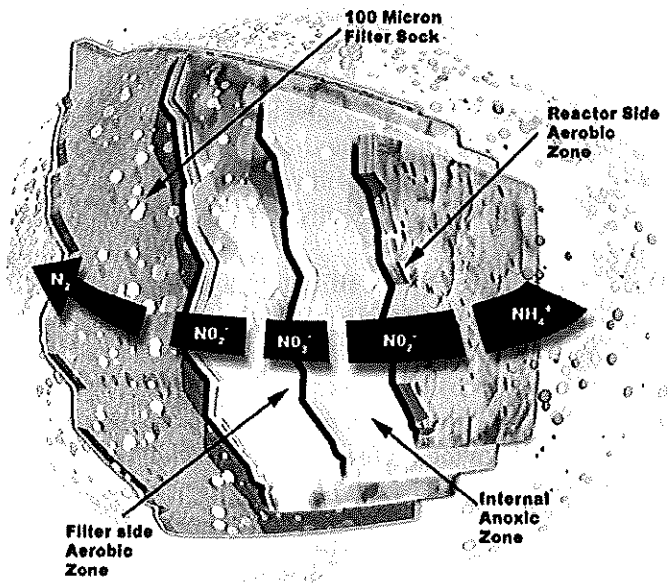


Figure 6—Enviro-Guard Filter Media Denitrification Process

The Enviro-Guard wastewater treatment system utilizes two nitrogen removal mechanisms, as adopted and illustrated in Figure 6. Significant nitrogen removal can occur in activated sludge systems. Microbial "floc" can contain aerobic and anoxic zones. [9] In addition the dense microbial colonies that develop on the Enviro-Guard's fixed film media provide a rich environment conducive to the development and maintenance of aerobic and anoxic zones. The dense floc, dense biomats, and air stripping of volatile nitrogen compounds account for the high nitrogen removal in Enviro-Guard.

Background Studies

Two recent, third party studies document significant total nitrogen removal in Multi-Flo. [10] In 1991, NSF International conducted re-certification tests for the Multi-Flo series. As an addendum to this re-certification testing, total nitrogen studies were conducted. Based on these studies, the average total nitrogen removal was 39 percent (n=8). The average influent total nitrogen was below a typical value of 50 mg/L total nitrogen; NSF influent values only averaged 22 mg/L. Effluent total nitrogen values averaged 16 mg/L while NO_3 averaged 14 mg/L. [11]

In 1997-98, additional re-certification tests were conducted. Based on these studies, the average total nitrogen removal was 52 percent (n=12). The average influent value was still low, 31 mg/L, and the average effluent total nitrogen was 15 mg/L. The effluent NO_3 concentration was 11 mg/L. At this value the standard deviation for average NO_3 was 3 mg/L, and the 95 percent confidence interval was 2 mg/L, showing a highly consistent—and low—effluent nitrate concentration. [12]

The University of Dayton conducted total nitrogen studies as a part of a 2001-2002 study. Over the entire study period, the influent total nitrogen averaged 39 mg/L; the effluent TN averaged 12 mg/L. The average nitrogen removal was 69 percent (n=37). [13] The standard deviation of the effluent total nitrogen was 5 mg/L while the 95 percent confidence interval was 2 mg/L, again showing high consistency in the expected nitrate concentration.

Intermittent Use Occupancy

To determine the effectiveness of the Enviro-Guard wastewater system in an intermittent use application, dosing to the NSF test unit was halted on February 1, 2005. On February 15, 2005, a second six-month maintenance was performed, and dosing resumed on March 21, 2005. Effluent quality sampling was conducted from March 22, 2005 until April 8, 2005. Based on this testing, the Enviro-Guard produced an effluent having less than 5 mg/L BOD and TSS within two days of dosing. [14]

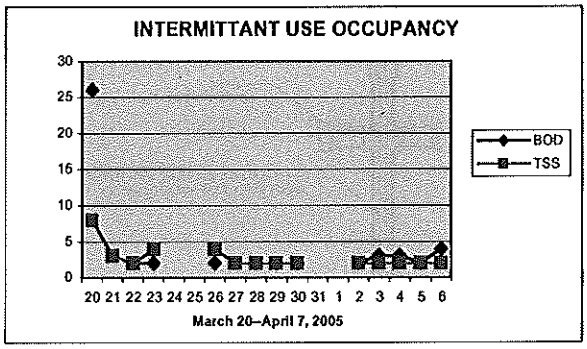


Chart 4—Effluent BOD and TSS During 100 Percent Loading Following Non-Use

Disinfection Testing

When required, the Enviro-Guard can be utilized in conjunction with ultraviolet disinfection. During NSF certification testing the installation included an ultraviolet light disinfection device for evaluation. Once initial testing and certification were complete an additional six-month test was performed to document the performance of the Salcor 3G ultraviolet light disinfection unit. This testing was conducted from June 4, 2004, to January 4, 2005. [15] NSF International concluded that the Enviro-Guard/Salcor 3G combination produced an effluent fecal coliform count substantially less than 200 col/100 mL, which is the generally accepted standard for body contact water. [16]

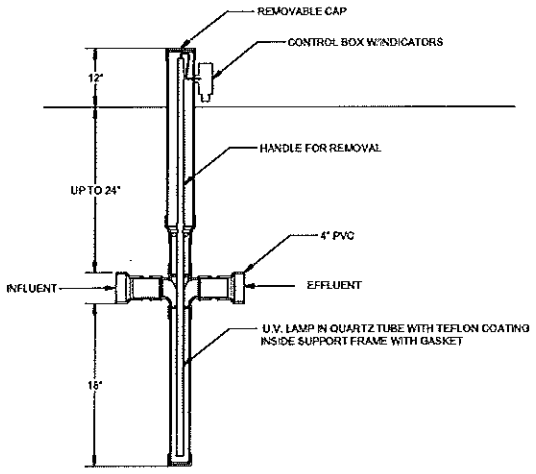


Figure 7—Salcor 3-G Ultraviolet Light Disinfection

Summary

The Enviro-Guard represents the evolution of onsite wastewater treatment. The system combines preliminary treatment, flow equalization, micro dosing, fixed film, positive filtration, and no-bypass features to protect public health and the environment. The Enviro-Guard can operate at 100 percent capacity indefinitely and provide effective, trouble-free treatment, even if the occupancy receives intermittent use. The Enviro-Guard produces an effluent that has a BOD and TSS of 5 mg/L or less and a total nitrogen reduction of over 60 percent. When used with optional disinfection, the Enviro-Guard provides an effluent that meets body contact standards. Enviro-Guard provides the highest quality effluent of any product and meets the challenges of the most sensitive sites.

References:

[1] Long-term discussions among CTS staff and representatives, which testing confirms, bear out two-thirds flow rule of thumb. No systematic testing, other than material presented in this document, has been conducted.

[2] Tchobanoglous, G. *Wastewater Engineering: Treatment, Disposal, and Reuse,* Third Edition. New York: Irwin/McGraw-Hill, 1991, pp 529-556.

[3] Tchobanoglous, G. and Crites, R. *Small and Decentralized Wastewater Management Systems.* New York: WCB/McGraw-Hill, 1998, pp 451-482.

[4] Specific $CBOD_5$, TSS, and fecal coliform data to be detailed throughout this document.

[5] Burks, B. "Multi-Flo Performance, July 2004." Franklin: Consolidated Treatment Systems, 2004, 14 Pages

[6] "Analysis of the Enviro-Guard Model 750 with Salcor 3G Ultraviolet Light Disinfection Unit for Fecal Coliform Reduction" NSF International, December 2004, 79 pps.

[7] Ongoing debate exists in the industry regarding the interpretation of effluent TKN and NH_3 values. Regulators, academics, and industry representatives observe residual TKN and NH_3 values when other indicators of treatment indicate total oxidation during treatment. Chloramine is considered a likely substance because of its increasing use in disinfection of potable water.

[8] Safferman, S. et. al. "Maximizing Total Nitrogen Removal from On-Site Generated Wastewater." Unpublished Study, p 7. (This study has been accepted for publication by the Journal of the National Environmental Health Association.)

[9] Metcalf & Eddy, Tchobanoglous, T. ed. *Wastewater Engineering: Treatment and Reuse*, 4th Edition. New York: McGraw Hill, 2003, pp 750-753.

[10] Total Nitrogen refers to the sum of the organic nitrogen, ammonia, nitrite and nitrate in the wastewater.

[11] Bruursema, T. April 17, 1995, NSF International correspondence to Robert A. Parker.

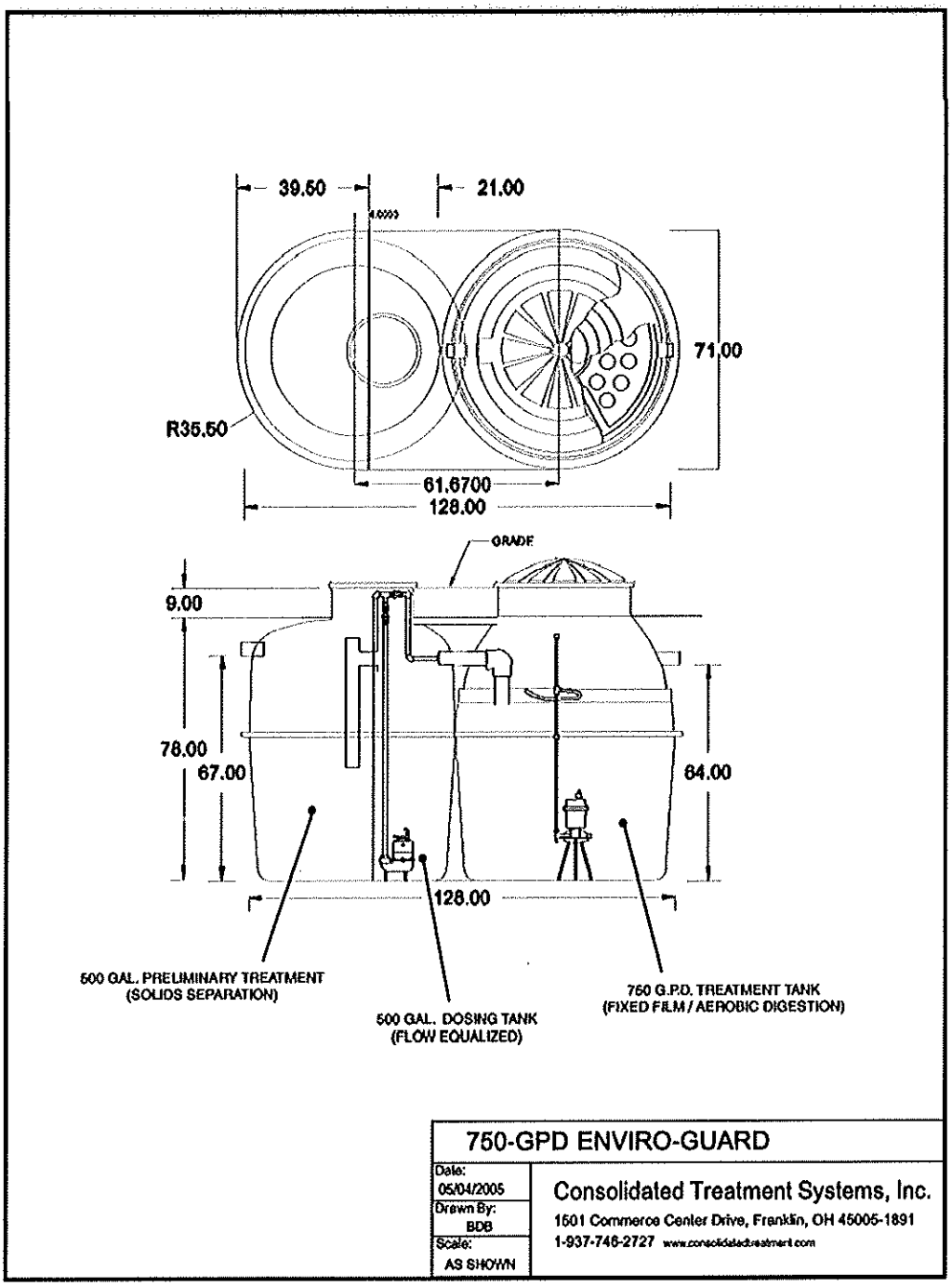
[12] Bruursema, T and Stevens, T. "Multi-Flo Model FTB-0.5 Nitrogen Series Report, October 19, 1998." Ann Arbor: NSF International.

[13] Safferman, S. et. al. "Maximizing Total Nitrogen Removal from On-Site Generated Wastewater." Unpublished Study. (This study has been accepted for publication by the Journal of the National Environmental Health Association.)

[14] A miscommunication resulted in a delay of sampling by one day. A laboratory accident invalidated the second day's BOD sample. Based on the 3 mg/L TSS result for the second sample, this author believes that the BOD would have been less than 5 mg/L, too.

[15] "Evaluation Report in Support of a Design Change: Consolidated Treatment Systems, Inc., ENV-0.75 Wastewater Treatment System." NSF International, January 2005, 17 pps.

[16] Tchobanoglous, G. *Wastewater Engineering: Treatment, Disposal, and Reuse,* Third Edition. New York: Irwin/McGraw-Hill, 1991, p 1219.



750-GPD ENVIRO-GUARD

Date: 05/04/2005	Consolidated Treatment Systems, Inc.
Drawn By: BDB	1601 Commerce Center Drive, Franklin, OH 45005-1891
Scale: AS SHOWN	1-937-746-2727 www.consolidatedtreatment.com

NOTES:

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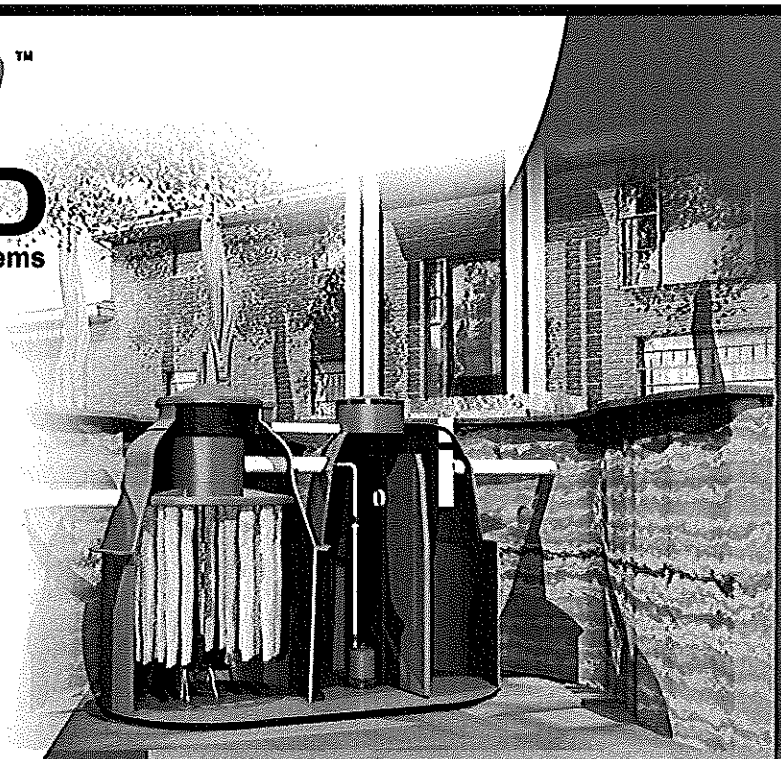
Revised May 2005

Enviro™

GUARD

Wastewater Treatment Systems



PROCEDURES FOR ASSEMBLY AND INSTALLATION

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CONSOLIDATED

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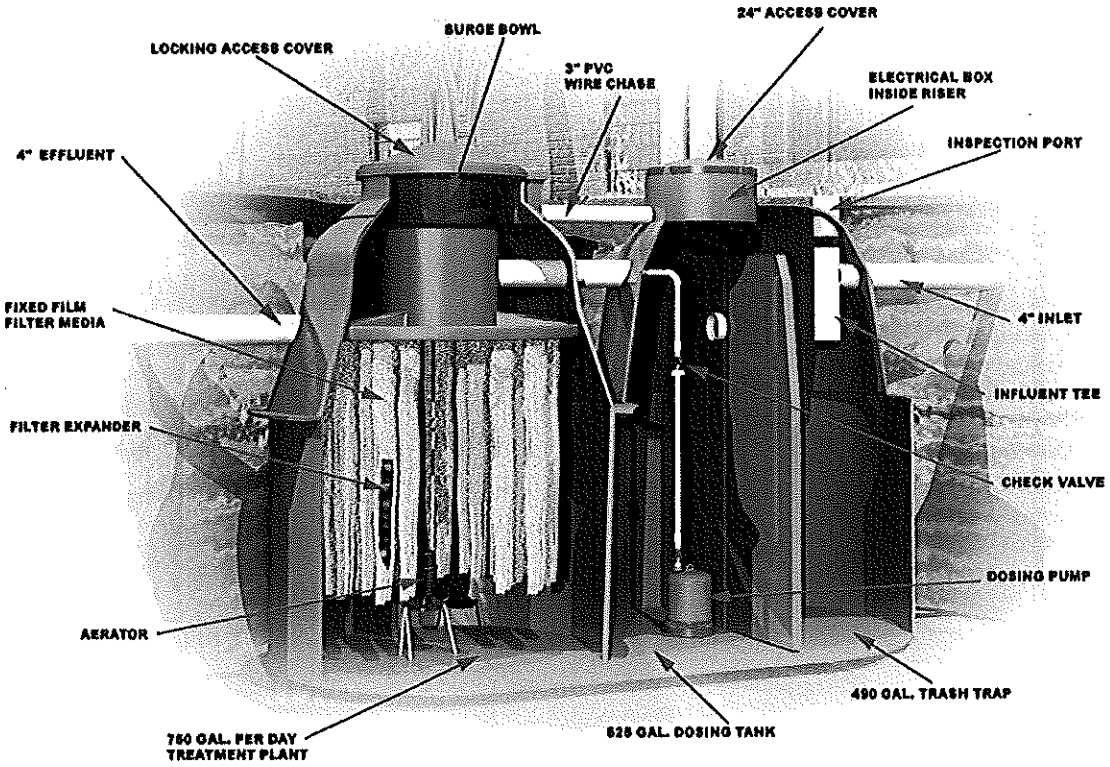
Figure 1



Enviro-Guard Components and Materials

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

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

Aerator:
- Cast Iron, Stainless Steel, 1/6 HP 1550 RPM Motor With Thermal Overload Protection 120 Volt AC, 60 Hz, 2.6 amps

Filter Tubes:
- Felted Polyester Fabric

Tube Expanders:
- Slotted and Drilled Polyethylene Pipe

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

Enviro-Guard™ Wastewater Treatment System

This manual is used to assemble and install the ENVIRO-GUARD Wastewater Treatment System.

The installation must comply with applicable state and local regulations.

SITE PREPARATION

LOCATION

An accurate, detailed site plan is essential for successful installation of ENVIRO-GUARD units. The site plan should show the locations and elevations of the wastewater treatment unit and effluent disposal system. Check to make sure the site plan accurately reflects the conditions actually existing at the site and that all required set-backs (i.e., to property lines, wells, etc.) are being met.

GRADE AND GROUND CONTOUR

Position the wastewater treatment unit in accordance with the plan. Confirm the accuracy of the elevations shown in the plan. The length of the unit should be set parallel with the surface contours to prevent the use of risers.

SURFACE WATER MUST NOT ENTER THE SYSTEM FROM AROUND THE ACCESS COVERS OR FROM THE DISCHARGE PIPE. ADDITIONALLY, THE UNIT MUST BE SET TO PREVENT GROUNDWATER FROM BACKING UP THE DISCHARGE PIPE WHEN USED IN CONJUNCTION WITH AN IN-GROUND SOIL ABSORPTION SYSTEM.

COVER EXPOSURE

The access covers and inspection port must be exposed by 2" min. at all times to permit the system to function properly and to allow for routine maintenance. There should be a minimum of two (2) inches between the bottom of the lid and the finished grade (refer to Fig. 3).

BUILDING SEWER LINE

Make sure that the sewer pipe from the building has the proper slope to meet the inlet invert of the ENVIRO-GUARD and maintain the grade requirements for the exposure of the cover and inspection port.

EXCAVATION PREPARATION

Mark off an area at least one foot larger than the dimensions of the ENVIRO-GUARD and maintain the grade requirements for the exposure of the cover and inspection port. (NOTE: Dimensions found on page 4, Figure 3)

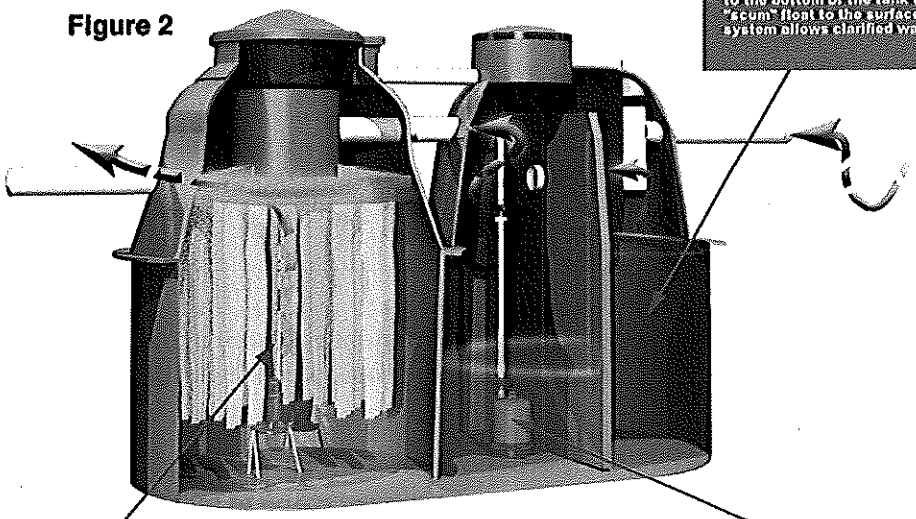
Enviro-Guard™ Wastewater Treatment System

TYPICAL INSTALLATION

The Enviro-Guard is a unique wastewater treatment system that combines primary treatment, flow equalization and secondary treatment by both fixed-growth and suspended-growth processes, and positive, no by-pass filtration within a single three-compartment tank. This combination provides maximum wastewater treatment efficiency with a minimum of operation and maintenance requirements. When operated and maintained in accordance with the manufacturer's recommendations, the Enviro-Guard will provide continuous excellent wastewater treatment. The Enviro-Guard and its associated treatment components are shown in Figures 1 and 2.

The three compartments are a trash tank, dosing tank, and treatment tank. The trash tank has a capacity of 490 gallons. The dosing tank has a capacity of 525 gallons. Within the dosing tank is a dosing pump that is operated by a dosing timer. The timer is set to provide 48 doses of 15 gallons each. Dosing occurs at 30 minute intervals over 24 hours. The treatment tank has a rated treatment capacity of 750 gallons per day.
NOTE: Local agencies may require primary dosing to be set based on projected home owner use. Factory settings should only be changed by qualified individuals authorized by the manufacturer.

Figure 2



Trash Tank (490 Gal. Cap.)

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

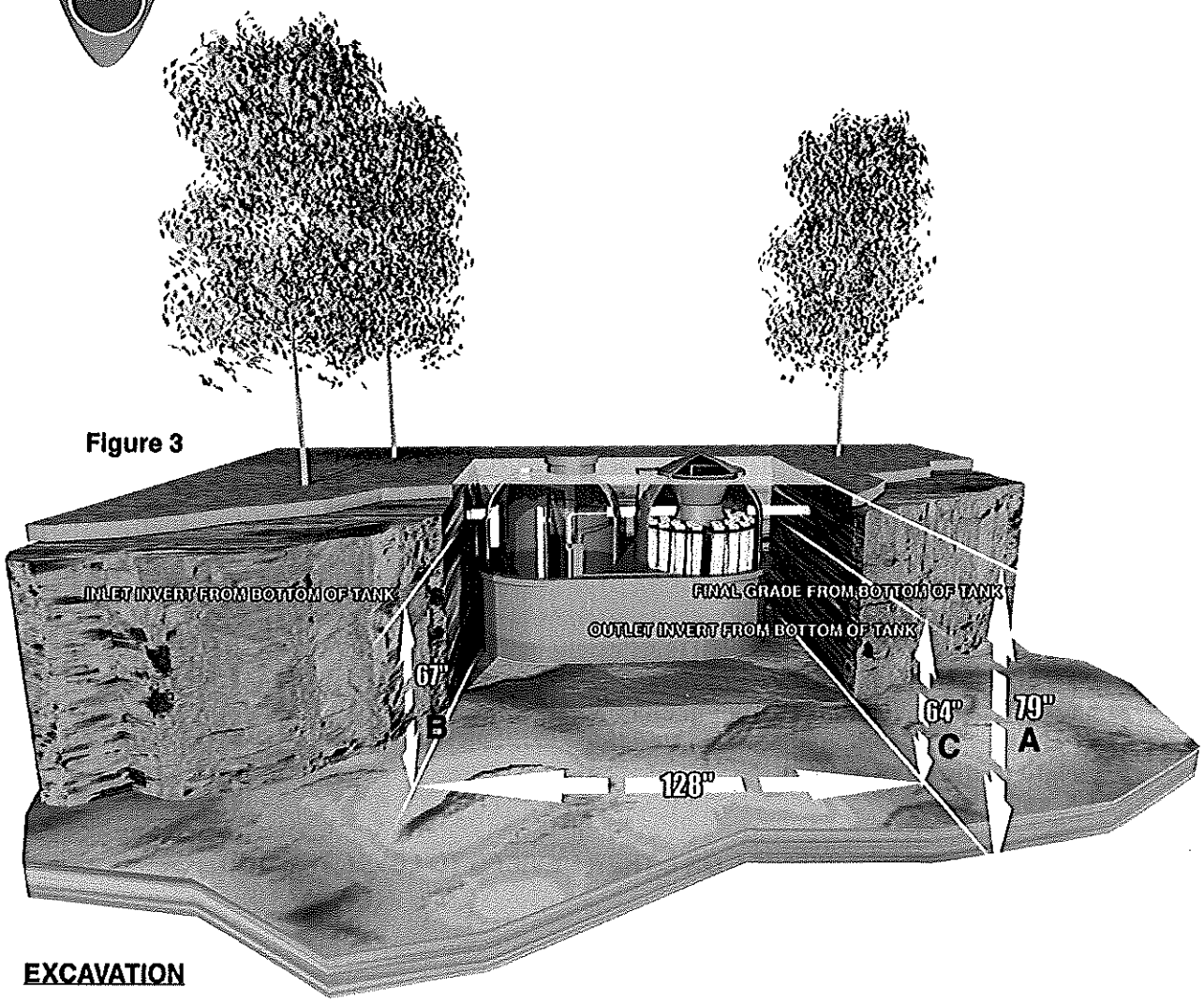
Treatment Tank (750 Gal. Per Day)

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

Dose Tank (525 Gal. Cap.)

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

Figure 3



EXCAVATION

Prepare the excavation and determine the depth required based upon the elevation of the invert of the inlet sewer line (B) or the elevation of the finished grade (A), both of which should conform to the site plan and contain an additional 4"-6" for the gravel base.
NOTE: If the distance from the finish grade elevation to the bottom of the excavation exceeds the dimension (A) shown in Figure 3, a riser will be required.

MINIMUM BEDDING REQUIREMENTS

Bed units in 4" - 6" O.D.O.T. #8 pea gravel and smooth out evenly. The excavation bottom should be level and well compacted.

Localized soil and groundwater conditions may require specialized procedures to assure proper installation.

INSTALLATION OF THE ENVIRO-GUARD

Placing the wastewater treatment unit into the excavation (Refer to Fig. 3)

Using the lift hooks that are attached to the unit slowly lower into the excavation, setting it carefully on the leveled aggregate bottom.

Position the unit, so that the trash tank inlet (higher four inch pipe) is aligned with the sewer line from the building as shown on site plan. (See Fig. 3)

LEVELING THE WASTEWATER TREATMENT UNIT

CAUTION: For proper operation, care must be taken to level the system.

Place a level across the center weir tower in several directions adjusting the unit until it is roughly level. To accurately finish leveling the unit plug the outlet pipe with a four-inch plastic pipe cap. Fill the area outside of the circular weir with water, adjust the unit until it is level by having water spill into the aeration chamber evenly over the weir. Leveling can be accomplished by shifting the bedding materials. Bedding materials must be evenly distributed to support the weight of the filled system.

DO NOT USE WEDGES OR OTHER DEVICES TO LEVEL THE UNIT.

FILLING THE TANKS WITH WATER

CAUTION: To avoid damage from flotation, always fill the tanks.

Fill each tank with clean water. Do not use water from a pond, river or ground water in the excavation because this water will contain silt or sediment. The ENVIRO-GUARD contains three tanks: a trash trap, a pump tank and a treatment system which will clog filter socks. Fill the trash trap to the outlet invert, and fill the treatment system to the outlet weir. Fill the pump tank enough to submerge the dosing pump. Alternate filling the trash trap and treatment system. While filling, check frequently to make certain that the tank remains level. If the tank shifts or seems to settle unevenly, discontinue filling and make the necessary corrections to level the tank. Stop filling the tanks when water flows out of the trash trap, when the water begins to flow over the weir and when the dosing pump is submerged.

BACKFILLING THE TANK

Once the tanks have been leveled and have been filled with water according to the instructions outlined in this manual, backfilling can begin (See Fig. 4).

Glue and firmly insert the inlet and outlet sewer pipes (4" Sch. 40 PVC) into their respective fittings.

Using O.D.O.T. #8 pea gravel carefully backfill (by hand) until there is approximately 2-3' of compacted fill around the tank.

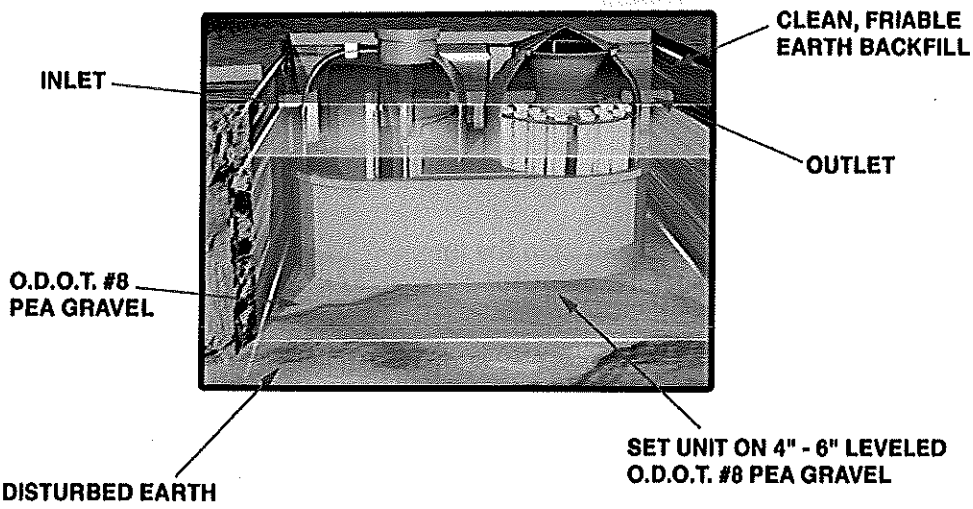
After checking the tank to insure it is level, place the access lids on the tanks and carefully backfill to the bottom of the inlet and outlet pipe with pea gravel.

Finish backfilling to a level approximately 2 inches below the access lids with clean, friable soil. Care should be taken with the backfilling procedures to prevent damage to the unit with rocks or clods of dirt, especially if the original soil is used for backfilling. When landscaping is completed, the access lids should be 2 inches above, finished grade level.

CAUTION: To prevent any damage to the inlet or outlet pipes due to settling or backfilling, make sure that both the inlet and outlet pipes are set on undisturbed or firmly packed fill material prior to final backfilling.

If the final elevations will not allow for the proper installation of the ENVIRO-GUARD, a lift station can be installed upstream. This lift station will pump wastewater into the ENVIRO-GUARD, which is installed at the proper elevation. A riser not exceeding 24 inches in height may be installed when elevation issues are not severe.

FIGURE 4



INSTALLATION OF FILTER BAGS AND EXPANDERS

Carefully place an expander into the bag and slide it to the bottom. Be careful not to damage the filter bags during installation.

Insert the closed end of the filter bag into one of the holes in the hanger plate.

Continue this process until all filters and expanders are installed. All holes in the hanger plate must have a filter and an expander.

INSTALLATION OF SPRING FASTENERS

All filters and expanders must be installed.

STEP 1 - Grasp the spring fastener.
STEP 2 - Squeeze the arms of the fastener together until it will slip into the filter bag up to the grooves.


FIGURE 5

STEP 3 - Release the spring, so that the top of the groove in the fastener is on top of the ring that is inside the filter. The bottom of the groove should be in contact with the underside of the hanger plate. The fastener is now holding the filter to the hanger plate. Place a second spring fastener in the filter at a right angle, so that it lays across the first fastener (see Fig. 5).

Continue until each filter has two fasteners in place.

AERATOR ASSEMBLY AND INSTALLATION

Remove all parts of the aerator from the box. This should include: aerator, legs (3), tee, 1/2" plug, 1/2" nipple, and the owner's manual.

Screw the three (3) legs into the angular threaded holes in the bottom of the aerator cross-shaped piece. Make sure the leg is screwed all the way into the cross.

A plastic cap must be on the plain end of each leg.

Turn the aerator on its side and spin the impeller by hand several times.
THIS STEP IS IMPORTANT TO ENSURE THE IMPELLER IS FREELY ROTATING.

With the aerator in the position shown (See Fig. 4) assemble the plastic tee to the nipple on the aerator.

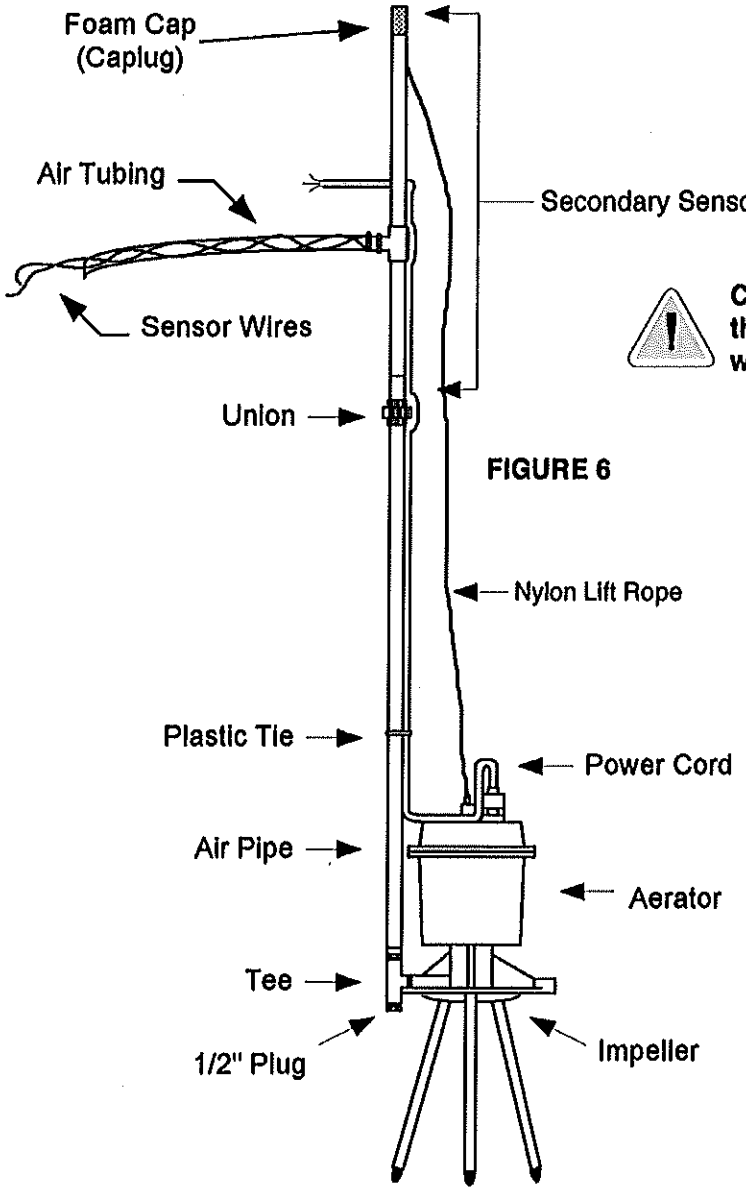
Screw the one-half inch plug into the bottom of the tee.

Screw the threaded end of the air intake pipe into the top of the tee.

Attach the sensor assembly (Fig. 6) with the union to the air intake pipe. Tighten as much as possible by hand. NOTE: Be sure that the O ring seal is in the union half of the assembly.

Tie the aerator power cord and lift rope to the air intake pipe with the plastic ties.

By grasping the lift rope, carefully lower the aerator assembly through the center of the tank opening to the bottom.



CAUTION: Be sure to keep the air tubing from crimping which will prevent air flow.

FIGURE 6

CAUTION: Do not pull or stretch the power cord. To facilitate removal, a nylon rope should be attached to the lifting ring on the top of the aerator.

DOSING PUMP ASSEMBLY AND INSTALLATION

Remove the pump from the box. Attach nylon lift rope, screw the prefabricated piping into the pump outlet (the entire assembly is temporarily attached to the dosing tank baffle for shipment). Tie the pump power cord to the pipe assembly with plastic ties. Lower the assembly into the dosing tank and screw the union fittings together to complete installation. See FIGURE 7

CAUTION: Union must be within 10" of bottom of access cover. Pipe assembly may need to be adjusted onsite for final application.

CAUTION: Power cords and auxiliary float cables are to run into the watertight cord grips located on end of wire chase.

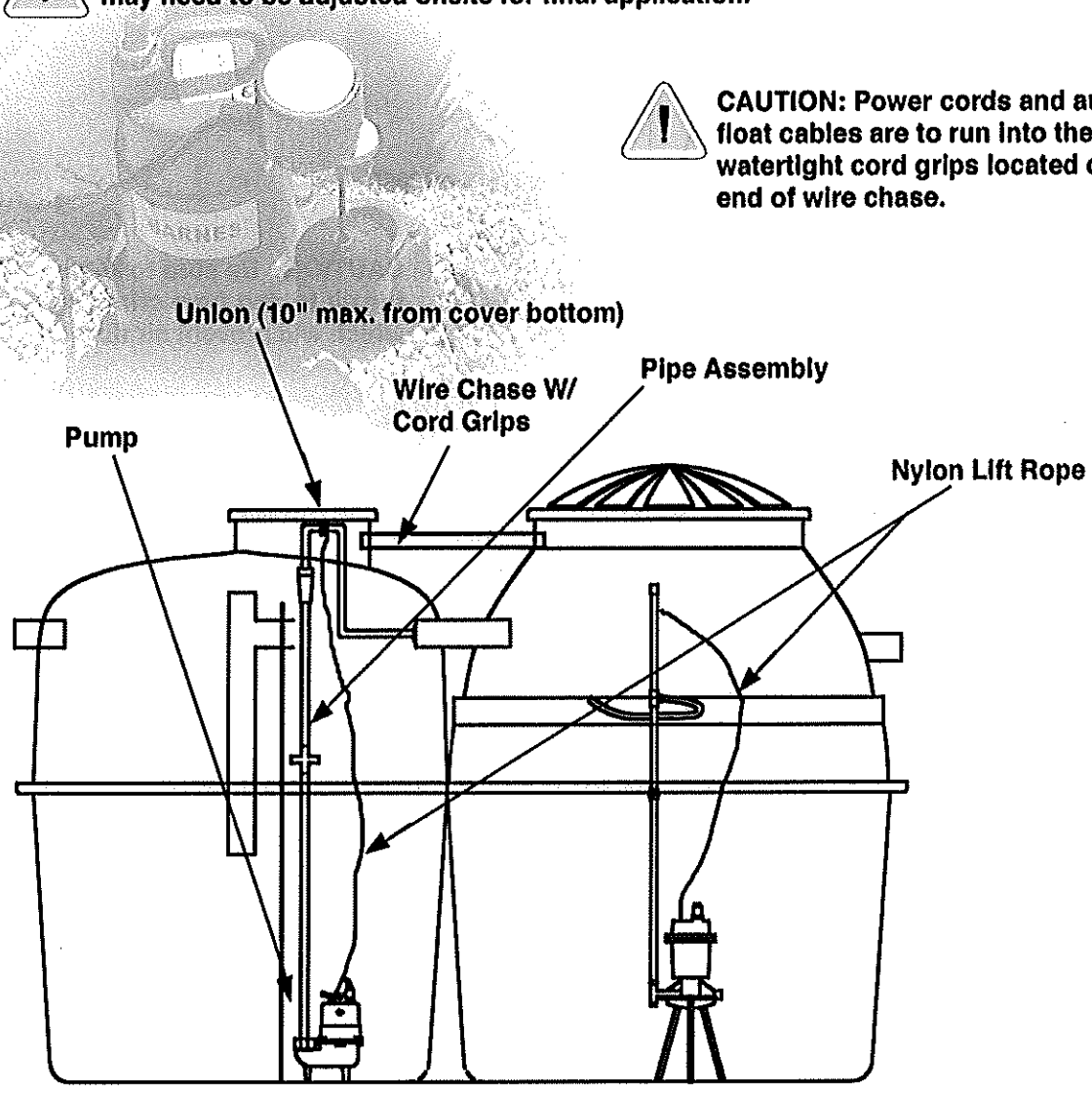
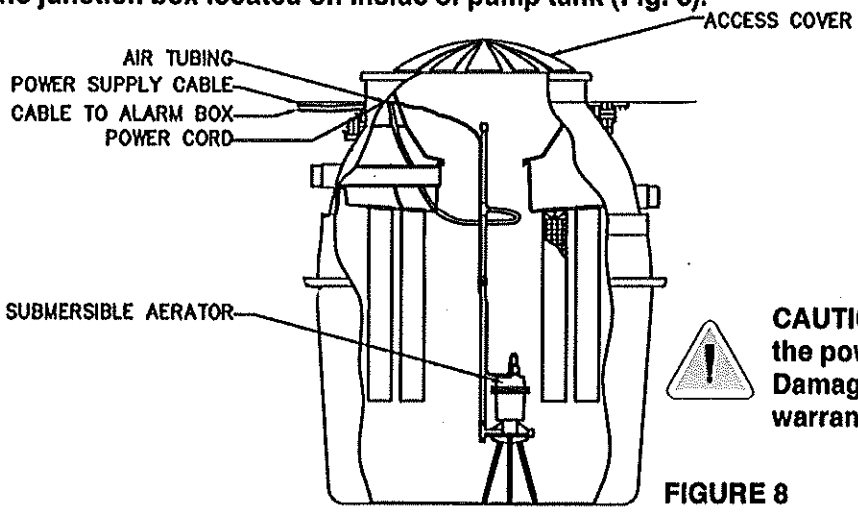


FIGURE 7

SENSOR ASSEMBLY

Run the aerator power cord through the watertight fittings at capped end of wire chase and into the junction box located on inside of pump tank (Fig. 8).



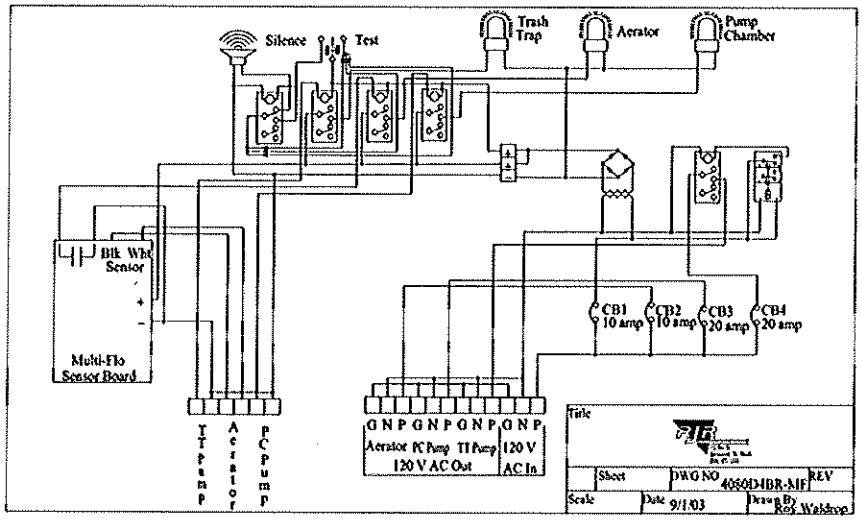
CAUTION: Use care when running the power cord through the fittings. Damage to the cord will void the warranty.

FIGURE 8

ELECTRICAL CONNECTIONS (ALARM AND AERATOR)
(Refer to specific installation sheet for each model)

ELECTRICAL CONNECTIONS

Wiring should be connected to terminals, as shown in the Wiring Diagram. Each terminal is appropriately marked for the incoming power, pump, aerator, and alarm leads.



CAUTION: Wiring is dependent on your specific application. Please refer to the wiring diagram supplied with your control panel. All connections should be in accordance with local codes and regulations.

START-UP PROCEDURES

CHECKING THE AERATOR

Once the aerator and alarm have been installed, and all electrical work is completed, power should be supplied to the aerator and alarm.

Check the aerator to insure proper operation. If no air bubbles are observed coming from the aerator, immediately disconnect the power source. Refer to the Trouble-Shooting Checklist for corrective action.

CHECKING THE FILTERS

Once the aerator is running, check each filter to see if any air bubbles are escaping under the filter ring. If so, remove the clips, re-adjust the filter and re-install the clips. Some adjustment may be necessary to eliminate the bubbles.

CHECKING THE ALARM

With the power being supplied to the aerator and alarm, press the "test" button to activate the alarm.

YOU MUST HOLD THE TEST BUTTON DOWN FOR 6-to-7 SECONDS BEFORE THE ALARM ACTIVATES.

Shut the power off to the aerator and check if the alarm is activated. Again, allow 6-to-7 seconds for the alarm to sound.

If the alarm is not activated during these tests, refer to the Trouble-Shooting Checklist for corrective action.

If the alarm activates after 10-15 minutes of operation, reverse the white and black sensor wires in the alarm.

UNIT START-UP

Once the aerator and alarm have been checked and are operational, the unit is ready to receive sewage flows.

Normally, it is not necessary to add any chemicals or enzymes to facilitate unit start-up. It is helpful, however, to limit the discharge of excessive amounts of gray water from showers and laundry during the initial 6-to-8 weeks of use.

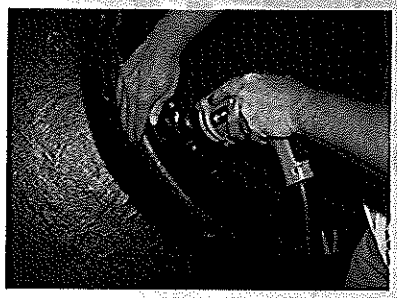
Noticeable odor or foaming, contact the factory or the local authorized representative for the proper procedure to follow to attain normal operation.

APPENDIX A - DOSING TANK RISER INSTALLATIONS

Based on site conditions, risers may be required to ensure proper operation. The following outlines the manufacturer's recommended steps for installation.

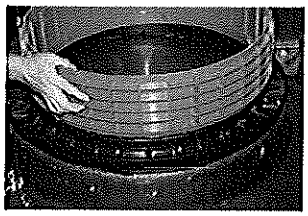
CAUTION: Care must be taken to ensure all joints are sealed and mechanically fastened for watertightness. Do not install riser sections over 24" without contacting the manufacturer or authorized installation professional.

DOSING TANK RISERS

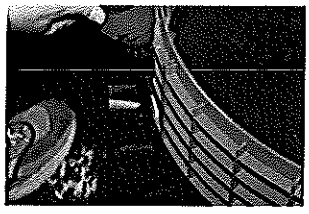


Manufacturer installed sealant and riser adapter mechanically fastened to ensure watertightness (1 x .75 CS-202 butyl sealant, 8 stainless steel carriage bolts w/ lock washers and nuts).

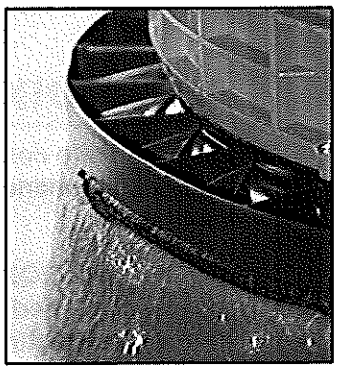
STEP 1
Remove any dirt or debris from surface. Install 1/2" x 1/2" CS-202 butyl sealant into groove on riser section.



STEP 2
Install riser section into the tank adapter and push down to seat riser.



STEP 3
Secure riser to adapter with stainless steel fasteners. A 30% compression of sealant should be obtained once screws are in place creating a watertight joint. Repeat procedure for each riser section to be installed.



CS-202 SEALANT SPECIFICATIONS

SEALING PROPERTIES

- Provides permanently flexible watertight joints.
- Low to high temperature workability:
- CS-102 . . . 30°F to 120°F (-1°C to 48°C)
- CS-202 . . . 0°F to 120°F (-12°C to 48°C)
- Rugged service temperature: -30°F to +200°F (-34°C to +93°C)
- Excellent chemical and mechanical adhesion to clean, dry surfaces.
- Sealed joints will not shrink, harden or oxide upon aging.
- No priming normally necessary. When confronted with difficult installation conditions, such as wet concrete or temperatures below 40°F (4°C), priming the concrete will improve the bonding action. Consult Concrete Sealants for the proper primer to meet your application.

HYDROSTATIC STRENGTH

Both ConSeal CS-102 and CS-202 meet the hydrostatic performance requirement as set forth in ASTM C-990 section 10.1 (Performance requirement: 10psi for 10 minutes in straight alignment – in plant, quality control test for joint materials.)

SPECIFICATIONS

ConSeal CS-102 and CS-202 meet or exceed the requirements of Federal Specification SS-S-210 (210-A), AASHTO M-198B, and ASTM C-990-91.

IMMERSION TESTING

- 30-Day Immersion Testing: No visible deterioration when tested in 5% Caustic Potash, 5% Hydrochloric Acid, 5% Sulfuric Acid, and 5% saturated Hydrogen Sulfide. *

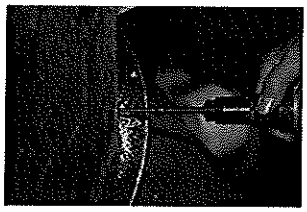
- One Year Immersion Testing: No visible deterioration when tested in 5% Formaldehyde, 5% Formic Acid, 5% Sulfuric Acid, 5% Hydrochloric Acid, 5% Sodium Hydroxide, 5% Hydrogen Sulfide and 5% Potassium Hydroxide.

- Requirements of ASTM C-990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

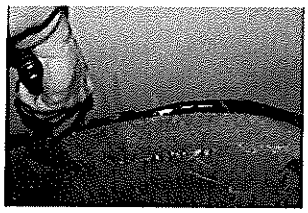
APPENDIX B - TREATMENT TANK RISER INSTALLATIONS

Based on site conditions, risers may be required to ensure proper operation. The following outlines the manufacturer's recommended steps for installation.

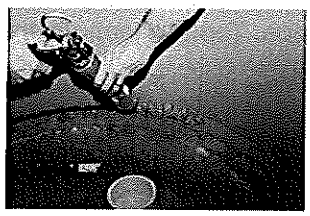
TREATMENT TANK RISERS



STEP 1
Level and fasten fiberglass riser to treatment plant with 4-6 stainless steel fasteners (supplied by manufacturer).



STEP 2
Fill any gaps between riser and treatment unit with CS-202 butyl sealant to create a dam for final elastomeric sealant.



STEP 3
Apply CS-1500 elastomeric sealant around the entire inner perimeter and trowl smooth to create a watertight bond. CS-1500 should also be used over all riser fasteners to seal penetrations.

CAUTION: Care must be taken to ensure all joints are sealed and mechanically fastened for watertightness. Do not install riser sections over 24" without contacting the manufacturer or authorized installation professional.

CS-1500 SEALANT SPECIFICATIONS

SEALING PROPERTIES

- CS-1500 is a moisture curing, elastomeric sealant
- Exhibits flexible, resilient rubber that adheres to a wide variety of substrates
- Joints designed to accommodate 50% total joint movement will not affect the seal or adhesive bond of CS-1500.
- CS-1500 will extend and compress a total of 50% of the installation width.
- Unaffected by water contact during or after cure on non-porous substrates
- Tack free skin is formed in 2 to 4 hours (@ 75°F / 23°C)
- Full cure takes place in 24 to 48 hours
- Exhibits excellent weatherability when exposed to ultraviolet radiation, rain, infrared radiation, atmospheric hydrocarbons.
- CS-1500 can be painted with emulsion or synthetic enamel paints.
- Available in 10.3 ounce cartridges; Five gallon pails.
- Shelf Life: 12 months when stored at temperature not exceeding 80°F
- Color: Gray

CS-1500 may be factory or field applied to seal various construction components. No primer is required except on masonry subjected to continuous immersion. Some substrate surfaces may required special cleaning or treatment for optimum performance. Tooling techniques using solvents or soapy solutions are not recommended.

SPECIFICATION COMPLIANCE

CS-1500 MEETS OR EXCEEDS THE TEST REQUIREMENTS OF:

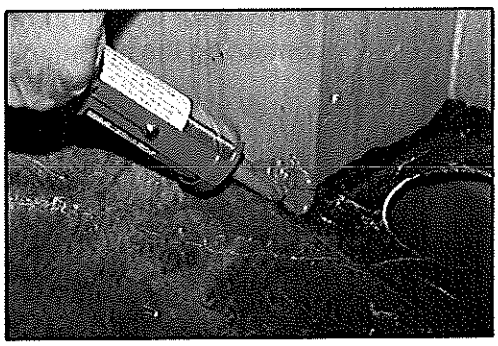
TT-S-00230 C (TYPE II) CLASS A, NON SAG, ONE COMPONENT

ASTM C 920 TYPE S, GRADE NS, CLASS 25, USE NT,

USE –A, USE-M, USE-G, USE-O

COMMERCIAL ITEM SPECIFICATION A-A-1556A

AAMA 808.3-92



APPENDIX C - ULTRAVIOLET DISINFECTION UNIT

DESCRIPTION

The Consolidated Treatment Systems ultraviolet disinfection (CTS UV) lamp, patent pending, is specifically developed to disinfect the effluent from onsite wastewater treatment units. The CTS UV lamp reduces fecal coliform bacterial levels well below the most stringent US treatment standards, even if an upstream treatment unit is operating in a mild upset condition.

Onsite wastewater treatment systems are installed such that their discharge piping is below grade. The CTS UV lamp couples directly to the discharge pipe and is permanently installed below grade. Figure 9 shows the design details of the unit.

The ultraviolet light source for disinfection is mounted in a sub-assembly, which can be inserted or removed through the top of the riser pipe for periodic servicing. The light source is mounted in the center of an anodized aluminum frame that divides the disinfection chamber in half. A frame gasket seals against the inner surface of the disinfection chamber to prevent bypass.

The disinfection sub-assembly is water tight throughout its length, which extends approximately one foot above grade. Waterproofing protects the electrical connections against a backup, which could cause the wastewater effluent level to rise to the maximum height of the upstream treatment plant.

Two pins mounted near the top of the disinfection chamber properly orient the lamp when the sub-assembly is inserted. Wastewater entering one side of the unit flows vertically downward makes a 180-degree turn, and then flow vertically and out the other end of the unit. This flow path is results in an exposure time sufficient to complete the disinfection.

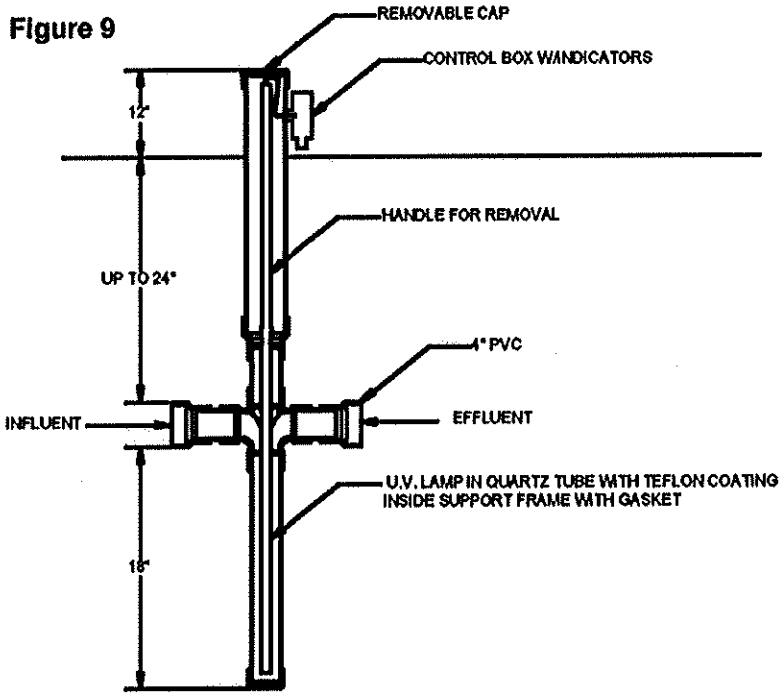
The ultraviolet lamp is surrounded by a clear, fused quartz tube to control lamp surface temperature. A clear Teflon film covers the quartz tube to minimize surface fouling. This design feature incorporates the beneficial attributes of both quartz and Teflon. When the disinfection chamber is filled with water, the ultraviolet light source can operate continuously, whether or not effluent is flowing. Continuous operation within a lamp surface temperature range of 105 -120 degrees Fahrenheit provides optimum ultraviolet light output and long lamp life.

The UV system operates on 12 Volt DC power and consumes less than 25 watts. A DC power converter is mounted inside junction box accepts standard 110 - 120 VAC. Two DC converter outlet wires are run from the home to the UV disinfection system through underground conduit to the electrical junction box on the above ground portion of the riser pipe. The power lead wires attach to a terminal strip inside the junction box.

A fiber optic probe conveys visible light from the ultraviolet light source to an electrical junction box mounted on the riser. Owners and maintainers can confirm operating status without having to remove the disinfection sub-assembly.

Two indicators, located on the outside of the electrical junction box, show the operating status of the ultraviolet disinfection system. One is a green LED, which indicates the availability of 12 VDC electrical power in the junction box. The other is a terminus of the fiber optic probe, which indicates that the ultraviolet light source is operating.

Figure 9



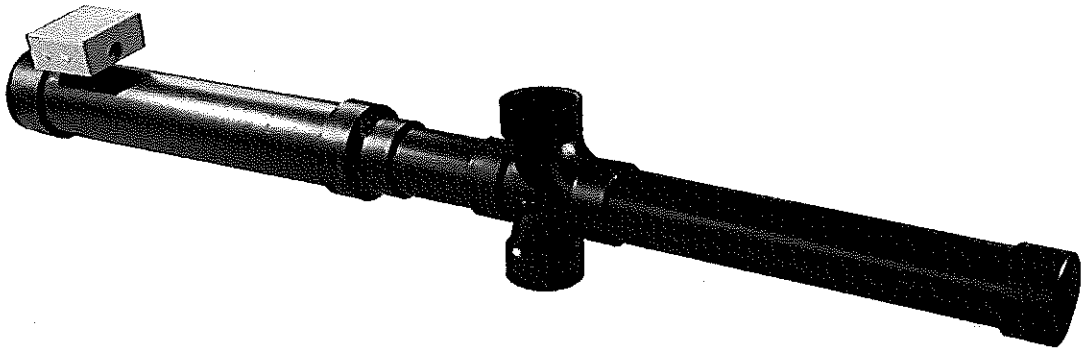
SPECIFICATIONS AND PERFORMANCE

Fecal coliform removal exceeds 3-logs—99.9 percent—when the following conditions are met:

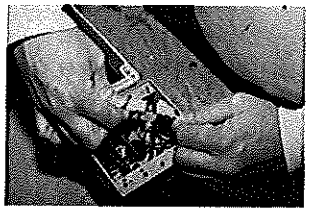
- The maximum flow is 6 gpm or less
- Total Suspended Solids (TSS) is less than 30 mg/L
- Five-day Biological Oxygen Demand (BOD_5) is less than 30 mg/L

There are no adverse effects from over exposing the effluent to germicidal ultraviolet light, because ultraviolet disinfection does not form byproducts in contrast to chlorination and other chemical disinfection methods.

APPENDIX C - ULTRAVIOLET DISINFECTION UNIT

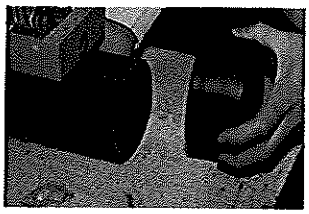


SERVICE

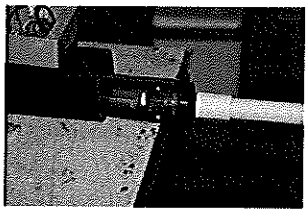


STEP 1
Tun power off to UV unit at control panel. Remove cover to electrical box and disconnect power terminal. Pull plug from UV bulb through electrical box.

CAUTION: To avoid risk of electric shock, disconnect electric power supply at control panel before servicing unit.

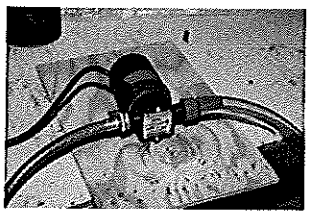


STEP 2
Remove waterproof cap from top of the UV unit

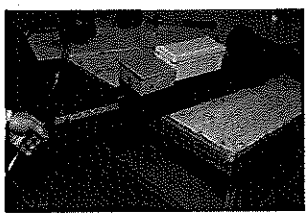


STEP 3
Grasp PVC handle attached to bulb assembly and carefully slide bulb out of housing. Set bulb assembly off to the side for cleaning.

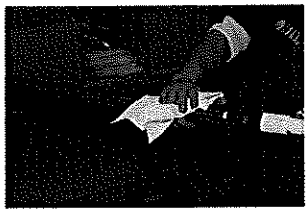
CAUTION: Bulb assembly is fragile. Care should be taken to prevent breaking bulb.



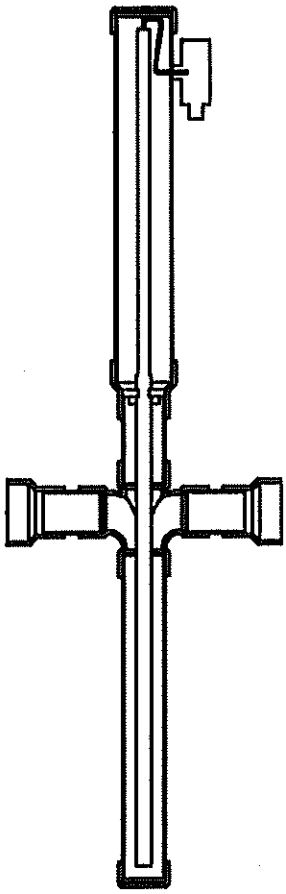
STEP 4
Attach flexible hose to the inlet and discharge sides of an electric or gas powered pump. NOTE: Rigid PVC pipe can be fitted to the inlet hose and used as a wand to vacuum solids from the bottom of the UV housing.

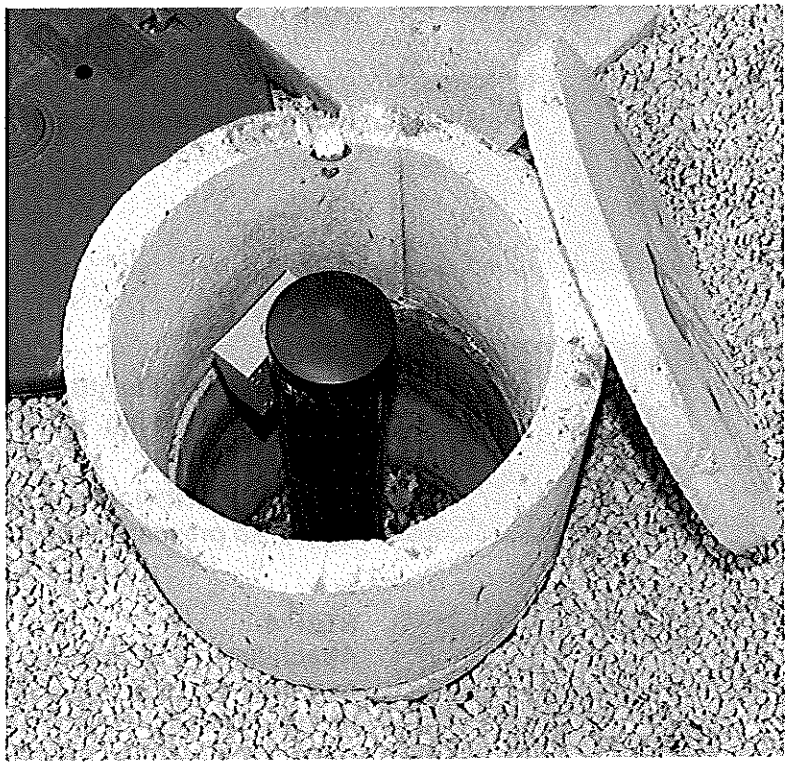


STEP 5
A standard garden hose can be used to spray inside of UV housing. Vacuum solids from bottom of UV housing and pump back into the trash tank.



STEP 6
Wash bulb assembly with soap and water. Dry with a clean soft towel. Re-assemble bulb assembly and hook up electrical connections.

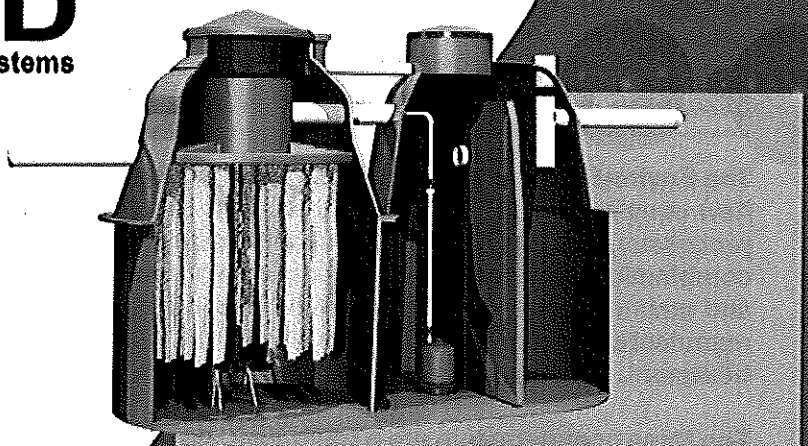




Enviro™

GUARD

Wastewater Treatment Systems



OPERATION, MAINTENANCE & TROUBLE-SHOOTING GUIDE

Consolidated Treatment Systems, Inc.
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Franklin, OH 45005
937-746-2727
Fax: 937-746-1446
www.consolidatedtreatment.com

CONSOLIDATED

Time Tested Wastewater Solutions!

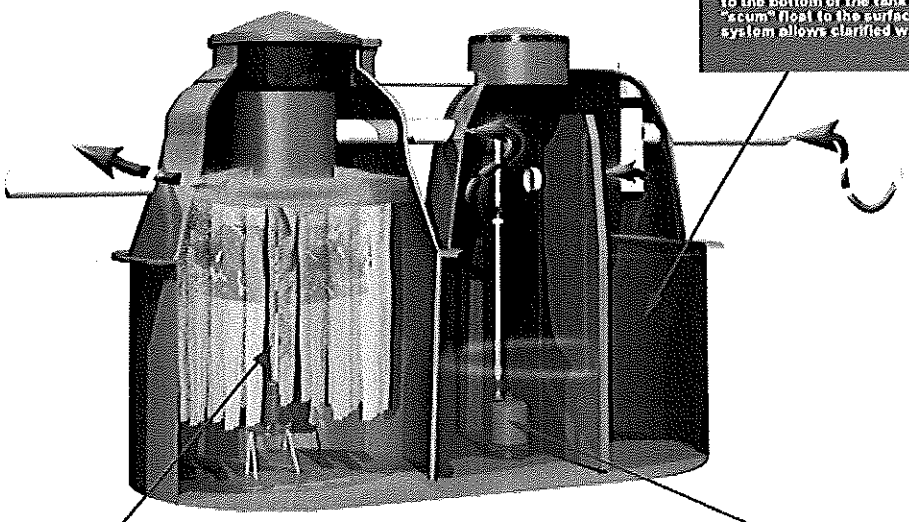
Enviro-Guard™ Wastewater Treatment System

BASIC OPERATION & MAINTENANCE REQUIREMENTS

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

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

Figure 1



Trash Tank (490 Gal. Cap.)

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

Treatment Tank (750 Gal. Per Day)

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

Dose Tank (525 Gal. Cap.)

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

Enviro-Guard™ Wastewater Treatment System

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

Figure 2 provides Enviro-Guard Details

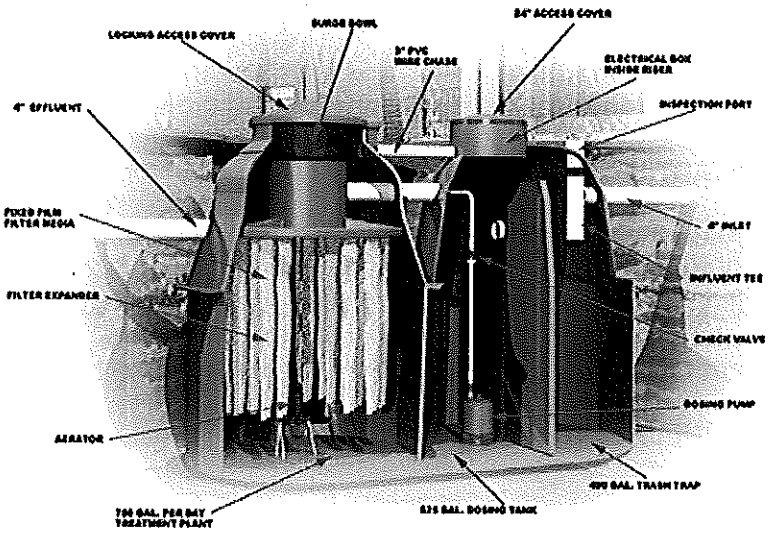


Figure 2

Enviro-Guard Components and Materials

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

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

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

Filter Tubes:
- Felted Polyester Fabric

Tube Expanders:
- Slotted and Drilled Polyethylene Pipe

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

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

ASSEMBLY AND INSTALLATION

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

START UP:

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

PUMPING EXCESS SOLIDS:

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

DOSING PUMP CLEANING AND REPLACEMENT:

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

FILTER CLEANING:

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

AERATOR CLEANING REPLACEMENT:

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

Enviro-Guard™ Wastewater Treatment System

ALARM:

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

SERVICE CONTRACT:

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

REPLACEMENT PARTS/SERVICE:

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

SUMMARY OF MAINTENANCE REQUIREMENTS

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

Table 1—Summary of Maintenance Requirements for Residential Installations

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

Enviro-Guard™ Wastewater Treatment Sy

ALARM:

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

SERVICE CONTRACT:

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

REPLACEMENT PARTS/SERVICE:

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

SUMMARY OF MAINTENANCE REQUIREMENTS

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

Table 1—Summary of Maintenance Requirements for Residential In

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Step 20 Test the alarm system.

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

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

PUMPING

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

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

PUMPING FREQUENCY

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

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

DETERMINING PUMPING FREQUENCY

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

Procedure

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

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

PROCEDURE FOR PUMPING THE ENVIRO-GUARD

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

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FILTER CLEANING

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

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

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

CLEANING PROCEDURE DURING ROUTINE PUMPING

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

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

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

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

CLEANING THE HANGER FILTER PLATE AND WEIR

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

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

PROCEDURE:

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

CLEANING FREQUENCY:

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

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

AERATOR REPLACEMENT

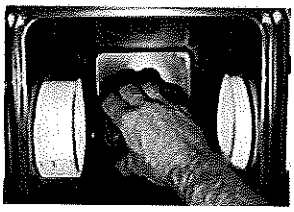
PROCEDURE:

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

ALARM REPLACEMENT

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

SAMPLE COLLECTION



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

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

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

IDENTIFYING & NARROWING THE SCOPE OF SYSTEM MALFUNCTIONS

When you are confronted with a service issue, you may not be sure where to begin. There are several steps you can take to help you identify and correct malfunctions. Simple visual inspections can eliminate and focus diagnosis and correction of issues.

Alarm events are the results of high water and aerator failures. These failures can be caused by several factors, all of which you can diagnose. If you eliminate causes under the owner's control, you can limit your examination to issues you can correct.

An electrical failure, through a power loss or open circuit breaker, is the chief cause of high water or aerator failure. Assuming the owner has checked the main panel, check the Enviro-Guard panel and confirm that all circuit breakers are properly activated.

High water can result from excessive flow into the unit. Assuming the owner has checked all plumbing fixtures in the dwelling or structure, examine the piping to confirm that there are blockages, and check the tank and lids to confirm there is no evidence of inflow. Be mindful that excessive laundry, high occupancy loads (such as a party), draining tubs, and so forth all can contribute excessive flow to the Enviro-Guard, so discuss with the owner and eliminate excessive flow as a cause.

High water can result from plugged filter media. Check for filter blockage by examining a filter. Pump the inside and see if it remains unfilled. If water does not flow into a pumped filter, or it flows slowly, replace the filter media.

High water can also result from groundwater through leaks in piping, lids, seams, and punctures in the fiberglass. Each potential source must be examined individually, and some examinations may require pumping of the unit and/or digging to uncover buried components.

Pump and aerator failures can examined by removing and inspecting the items for blockages, damage, or other indicators of impairment. While the items are removed, they may be activated for brief periods of less than two minutes to confirm if they operate properly. Replace inoperable pumps and aerators.

Check the pump timer if the pump is inoperable. The timer could have malfunctioned. Turn the On/Off dials to activate the pump. Test the pump in another circuit for operation. Replace an inoperable timer.

Odors may be indicative of faulty lid placement, faulty plumbing, incomplete treatment, or wastewater characteristics. Seal leaking lids. Raise roof vent so its height is close to the elevation of the peak. Confirm proper operation of the aerator.

Wastewater treatment can be inhibited by additions of medicines, disinfectants, degreasers, or toxic materials to the wastewater. Medicines, such as antibiotics and chemotherapy compounds, are particularly harsh. You should assess these types of items have entered the waste stream and eliminate them as much as possible. In serious cases, pumping may be the only solution to remove these compounds.

Owners may be reluctant to admit to taking medications or having used excessive amounts of toxic materials. Interview the owners, and if they are willing, examine their cleaning products and plumbing fixtures if they deny taking medicines or using toxic materials. You may be able to find evidence in the dwelling or structure. Such evidence would include presence of toxic materials in high quantities, residues, medicine bottles, and so forth. The Enviro-Guard may also contain evidence in the form of undigested capsules pills. A testing laboratory can perform toxicity testing and chemical analyses as a final resort.

Cloudy and/or odorous effluent is indicative of incomplete treatment or lack of maintenance. Perform maintenance and confirm proper operation. If effluent issues remain, begin the diagnosis to determine if toxic material is in the wastewater.

SERVICE POLICY

During your initial two-year warranty, an authorized service representative will inspect your unit at six-month intervals and make any necessary adjustment to the system. The only exception is for the replacement of "out of warranty" and "physically abused" parts or abuse to the treatment process. Moreover, this warranty will not cover other treatment and dispersal components and devices, such as pre-tanks, drain fields, pump stations, and the like.

In the event a problem arises or service is required, refer to the unit's data plate (located on the alarm and access lid) or the service label for instructions on contacting your closest service provider. Occasional pumping is required, due to the accumulation of solids. The pumping cost may not be covered under your maintenance and service program. If you need parts or service, please contact the factory for the name of the service provider nearest you.

Before the initial two-year warranty expires, your service provider will notify you, in writing, that an extended service agreement may be purchased. This extended service agreement will have terms, conditions, and limitations comparable to the initial agreement. If the service provider does not provide extended service agreements, the service provider will refer you to an authorized service provider who provides extended service agreements. You may also contact the Factory for assistance in locating an authorized service provider.

MODEL SERVICE INSPECTION REPORT

Model Service Inspection Report

DATE:_____

TIME:_____

SORRY WE MISSED YOU!

YOUR ENVIRO-GUARD SERVICE PROVIDER CALLED TODAY TO SERVICE YOUR SYSTEM.

HERE'S WHAT YOUR SERVICE PROVIDER OBSERVED

Mechanical Operation OK Not OK Comments_____

Effluent Color: Clear, Brown, Yellow Comments_____

Effluent Clarity: Clear, Cloudy Comments_____

Odor: None Musty Objectionable Fragrance Comments_____

Solids Overflow: None Evidence Comments_____

Issue Requiring Correction:_____

Anticipated Date and Time of Correction:_____

Other Comments:_____

Please call _____ **at** _____ **if you have any questions, concerns, or comments.**

Enviro™
GUARD
Wastewater Treatment Systems

OWNER'S MANUAL

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CONSOLIDATED
Time Tested Wastewater Solutions!

Enviro-Guard™ Wastewater Treatment System

Thank you for your recent purchase of the Enviro-Guard Wastewater Treatment System. We are confident that if properly maintained your system will provide years of trouble free operation while maintaining the highest effluent quality standards. Through the use of time tested components, certified under ANSI/NSF Standard 40, the Enviro-Guard system meets the needs for onsite wastewater treatment beyond the capabilities of septic tanks by providing three stages of treatment in one compact, easy to install, package.You can expect your unit to treat domestic-strength wastewater to produce an effluent that is clear, odorless and environmentally safe.

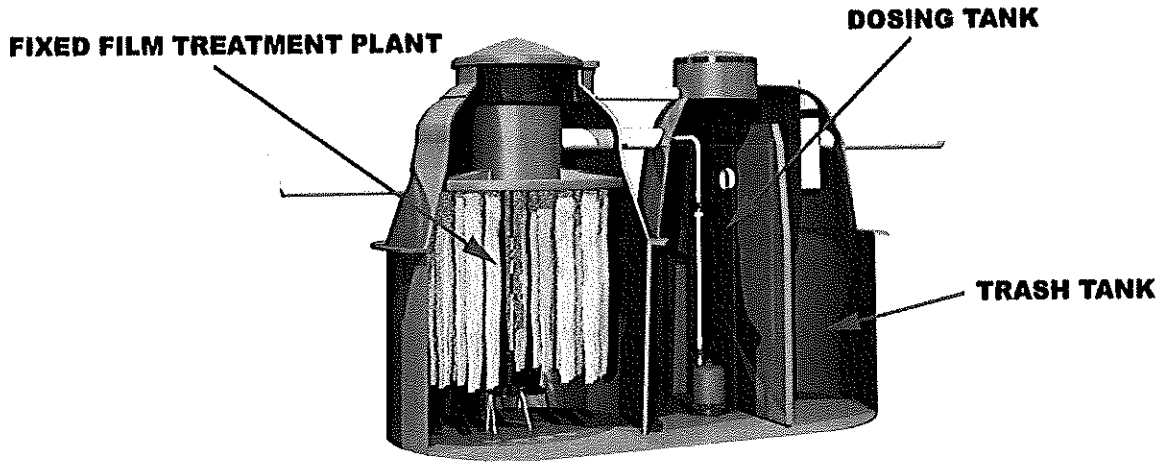


FIGURE1:
Enviro-Guard Wastewater Treatment System

HOW DOES THE ENVIRO-GUARD WORK?

Among the unique features of the Enviro-Guard is that the entire three stage process takes place within a single, watertight tank. Wastewater flows into the first stage, a trash tank, which traps grit, inert material, and floatable solids. From the trash tank, clarified wastewater flows into a dosing tank where it is pretreated and held until it is pumped into the final treatment tank in measured doses and at timed intervals. Inside the treatment tank, an aerator near the bottom draws air in and disperses it. This process transfers oxygen throughout the tank. The oxygen, which is dissolved in the water, provides an environment that promotes the growth of aerobic microbes. These microbes effectively consume organic materials. As important, the oxygen promotes the growth of microbes on the 135 ft2 of fabric media that are placed into the tank. Figure 1 shows the Enviro-Guard.

Fixed film filter media serve a second, vital function: filtration of the effluent. All treated water leaving the tank passes through the filters. All solids are retained in the system. There is no by-pass to permit organic waste to be discharged into the environment.

The result is CLEAR, ODORLESS, AND ENVIRONMENTALLY SAFE EFFLUENT!

IMPORTANT ITEMS TO REMEMBER

The Enviro-Guard has an initial break-in period from four-to-six weeks, during which time bacteria and other microorganisms establish themselves in the treatment tank and on the fabric media. The development of these colonies occurs naturally, so use all plumbing fixtures in a normal manner from initial start-up. You may notice a tendency for the unit to foam from laundry wastes during this period. This is normal and should cease by the sixth week. You can control this foaming by using moderate amounts of low-sudsing bio-degradable liquid detergents.

Enviro-Guard systems are designed to treat domestic-strength wastewater and should not be expected to treat industrial-strength wastewater. The continuous addition of large amounts of cleaners, greases, and oils, etc., will lead to a need for service calls. DO NOT DISPOSE OF PAINTS OR SOLVENTS IN ANY QUANTITY.

Storm drains and other surface waters should not be permitted to enter the system because the additional water will overload the unit.

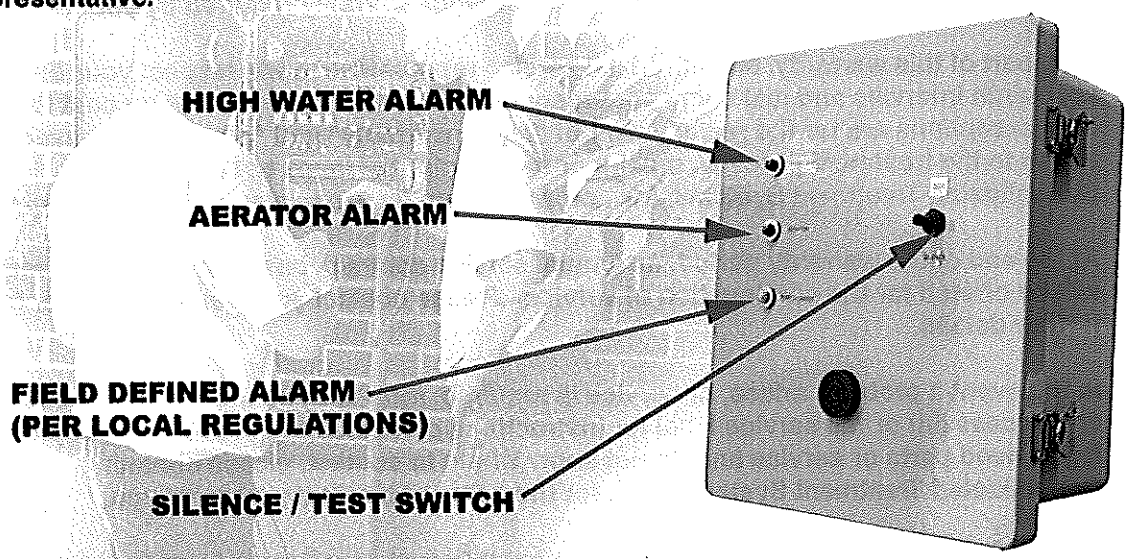
You will not be required to service or to maintain your Enviro-Guard unit, but there are a number of "DO" and "DO NOTS" to ensure proper, trouble free operation. Following these simple rules will minimize maintenance issues and prolong efficiency of your Enviro-Guard.

DO . . . Check that your unit's access lids are securely tightened down
DO . . . Keep the surface water from ponding around the unit
DO . . . Call your service technician at the first sign of trouble
DO . . . Follow your service technician's advice. He is trained to ensure that your unit operates at its maximum efficiency
DO . . . Use low-sudsing, low phosphate bio-degradable detergents
DO . . . Contact your authorized Enviro-Guard service representative if the system is to be used intermittently or if extended periods of non-use are anticipated
DO . . . Contact your service representative when you plan to leave the unit operating for extended periods of no-flow

DO NOT . . . Put non-disposable items into your system. These items include but are not limited to: wet strength paper towels, disposable baby diapers, sanitary napkins, rubber and plastic products, rags, grit and coffee grounds
DO NOT . . . Place excessive amount of fats, oil, or grease into your system. This will impair the operation of the system
DO NOT . . . Put solvents, paints, etc., in the drain. These are harmful to the environment and will increase the need for service.
DO NOT . . . Attempt to service the unit yourself. This may void your warranty

AUDIO VISUAL CAUTION SYSTEM

Every Enviro-Guard unit comes equipped with an audio-visual alarm system. This alarm should be mounted in a location that is visible and easy to access. If a service condition develops, you will be alerted—AUDIBLY and VISUALLY—with a light and buzzer. Silence the buzzer by pressing the silence button on the alarm. If the light should stay on, call your service representative.



Malfunctions may arise from a variety of causes. Here are some observations you can make in helping your service representative diagnose the malfunction:

1. Is the alarm activated during a non-flow period, i.e., late at night, early morning? If so, then the probable cause is a aerator outage, leaking plumbing or overloading from a sources outside the sanitary sewer (i.e., storm drains plumbed into treatment system).

2. Is the alarm activated intermittently while washing clothes or taking a shower? If so, then you may have an impending service need or excessive water use.

You should periodically check your alarm's circuitry by depressing the alarm test button and verify that the light and buzzer activate.

MAINTENANCE PROGRAM

YOUR ENVIRO-GUARD UNIT REQUIRES PERIODIC SERVICING AS OUTLINED BY NSF AS A CLASS 1 SYSTEM.

Maintenance of your Enviro-Guard is essential to ensure its proper operation and longevity, so your unit comes with an initial two-year maintenance warranty required by your servicing dealer.

As a part of this warranty, an authorized service representative will inspect your Enviro-Guard at six month intervals and make any necessary adjustments on your unit at no cost to you. The only exceptions are for the replacement of "out of warranty" and "physically abused" parts, abuse to the treatment process, repairs or replacement of items not supplied by Consolidated Treatment Systems, Inc., or installation issues related to the soil dispersal system.

At the end of the warranty period, an annual service contract, based on the above requirement will be offered for the continuation of service. Please contact your servicing dealer for further details.

In the event a problem arises, or service is required, refer to the data plate (located on the alarm and access lid) or the service label for instructions on contacting your service representative. If you need parts or service and do not know whom to contact, please contact Consolidated Treatment Systems, Inc., for the name of the dealer nearest you.

Periodic residuals removal is critical to the operation of your Enviro-Guard system. **Enviro-Guard systems accumulate inert material as a normal part of their operation. These solids will eventually need to be removed. When your service provider performs six-month maintenance, the service provider will measure the level of solids in the treatment tank. Your service provider will notify you when pumping is necessary. Typically, an Enviro-Guard will require pumping approximately every three years.Solids will accumulate in all three tanks, so periodic pumping will be necessary. Please speak with your servicing dealer so that you have a clear understanding of what equipment and services are covered in any warranty or annual service agreement.**

Your Enviro-Guard system is designed and intended to treat domestic-strength wastewater (i.e., human bodily waste and liquid waste generated by the occupants of dwellings). To insure optimum performance and longevity, do not discharge any type of non-residential wastewater or other high-strength waste, including commercial food service waste, without contacting the manufacturer to determine if this will be acceptable without additional treatment.

Enviro-Guard units must be installed and maintained in compliance with all state and local laws and regulations. This includes compliance with all regulations concerning proper effluent disposal and the pumping and disposal of solids and byproducts pumped from the unit.

IDENTIFYING SYSTEM MALFUNCTIONS

An alarm will alert you to high water and aerator failures. These failures can be caused by several factors, some of which you can diagnose. If you eliminate causes under your control, your service provider should be contacted to examine your system to determine the nature of the failure.

An electrical failure, through a power loss or open circuit breaker, is the chief cause of high water or aerator failure. Check the appropriate circuit breaker in your main electrical panel to determine that the breaker is properly activated.

High water can result from excessive flow into the unit. Check all plumbing fixtures in the dwelling or structure to confirm that there are no leaky fixtures. Be mindful that excessive laundry, high occupancy loads (such as a party), draining tubs, surface water leaking around lids, connections of stormwater drains and so forth all can contribute excessive water to the Enviro-Guard.

High water can result from plugged filter media. A qualified service provider, who should be contacted immediately, can only make this diagnosis.

High water can also result from groundwater or blocked piping. These issues are beyond the scope of this manual and must be addressed by a qualified service provider. Please contact your authorized Enviro-Guard dealer if you experience high water and have ruled out excessive flow from sources you can control.

Please contact your authorized Enviro-Guard dealer if you experience an aerator failure and have ruled out an open circuit breaker. The issue is now beyond the scope of this manual and must be addressed by a qualified service provider.

You should not experience odors from your Enviro-Guard. Odors may be indicative of faulty lid placement, faulty plumbing, incomplete treatment, or wastewater characteristics. If you notice an odor, check to see that lids are properly closed and locked. If this is the case, the odor may be coming from a roof vent. Raising the roof vent so its height is close to the elevation of the peak can eliminate odors from roof vents.

Odors can arise if incomplete wastewater treatment is taking place. Wastewater treatment can be inhibited by additions of medicines, disinfectants, degreasers, or toxic materials to the wastewater. Medicines, such as antibiotics and chemotherapy compounds, are particularly harsh. You should assess these types of items have entered the waste stream and eliminate them as much as possible. In serious cases, pumping may be the only solution to remove these compounds.

Some items, such as soap, have fragrances in them. You may notice these fragrances if you have added to much fragrance-containing substance to the wastewater stream. Fragrances are intended to "volatilize" easily, so eliminating the odor will result from using less of or eliminating the substance from wastewater.

Effluent from an Enviro-Guard system should be clear and odorless. If effluent is cloudy and/or has odors, contact your Enviro-Guard dealer immediately. The causes and remedies of effluent issues are beyond the scope of his manual.

SERVICE POLICY

The purchase of every Enviro-Guard Wastewater Treatment System includes a (2) year initial service policy furnished to the owner by the manufacturer or the authorized service representative. The initial policy contains provisions for 4 inspection / service visits (scheduled once every six months over a two year period) during which electrical, mechanical, and other applicable components are inspected, adjusted, and serviced.

The initial service policy also contains provisions for an effluent quality inspection consisting of a visual assessment for color, turbidity, and scum overflow, and an olfactory assessment for odor.

A authorized service representative will notify you, in writing, regarding any improper system operations that cannot be remedied at the time of inspection and the written notification shall include an estimated date of correction.

Following your initial (2) year service policy, an extended service policy will be made available, for purchase by the owner, with terms comparable to those in the initial service policy.

The only exception to the above is for the replacement of "out of warranty" and "physically abused" parts or abuse to the treatment process. Moreover, this warranty will not cover other treatment and dispersal components and devices, such as pre-tanks, drain fields, pump stations, and the like.

YOUR ENVIRO-GUARD WARRANTY DOES NOT COVER THE COST OF SERVICE CALLS, LABOR OR MATERIALS REQUIRED DUE TO THE FOLLOWING:

1. Misuse, "abuse," or any repair or alteration performed by anyone other than authorized Enviro-Guard personnel;

2. Use of components other than authorized Enviro-Guard replacement components;

3. Other influent, including but not limited to, flow from storm water connections, leaking piping, leakage from improperly maintained plumbing fixtures, water softener backwash, and the like;

4. Failure to maintain electrical power to the dosing pump and treatment tank in accordance with the requirements of the Consolidated Treatment Systems, Inc. or the authorized Enviro-Guard service representative;

5. Disposal into the Enviro-Guard of non-biodegradable materials (i.e., plastics, coffee grounds, etc.) chemicals, solvents, grease, all paints or any other type of non-domestic wastewater;

6. Wastewater flows to the Enviro-Guard that exceed the hydraulic or organic treatment design capabilities;

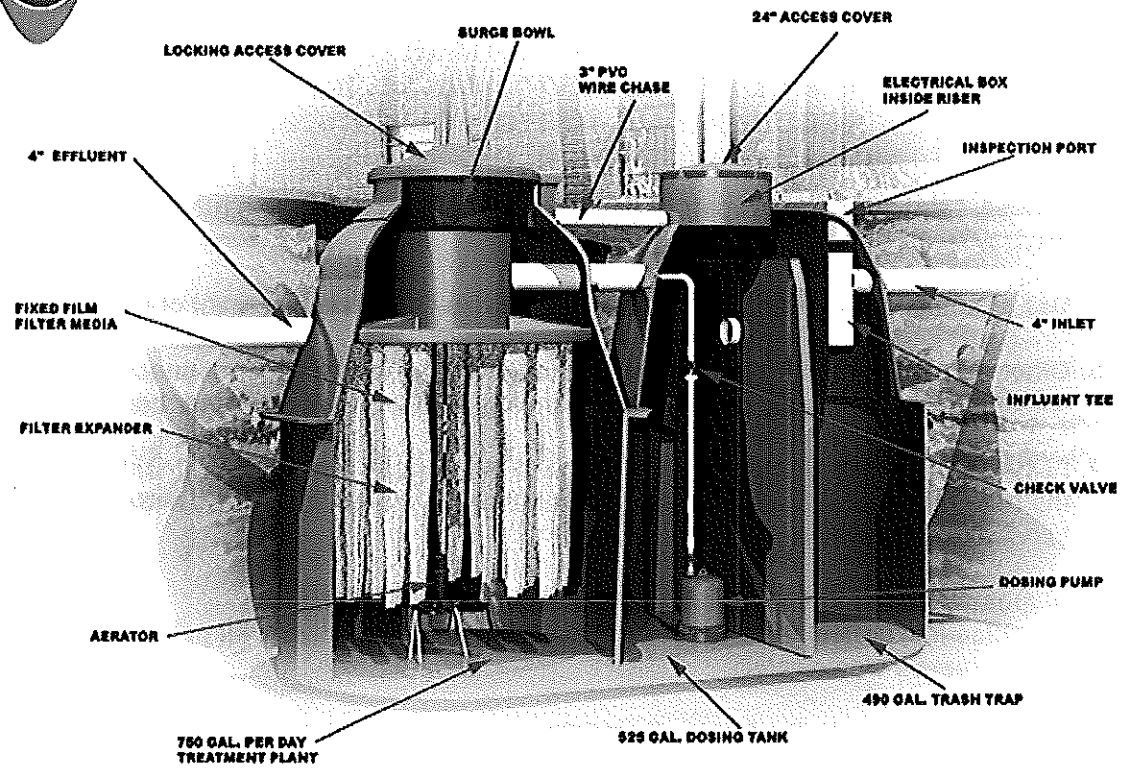
7. Any usage contrary to Enviro-Guard owner's manual and/or the Enviro-Guard representatives' recommendations. (Please refer to "Do's and Do Not's).

ENVIRO-GUARD SPECIFICATIONS, COMPONENTS, and MATERIALS

ENVIRO-GUARD SPECIFICATIONS FOR WASTEWATER TREATMENT
(Based Upon NSF Standard 40 Evaluation of Wastewater Treatment Process)

PARAMETER (Mean Results)	INFLUENT (mg/L)	EFFLUENT (mg/L)	REDUCTION (Percent)
$CBOD_5$	224	5	98%
TSS	219	5	98%

Enviro-Guard™ Wastewater Treatment System



Enviro-Guard Components and Materials

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

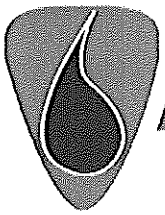
Dosing Pump:
- **Cast Iron, 1/3 hp Effluent Pump, 3450 rpm with 3/4-inch solids handling. 120 Volt AC, 60 Hz, 1.80 amps.**

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

Filter Tubes:
- **Felted Polyester Fabric**

Tube Expanders:
- **Slotted and Drilled Polyethylene Pipe**

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



Enviro-Guard™ Wastewater Treatment System

WARRANTY

Consolidated Treatment Systems, Inc., warrants the parts in each aerobic treatment plant to be free from defects in material and workmanship for a period of two (2) years from date of installation for treatment of household wastewater when properly registered with the manufacturer. Consolidated Treatment Systems, Inc., sole obligation under this warranty is as follows: Consolidated Treatment Systems, Inc., shall fulfill this warranty by repairing or exchanging any component part, FOB Factory, that shows evidence of defects, provided said component part has been paid for and is returned through an authorized dealer, transportation prepaid. The warrantee must also notify Consolidated Treatment Systems, Inc., of the defect complained of. There is no informal dispute settlement mechanism available under this LIMITED WARRANTY.

No warranty is made as to the field performance of any plant. This LIMITED WARRANTY applies only to the parts manufactured by Consolidated Treatment Systems, Inc., does not include any portion of the household plumbing, drainage, or installation of disposal system. Components or accessories supplied by Consolidated Treatment Systems, Inc., 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 Consolidated Treatment Systems, Inc., be responsible for delay or damages of any kind or character resulting from, or caused directly or indirectly by, defective components or materials manufactured by others.

Recommendations for special applications will be based on the best available experience of Consolidated Treatment Systems, Inc., and published industry information. Such recommendations do not constitute a warranty of satisfactory performance.

This LIMITED WARRANTY extends to the consumer of the product. As used herein, "consumer" is defined as the purchaser who first uses the plant or the subsequent user(s) for the 2 years after its initial installation. It is the first user's or servicing dealer's obligation to make known to the subsequent user(s) the terms and conditions of this warranty.

This warranty is a LIMITED WARRANTY and no claim of any nature shall be made against Consolidated Treatment Systems, Inc., unless and until the consumer, or his legal representative, notifies Consolidated Treatment Systems, Inc., in writing of the defect complained of and delivers the product and/or defective part(s), freight prepaid, to the factory or an authorized service station.

Consolidated Treatment Systems, Inc., reserves the right to revise, change, or modify the construction and design of the aerobic treatment plants for household wastewater, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in equipment previously sold. Consolidated Treatment Systems, Inc., also reserves the right, in making replacements of component parts under this warranty, to furnish a component part which, in its judgment, is equivalent to the part replaced.

UNDER NO CIRCUMSTANCES WILL CONSOLIDATED TREATMENT SYSTEMS, INC., BE RESPONSIBLE TO THE WARRANTEE FOR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOST INCOME, LABOR CHANGES, DELAYS IN PRODUCTION AND/OR IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY A DEFECT IN MATERIAL AND/OR WORKMANSHIP IN ITS PRODUCT OR PARTS SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS, AND OF ANY OTHER OBLIGATION ON THE PART OF CONSOLIDATED TREATMENT SYSTEMS, INC., SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIAL LEGAL RIGHTS AND YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE.