



Oregon

Tina Kotek, Governor

Department of Environmental Quality
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TTY 711

July 2, 2024

Calvin Locker
Ecological Tanks, Inc.
2247 Hwy 151 N
Downsville, LA 71234

RE: Aqua Safe® AS600L-X 2 with Salcor UV Unit
Aqua Safe® AS800L-X 2 with Salcor UV Unit
Aqua Safe® AS1100L-X 2 with Salcor UV Unit
Treatment Standard 2

You applied to Oregon Department of Environmental Quality to list the above-referenced products as approved alternative treatment technologies. DEQ reviewed your application, plans, specifications, and other required exhibits for the Aqua Safe® system. The systems' design flow ratings are listed below, and your applications were submitted requesting *treatment standard 2* designation.

You provided third party NSF/ANSI testing data from an organization whose accreditation is specific to onsite wastewater treatment products certifying the product complies with all applicable DEQ rules. DEQ has reviewed these materials for compatibility with the standards and criteria found in Oregon Administrative Rules 340-071-0345. I am pleased to advise you that DEQ has found the following ATT systems manufactured by Ecological Tanks, Inc. to meet the approval criteria for **Treatment Standard 2** when used as part of an onsite wastewater treatment system in Oregon:

Aqua Safe® AS600LX 2 with 3 Salcor UV Units - Design Flow 1,200 gallons per day
Aqua Safe® AS800L-X 2 with 4 Salcor UV Units - Design Flow 1,600 gallons per day
Aqua Safe® AS1100L-X 2 with 5 Salcor UV Units - Design Flow 2,200 gallons per day

Ecological Tanks, Inc. is authorized to manufacture, market, and distribute these ATTs for use in commercial facilities in Oregon so long as the following conditions are met:

1. You must manufacture the ATT in compliance with DEQ's rules, approved plans and design specifications. Alteration of the ATT system design that might affect system performance must be approved by an ANSI accredited, third-party testing and certification organization and DEQ.
2. The approved versions of the plans are dated June 27, 2024.

3. Septic tanks. Tanks must be approved for use in Oregon and refer to DEQ-approved drawing for specific configuration.
4. Per OAR 340-071-0345(6)(a), the system must be designed to prevent untreated waste passing into the absorption field if the plant malfunctions. The manufacturer has stated that the system is designed that if a malfunction occurs, sewage would surface before passing untreated or partially treated effluent to the soil absorption system.
5. An audible and visual alarm must activate in the event of electrical, mechanical equipment or hydraulic malfunction of the system.
6. You must train and certify maintenance providers on system maintenance for these ATTs. Individuals installing your system, and regulators in the county of installation, must be trained prior to installation of your products in Oregon, in accordance with the approved plan included in your application.
7. As the manufacturer of these products, it is your responsibility to assure that each assembled ATT delivered to the construction site is watertight. Assurance must be achieved by periodic testing of the ATT products for watertightness at the manufacturing facility.
8. Service contracts and inspection / service visits must meet or exceed the requirements of OAR 340-071-0345(14) & 340-071-0130(23).
9. Unless otherwise authorized by DEQ, Ecological Tanks, Inc. must submit an annual manufacturer report, starting in 2025. The report must include, but is not limited to:
 - a. A current list of each ATT sold in the State of Oregon for the reporting period, including the model number, serial number, and the property address where the ATT is located;
 - b. A current list of all maintenance providers certified by Ecological Tanks, Inc. and;
 - c. Alternative Treatment Technology Annual Compliance Determination Fee in OAR 340-071-0140(5) (Table 9F).
10. Plans and specifications for all systems with a projected daily sewage flow over 600 gallons per day that includes an ATT must be signed by a person registered under ORS 672 or 700.
11. All other applicable rules and requirements within OAR 340-071 and 073 must be followed.

Pursuant to OAR 340-071-0345(2)(e), DEQ has the authority to remove ATTs from the approved list if DEQ determines that the requirements for approval are no longer satisfied, or if any of the following conditions have occurred:

- Ten percent or more of system under 10 years of age fail;
- The ATT does not produce effluent quality equal to or better than Treatment Standard 2 requirements, respectively, under normal operating conditions;

- The manufacturer fails to submit the annual report and annual compliance determination fee by the date specified by DEQ; or
- The manufacturer goes out of business.

DEQ's decision to list this ATT as approved does not constitute an endorsement of the product. Moreover, DEQ is not responsible for any situation that may result from improper use or misapplication of your product.

If you have any questions regarding this letter, please contact Randy Trox at (541) 687-7338, or by email at randall.trox@deq.oregon.gov.

Sincerely,



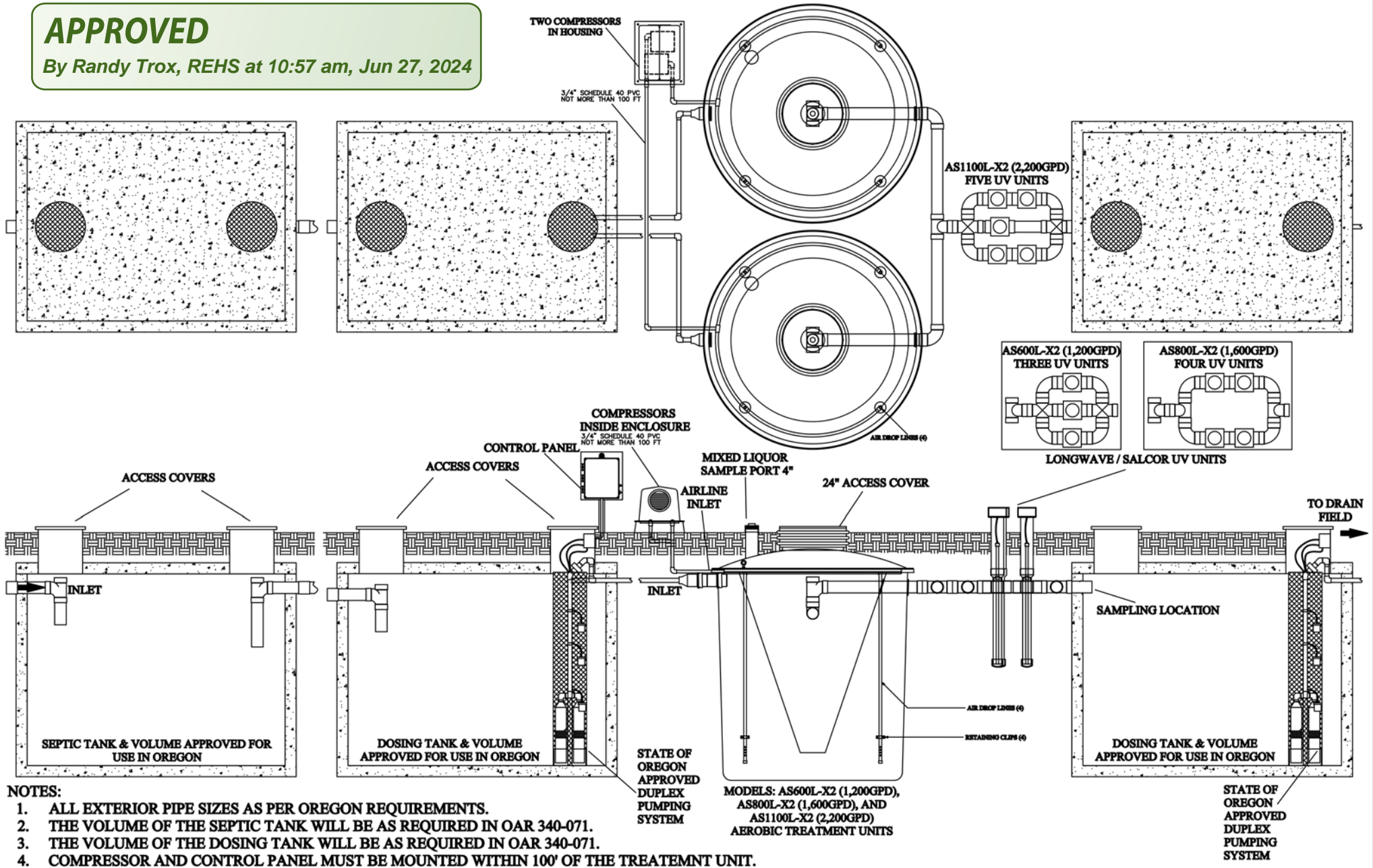
Sean Rochette
Onsite Program Manager

Enclosures – approved plans

EC: All Contract County Offices
All DEQ Direct Service Offices

APPROVED

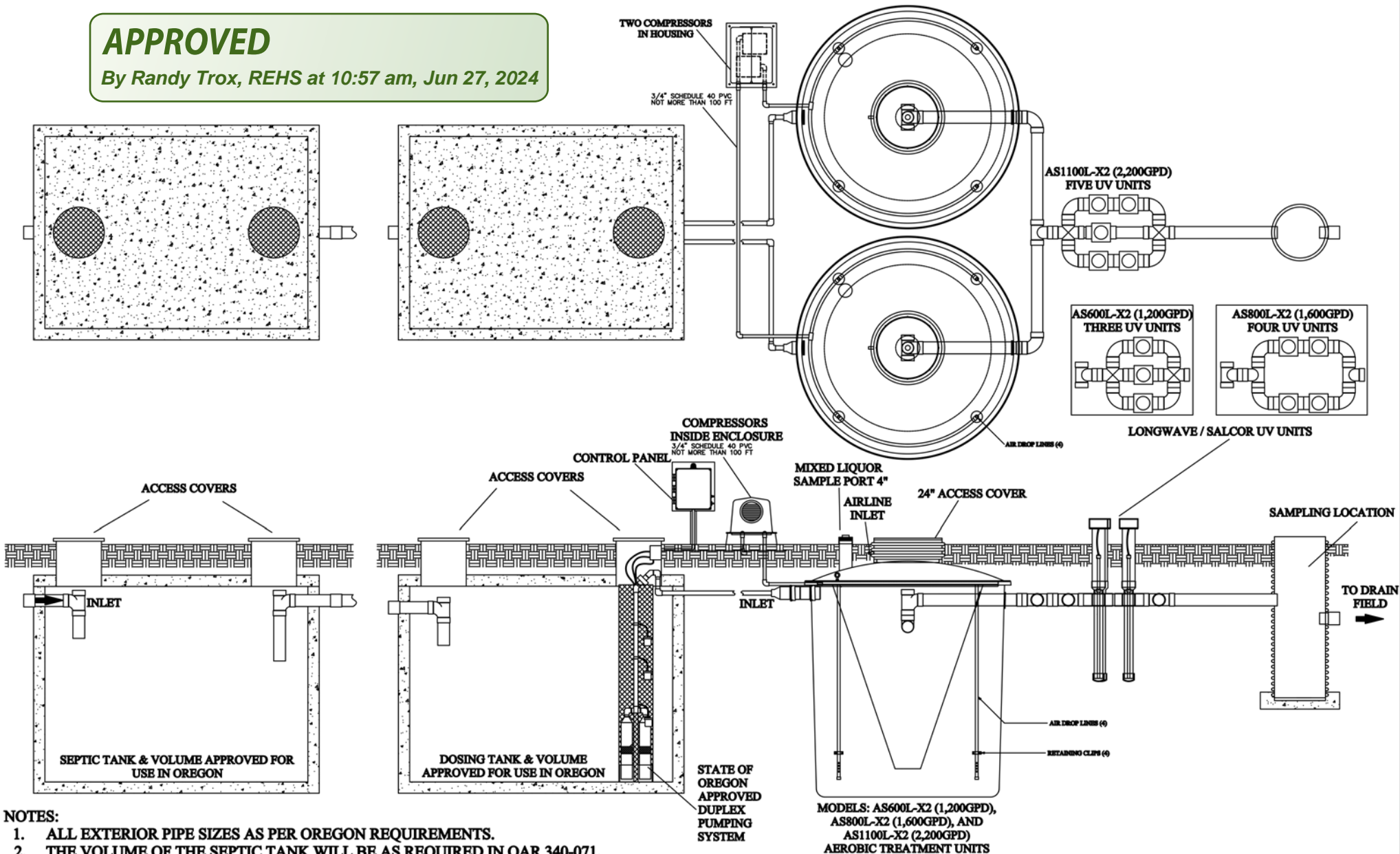
By Randy Trox, REHS at 10:57 am, Jun 27, 2024



<p>ECOLOGICAL TANKS, INC 2247 HWY 151 NORTH DOWNSVILLE, LA 71234</p>	<p>AQUA SAFE X2 PARALLEL CONFIGURATION + UV UNIT WITH OREGON APPROVED PRECEDING SEPTIC, DOSING TANKS, AND PUMP DISCHARGE</p> <p>NO PART OF THIS DOCUMENT MAY BE REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF ECOLOGICAL TANKS, INC.</p>	<p>SCALE: NTS</p>	<p>DATE 3/28/24</p>	<p>DRAWING NO.: AS X2 1200-2200 GPD.DWG TREATMENT STANDARD 2</p>
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APPROVED

By Randy Trox, REHS at 10:57 am, Jun 27, 2024



- NOTES:**
1. ALL EXTERIOR PIPE SIZES AS PER OREGON REQUIREMENTS.
 2. THE VOLUME OF THE SEPTIC TANK WILL BE AS REQUIRED IN OAR 340-071.
 3. THE VOLUME OF THE DOSING TANK WILL BE AS REQUIRED IN OAR 340-071.
 4. COMPRESSOR AND CONTROL PANEL MUST BE MOUNTED WITHIN 100' OF THE TREATMENT UNIT.

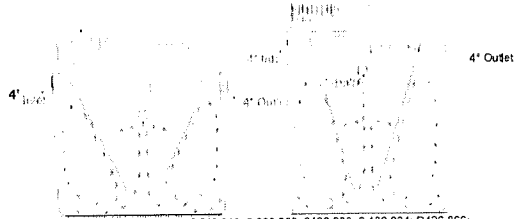
<p>ECOLOGICAL TANKS, INC 2247 HWY 151 NORTH DOWNSVILLE, LA 71234</p>	<p>AQUA SAFE X2 PARALLEL CONFIGURATION + UV UNIT WITH OREGON APPROVED PRECEDING SEPTIC, DOSING TANKS, AND GRAVITY DISCHARGE</p>		
	<p>NO PART OF THIS DOCUMENT MAY BE REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF ECOLOGICAL TANKS, INC.</p>	<p>SCALE: NTS</p>	<p>DATE 3/28/24</p>

ECOLOGICAL TANKS, INC.



"The standard by which the performance of other units is compared"®

**Class I Wastewater Treatment Plants
OWNER'S MANUAL**



US Patent Numbers 5,549,818; 6,096,203; 0432,638; 6,160,034; D426,866;
D424,659; D539,383; D539,382; 1,3510,757
Other Patents Pending

- | | | |
|---|---------------------------------|---|
| <input checked="" type="checkbox"/> AS500 | <input type="checkbox"/> AS800 | <input type="checkbox"/> AS "NR" Series |
| <input type="checkbox"/> AS520 | <input type="checkbox"/> AS1000 | <input checked="" type="checkbox"/> AS "L" Series |
| <input type="checkbox"/> AS600 | <input type="checkbox"/> AS1100 | <input checked="" type="checkbox"/> With EZ Top |
| <input type="checkbox"/> AS750 | <input type="checkbox"/> AS1500 | <input type="checkbox"/> AS "CU" Series |
| <input type="checkbox"/> AS "Trio" Series | | <input type="checkbox"/> AS "Duo" Series |

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Mfg. By
Ecological Tanks, Inc.
2247 Hwy 151 North
Downsville, LA 71234
PH (318) 644-0397 * FAX (318) 644-7257



Certified to NSF/ANSI Standard 40 All Models
Certified to NSF/ANSI Standard 245 NR Series Only

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INTRODUCTION

All Aqua Safe® series models are certified based on provisions in NSF/ANSI Standard 40. The Ecological Tanks, Inc., Aqua Safe® model AS500 has been tested by the Baylor University Department of Environmental Studies according to requirements listed in NSF/ANSI Standard 40, and meets or exceeds Class 1 effluent requirements.

Installation needs vary by state. Therefore your wastewater treatment plant may contain additional components with the treatment plant which are not furnished by Ecological Tanks, Inc. Included in this owners manual are the Aqua Safe® models AS500, AS500L, AS520, AS520L, AS600, AS600L, AS750, AS800L, AS1000, AS1100L and AS1500 series wastewater treatment plants.

State and/or local regulations govern the installation and use of individual aerobic wastewater treatment systems. All permits required by state and/or local regulations should be obtained prior to the Aqua Safe® plant installation.

It is the responsibility of the end user (owner) to see that the Aqua Safe® plant and associated auxiliary component items are installed in accordance with all applicable laws, regulations and guidelines in effect in your respective state. Please consult your local sanitarian or environmentalist prior to system installation.

AQUA SAFE WASTEWATER TREATMENT PLANT PROCESS DESCRIPTION

Ecological Tanks, Inc., Aqua Safe® model numbers AS500, AS500L, AS520, AS520L, AS600, AS600L, AS750, AS800L, AS1000, AS1100L and AS1500 are made up of an outer mixing compartment and a center settling or clarifier compartment. They are in many ways similar to large township or municipality sewage treatment plants. They employ an extended aeration activated sludge process. This type of treatment depends primarily upon the use of air that is introduced by air passing from the aerator compressor to four air lines located around the perimeter of the aeration mixing compartment. As wastewater enters the aeration mixing compartment simple hydraulic displacement is accomplished by the introduction of air which promotes the growth of aerobic organisms in much larger quantities than would occur naturally. These bacteria break down the organic solids in the wastewater. From the aeration mixing compartment, mixed liquid enters the cone shaped settling or clarifier compartment from the bottom. No mixing occurs in this quiet zone where solids separate from the liquid and settle to the bottom of the clarifier and re-enter the mixing compartment. The liquid that separates from the solids in the clarifier continue to flow upward to the discharge pipe. The results of the Aqua Safe process are a clear, odorless effluent discharge, which meets and exceeds state and national water quality standards.

AQUA SAFE RECOMMENDED PLANT INSTALLATION INSTRUCTIONS

1. Inspect entire treatment plant and component parts.
2. Select location of plant site which is accessible to the home sewer discharge line, at least ten (10) feet from the home foundation, in an area that will not receive vehicular traffic. Prepare an excavation site by digging a hole at least one (1) foot larger than the

2

treatment plant and a depth that will allow for sufficient coverage leaving approximately three (3) inches of the inspection port to extend above normal ground level. The depth of the plant will be controlled by the depth of the building, sewer outlet line plus the amount of proper fall required from the building outlet sewer line to the inlet invert of the plant. The prepared excavation should have a solid, level bottom that will eliminate plant settling. Additionally, the bottom of the excavated hole should be free of rocks or sharp objects. Aqua Safe® plants should be installed on a bed of sand on undisturbed soil to provide a solid flat base.

3. Utilizing lifting lugs provided, carefully place the plant in the excavation. The inlet line should slope down toward the plant and the outlet line should slope down away from the plant. The plant should be level within one (1) inch, edge to edge. Aqua Safe® wastewater treatment plants should only be connected to properly trapped and vented plumbing systems in compliance with state and local plumbing codes.

4. Position the inlet and outlet lines and make the necessary connections. Clean-outs should be installed at the building sewer tie-in, any changes in direction of flow and at maximum intervals of seventy (70) feet when using four (4) inch piping. The inlet line should be inserted and glued into the inlet elbow and the discharge line should be inserted and glued into the outlet coupling. Open the inspection port on top of the plant and make sure the discharge tee assembly is level and centered in the clarifier prior to connecting discharge piping. Fill the tank with water to the point of flowing discharge before backfilling. Backfill evenly around the plant, up to the bottom of the inlet and outlet piping, taking care not to damage the tank or dislodge the piping. Backfill material must be void of rocks, gravel, heavy clay or any type of material which might damage the tank.

5. The aerator compressor must be installed in a well ventilated, relatively clean and dry location. Install the aerator compressor on the treatment plant's tank top or at a remote location no more than one hundred (100) feet from the treatment plant. The aerator compressor is supplied complete with all discharge fittings. Install 3/4" Sch. 40 PVC piping (supplied by others) between the aerator and treatment plant. A minimum of twelve (12) inches ground cover is recommended over the 3/4" Sch. 40 PVC air piping.

6. The electrical control for the aerator compressor, visual and audible alarms for aerator failure and high water conditions are contained in a weather proof enclosure. It may be installed in any above ground area where the alarms are easily noticed by the occupants. It is recommended that the control box be at least six (6) inches above ground level and in view of the aerator compressor. All electrical wiring should be installed by a qualified person and must comply with NFPA 70, 1999, National Electrical Code. All electrical components not supplied must comply with U.L. Standards.

7. Install electrical wiring (provided by others) to interconnect the aerator compressor and alarms to the electrical control panel. A minimum of twelve (12) inches of ground cover is recommended over underground electrical conduit and wiring.

8. The aerator compressors used on Aqua Safe® wastewater treatment plants run continuously. They provide relatively quiet, energy efficient operation. Once properly connected, the electrical control box is to be closed. Operate the aerator compressor by placing the on/off electrical circuit (provided by others) in the AON@ position.

9. Turn on aerator compressor and check all air piping and fittings for leaks. This can be accomplished by preparing a saturated solution of soap and water and applying to entire run of pipe and fittings. If a leak is detected, effect repairs.

10. Carefully backfill all underground lines and the rest of the plant's excavation in a manner which will not cause damage to the completed installation.

11. The Aqua Safe® plant is ready to receive incoming sewage.

AQUA SAFE PLANT START UP

Initially, the Aqua Safe® wastewater treatment plant is filled with clean water, usually from an owner's water supply. As stated in the installation instructions, once all proper connections have been completed and it is filled with water and the aerator turned on, the system is now in operation.

For the treatment plant to be biologically stable, it will take from four (4) to twelve (12) weeks after first using the plant to develop a population growth of microorganisms (bacteria). It is these bacteria which make the treatment system operate.

OWNER MAINTENANCE CARE AND OPERATION INSTRUCTIONS

Aqua Safe® home wastewater treatment plants have been designed and built by Ecological Tanks, Inc., to provide long term, reliable and cost efficient service. Our treatment plants will operate with a minimum amount of attention.

If service is required, reference the system's DATA PLATES located on the Aqua Safe® control panel or aerator compressor for the plant's model number, the name, address and phone number of the local service person that can provide service. The following procedures should be performed on a routine basis to insure proper plant operation:

DAILY: Check the warning light and audible alarm located on the plant's control panel for an air supply malfunction or a system high water indication. If an alarm condition is observed, it is an indication of malfunction. First check the electrical circuit providing power to the system to insure the circuit is closed. Check the aerator compressor to be sure it is operating. Check for over heating, excessive vibrations and unusual noises. If an aerator compressor failure is observed, call your service provider for service. After a power outage, an alarm condition may exist. Should an alarm remain on for more than thirty (30) minutes after power is restored, you should call your local service provider to report the alarm.

WEEKLY: Check the treatment plant for offensive odor. If present call for service.

PERIODICALLY: Check and clean the air filter on the aerator compressor. Rinse with warm water to clean if necessary. Make sure filter is dry and re-install on aerator compressor.

RECOMMENDED: The frequency of solids removal is no more often than every two (2) to five (5) years. Determination of the need for pumping can be made only by a trained service person by testing the tank contents and/or effluent. **WARNING** - Hydraulic displacement and tank flotation may occur whenever tanks are pumped. Additionally, care should be taken not to damage internal component parts. A certified Aqua Safe® service technician should oversee tank pumping.

OWNER'S RESPONSIBILITY

It is the *owner's responsibility* to operate the Aqua Safe® wastewater treatment plant to the best of their ability. To keep maintenance to a minimum and insure high effluent quality, the following items should not be permitted to enter the treatment plant:

1. Strong disinfectants or bleaches, other than small amounts used in day to day house cleaning and laundries. Recommended detergents are low-sudsing, low phosphates and biodegradable. Recommended cleaning products are non-chlorine, non-toxin, non-corrosive and biodegradable. Anti-bacteria soaps should be avoided.
2. Backwash discharge from any type of water softeners.
3. Citrus products, coffee grounds, chemical wastes, paint or paint thinners, oils or grease (such as used cooking grease), pet shampoo, pet dip disinfectant, pesticides, herbicides, automotive fluids or any other toxins.
4. Disposable diapers, tampons, sanitary napkins, large quantities of paper products, tobacco products, or similar items. Home brewery waste, strong medicines and antibiotics.
5. Waste material from a garbage disposal is not recommended without the use of a trash trap or pretreatment tank preceding the Aqua Safe® plant. Food waste represents additional loading the aerobic treatment unit would have to digest, increasing pump out intervals.
6. The Aqua Safe® wastewater treatment plant is designed for the treatment of domestic wastewater and nothing else should go into it.

During extended periods of intermittent or non-use, such as vacation time, the aerobic bacteria inside the plant will decrease due to no food in the form of incoming wastewater. The treatment plant will become biologically stable again soon after the resumption of normal loading. The aerator compressor should be left on during periods of vacation time. During extended periods of absolute non-use (3 months or longer) the aerator compressor should be removed, cleaned and stored with the compressor's inlet and outlet sealed. Additionally, the air line piping should also be capped to prevent debris from entering air distribution system.

The Aqua Safe® plant will not perform to its fullest capabilities if subject to hydraulic overloading. This condition exists whenever excessive water, above the plants designed treatment capacity, is allowed into the plant. Leaking plumbing fixtures or excessive water use may cause this condition. Hydraulic overload may also occur on wash days, when multiple loads of laundry are washed in succession.

Ecological Tanks, Inc. is not responsible for the infield operation of our plants. The proper operation of this wastewater treatment plant depends upon proper organic and hydraulic loading of the plant. We cannot control the loading of substances in our plants that may upset its biological balance. We can only provide a complete owner's manual which outlines materials that should be kept out of the treatment plant. User operation instructions must be followed or warranties are subject to invalidation.

WARNING! Ants and rodents are destructive to the mechanical and electrical equipment on wastewater treatment plants. Care should be taken to prevent infestation

of ants near the plant. Damage or destruction of mechanical or electrical equipment by ants or rodents is not covered under manufacturers' warranty.

Any and all safety requirements such as the electrical wiring, blower operation or plant discharge concerning the owner, their families, friends, or guests is the sole liability of the owner (see warranty and service policy).

The electrical control panel contains a schematic for the system. However, the electrical control panel is sealed and contains no user serviceable parts. Test and alarm silence switches are located on the outside of control panel.

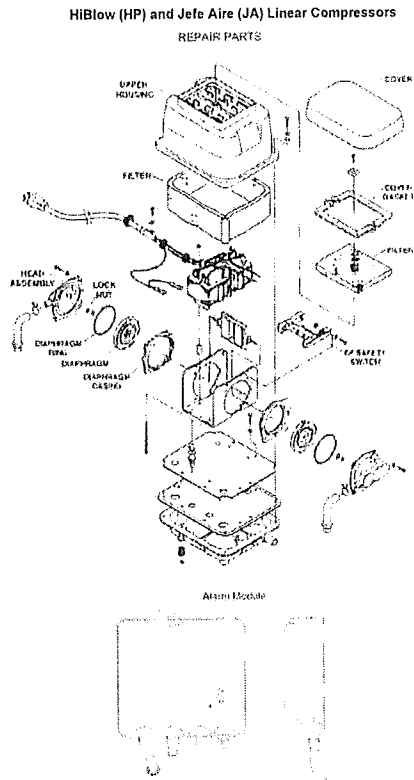
WARNING! Service to the electrical control panel by a non-qualified person may result in an electrical shock hazard resulting in serious injury or death. If service is required contact your local authorized installer representative or maintenance provider.

Many states already require the use of a chlorination unit behind all mechanical treatment plants for total effluent disinfection prior to final discharge. **Ecological Tanks, Inc.** recommends the use of a disinfection device behind its mechanical plants for total effluent disinfection prior to final discharge.

SOURCES FOR OBTAINING REPLACEMENT PARTS OR COMPONENTS


Replacement parts or components may be obtained from your local installer or from Ecological Tanks, Inc., 2247 Highway 151 North, Downsville, LA 71234.

Office: 318-644-0397 *Fax: 318-644-7257 *E-mail: sales@etiaquasafe.com




Replacement alarm module available for all HP and Jefe Aire Models (except HP200 and JA800).


Fujimac Diaphragm Replacement Procedure




1 Remove cover bolts using a beam-cox wrench



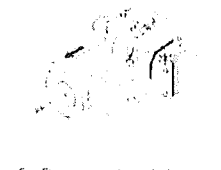
2 Remove an auto-stop piece as instructed above



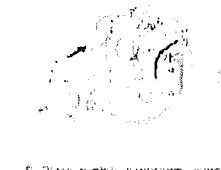
3 Remove a power cable from 3 hooks
Attention Do not remove screws!!



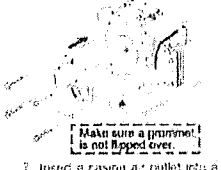
4 Remove 4 screws from a cabinet using a cross slot screwdriver




5 Remove nut and take a diaphragm off from a body



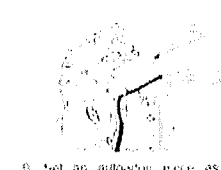
6 Place a new diaphragm using new nut provided
*tightening torque – about 3 Nm




7 Insert a casing and gasket into a rubber grommet and to a casing assembly with 4 screws
Make sure a grommet is not flipped over.



8 Fit a power cable in 3 hooks



9 Set an auto-stop piece as instructed above



10 Fix cover bolts using a beam-cox wrench

Warning Make sure to turn off the power when replacing the diaphragm/valve assembly. Neglecting this note may cause an electric shock.

Attention Make sure to replace both side of diaphragm/casing assembly at the same time. Neglecting this note may cause early breakage of the diaphragm.

* Replace diaphragm/valve assembly every year.
* Make sure to carry out test operation and ensure that the air pump works properly after replacing.



INITIAL SERVICE POLICY

The local dealer/installer from whom you purchased your **Aqua Safe®** wastewater treatment plant is responsible for routine inspections for the first two years from the original date of installation. The plant will be checked for proper operation at each inspection. If a problem exists, service will be performed at no charge to the owner unless the required maintenance is not warranty related. These service call/inspections shall include at least four inspections over the two year period and shall include the following:

1. Adjustment of the electrical control, if applicable, and servicing of the mechanical component parts to ensure proper function.
2. An effluent quality inspection consisting of a visual check for color, turbidity, scum overflow, and an examination for odors.
3. Immediate notification to the owner/warrantee in writing of any improper observation which cannot readily be repaired. This notification will or shall advise said owner of the problem, if it is covered by warranty and estimated date for correction of said problem.

Pumping of sludge build up from the treatment plant, if necessary, **IS NOT INCLUDED** in the initial service policy.

An annually renewable service policy affording the same coverage as the initial service policy is available. Consult your local dealer for pricing information.

LIMITED WARRANTY

Ecological Tanks, Inc., Aqua Safe® (hereinafter identified as manufacturer) warrants each **Aqua Safe®** wastewater treatment plant to the **original purchaser only** to be free from defects in materials and workmanship from the date of installation by an authorized dealer/installer for a period of two (2) years. Manufacturer warrants fiberglass tanks, for a limited period of five (5) years, to be free from defects in material and workmanship. Electrical controls, float switches and application pumps provided by the manufacturer are warranted for two (2) years. Concrete tanks are limited to two (2) years from date of installation. When properly installed and **registered** with the manufacturer, the manufacturer's sole obligation under this **limited warranty** is as follows:

To repair or exchange any components, F.O.B. factory, that in the manufacturer's judgment is defective, provided that said component part has been paid for and is returned through an authorized dealer, prepaid. The warrantee must specify the nature of the defect in writing to the manufacturer. The **limited warranty** makes no provision for any informal dispute settlement agreement.

The **limited warranty** does not cover any **Aqua Safe®** wastewater treatment plant that has not been properly installed, damaged due to altered installation or improper wiring or overload protection, flooded by any external means, disassembled by any unauthorized person, filled with anything other than normal household wastewater or damaged by an act of nature. The **limited warranty** does not cover damages or defects caused by ants, insects or rodents to any component part of the **Aqua Safe®** wastewater treatment plant.

No warranty is made as to the field performance of any system. The **limited warranty** applies only to the **Aqua Safe®** wastewater treatment plant itself and does not include any of the purchaser's plumbing, drainage and/or disposal system, house wiring or the installation of the **Aqua Safe®** treatment plant.

The manufacturer reserves the right to replace any component part covered under this **limited warranty** with a component part, which in the manufacturer's judgment is equivalent to the part being replaced. The manufacturer claims no responsibility for any delays or damages caused by defective components or materials which cause losses incurred by interruption of service or for repairs or replacements of component parts covered by the **limited warranty**.



MANUFACTURER'S WARRANTY REGISTRATION
CERTIFICATE

It is the authorized dealer/installer's responsibility to fill out the registration certificate and mail it within 30 days of installation to the address below. The owner/purchaser should verify that this is done to insure proper registration for warranty purposes.

ECOLOGICAL TANKS, INC.
2247 HIGHWAY 151 NORTH, DOWNSVILLE, LA 71234
OFFICE: 318-644-0397 FAX: 318-644-7257

PLEASE PRINT
AQUA SAFE PURCHASER'S RECORD

Serial# _____ Model# _____
Installer's Name _____ Installation Date _____
Mailing Address _____ Phone _____
City, State, & Zip _____

AQUA SAFE INSTALLER'S RECORD

Serial# _____ Model# _____
Owner's Name _____ Installation Date _____
Physical Address _____ Phone _____
City, State, & Zip _____

AQUA SAFE REGISTRATION CERTIFICATE
(Must be returned to manufacturer)

Serial# _____ Model# _____
Owner's Name _____ Installation Date _____
Physical Address _____ Phone _____
City, State, & Zip _____
Dealer's Name _____ Phone _____
Mailing Address _____
City, State, & Zip _____
Installer's Name _____ Phone _____
Mailing Address _____
City, State, & Zip _____



203
ISO 17065
Accredited Product
Certification Body



LA Department of Environmental Equality
NELAP/LELAP 195101
14378 Park Avenue
Prairieville, Louisiana 70769



AQUA  SAFE [®]
Model AS500L

Standard 245 SPE Report

Under the provisions of NSF/ANSI Standard 245 (2019)
Residential Wastewater Treatment Systems:
Nitrogen Reduction

SPE388

July 1, 2020

EXECUTIVE SUMMARY

Gulf Coast Testing, LLC conducted testing and specific performance evaluation of the Ecological Tanks, Inc. Model AS500L aerobic treatment system under the provisions of NSF/ANSI Standard 245 (2019) from November 3, 2019 to May 02, 2020. The test was conducted at Gulf Coast Testing's wastewater facility located at 14378 Park Avenue, Prairieville, LA, 70769 in Ascension Parish using wastewater diverted from a lift station supplied by a residential neighborhood. The test consisted of three weeks of dosing with sampling to allow for plant start-up, sixteen weeks of dosing at design flow, seven- and one-half weeks of stress testing and an additional two- and one-half weeks of dosing at design flow. Sampling started in the fall and continued through the winter into the spring, covering a wide range of operating temperatures. All data collected for the specific performance evaluation was collected pursuant to NSF/ANSI Standard 245 (2019) testing protocol.

The Ecological Tanks, Inc. Model AS500L produced an effluent that successfully meets the requirements of NSF/ANSI Standard 245 (2019), and concurrently met the requirements for NSF/ANSI Standard 40 (2019) as detailed in SPE Report 387 and NSF/ANSI Standard 350 (2019) as detailed in SPE Report 390.

- The average carbonaceous 5-day biochemical oxygen demand (CBOD₅) for the criteria samples was 6 mg/L, and average total suspended solids (TSS) for all the samples was 5 mg/L. The CBOD₅ and the TSS were both below the criteria maximums of 25 and 30 mg/L, respectively, as required by the Standard.
- The average total nitrogen concentration for the Standard 245 (2019) criteria influent samples was 47.2 mg/L, and the average total nitrogen concentration of the Standard 245 criteria effluent samples was 12.9 mg/L. This calculates to an average nitrogen reduction of 72.6%, above the 50% as required by the Standard.
- The pH range for the Standard 245 (2019) criteria samples was within the 6.0 to 9.0 SU range required by NSF/ANSI Standard 245 (2019). The effluent pH ranged from 7.00 to 7.50 SU during the evaluation with an average of 7.21 SU and a median of 7.18 SU.
- The Model AS500L was loaded with 33.8 pounds of nitrogen over the duration of the test. Of that, the Model AS500L removed 24.5 pounds which is 72.6% of the nitrogen.

The following table represents the actual percent nitrogen reduction over the course of the test.

Thirty-Day Periods of Percent Nitrogen Reduction					
1	2	3	4	5	6
65.6%	71.6%	70.4%	80.7%	79.1%	65.7%

PREFACE

Specific performance evaluation of residential aerobic treatment systems is achieved within the provisions of NSF/ANSI Standard 245 (2019) *Residential Wastewater Treatment Systems – Nitrogen Reduction*.

Conformance with the Standard is recognized by issuance of the GCT Mark. This is not to be construed as an approval of the equipment, but a certification of the data provided by the test and an indication of compliance with the requirements expressed in these Standards.

Plants conforming to NSF/ANSI Standard 245 (2019) are classified as Class I or Class II plants according to the quality of effluent produced by the plant during the performance evaluation. Class I plants must also demonstrate performance consistent with the effluent color, odor, and oily film and foam requirements of the Standards. Additionally, Class I plants must meet the requirements of EPA Secondary Treatment Guidelines for five-day carbonaceous biochemical oxygen demand, total suspended solids, and pH.

Permission to use the GCT Mark is granted only after the equipment has been tested and found to perform satisfactorily, and all other requirements of the Standards have been satisfied. Continued use of the Mark is dependent upon evidence of compliance with the Standards and GCT General and Program Specific Policies as determined by periodic inspection of the equipment at the factory, distributors, and reports from the field.

NSF/ANSI Standard 245 (2019) requires the testing laboratory to provide the manufacturer of a residential aerobic treatment system a report including significant data and appropriate commentary relative to the performance evaluation of the plant. GCT policy specifies GCT will provide specific performance evaluation reports to appropriate state regulatory agencies at publication. Subsequent direct distribution of the report by GCT is made only at the specific request of, or by permission of, the manufacturer.

The following report contains all the data collected in accordance with the testing and evaluations within these Standards, a description of the plant, its operation, key process control equipment, and a narrative summary of the test program, including test location, procedures, and significant occurrences. The plant represented herein reflects the equipment authorized to bear the GCT Mark.

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APPENDICES

- Appendix A: Plant Specifications and Drawings
- Appendix B: NSF/ANSI Standard 245 (2019), Section 8
- Appendix C: Analytical Results – NSF/ANSI Standard 245 (2019)
 - Appendix C1: All Data
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- Appendix D: Manuals

CERTIFICATION CERTIFICATE

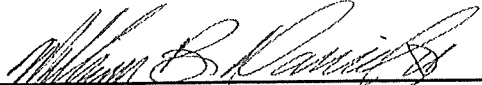
Gulf Coast Testing, LLC's Residential Aerobic Wastewater Testing Program personnel have performed a complete specific performance evaluation of the Ecological Tanks, Inc., Model AS500L, five hundred (500) gallon per day, Single Family Residence aerobic treatment system, manufactured by Ecological Tanks, Inc. of Downsville, Louisiana, using the requirements and provisions of the NSF/ANSI Standard 245 (2019) and the Gulf Coast Testing Wastewater Certification Quality Procedures Manual. The Ecological Tanks, Inc. Model AS500L aerobic treatment system has successfully completed all the requirements of the NSF/ANSI Standard 245 (2019) for Class I effluent.

The observations, data, analyses, and results contained in this report are hereby certified to be correct.

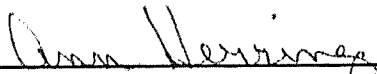
All feeding and data collection were performed by Gulf Coast Testing, LLC at its wastewater test site in Ascension Parish located at 14378 Park Avenue, Prairieville, Louisiana. All laboratory tests were performed at Gulf Coast Testing, LLC's laboratory also located at 14378 Park Avenue, Prairieville, LA.

Ecological Tanks, Inc. and Gulf Coast Testing, LLC hereby agree to comply with the continual follow-up certification procedures as specified in the Gulf Coast Testing, LLC's Wastewater Certification Manual. All data contained in this report is the property of Gulf Coast Testing, LLC and can only be released with the consent of Gulf Coast Testing, LLC.

This certification is effective as of July 1, 2020 and good for seven (7) years ending on July 1, 2027.



Program Manager 07/01/2020



Quality Assurance Officer 07/01/2020

1.0 PROCESS DESCRIPTION

The Ecological Tanks, Inc. Model AS500L uses extended aeration activated sludge processes to achieve treatment of BOD, TSS, and nitrogen. In the activated sludge process, microorganisms 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 assailed by extra cellular 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.

Extended aeration is a modification of the activated sludge process in which the microorganisms can remain in the treatment process for prolonged 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 the organisms in the system to consume themselves, reducing the total amount of solids produced by the treatment process.

Nitrogen reduction is accomplished by converting the carbonaceous organics in the aeration compartment causing ammonium and organic nitrogen to be released. The ammonium and organic nitrogen are nitrified by autotrophic bacteria, creating nitrite and nitrate. The nitrified effluent uses heterotrophic bacteria in the aeration compartment to convert the nitrate into nitrogen gas which bubbles out of the compartment. The alkalinity consumed by nitrification is recovered during denitrification thereby reducing the alkalinity requirements of the system.

2.0 PERFORMANCE EVALUATION

2.1 Description of Plant Evaluated

Ecological Tanks, Inc. Model AS500L aerobic treatment system tested in this evaluation has a rated capacity of five hundred (500) gallons per day (gpd) and is constructed of fiberglass. The zones are accessible through twenty (20) inch risers located on top of the tanks. A Jefe Aire Model JA380 aerator with an attached alarm was used to provide aeration. Specifications and drawings are attached as Appendix A.

Wastewater enters the 756-gallon aeration chamber where it is mixed with organisms formed during decomposition of organic material in the wastewater. The aeration chamber has a hydraulic retention time of 36.3 hours at design flow. The Jefe Aire Model JA380 aerator operates continuously and aerates through four air-drop line diffusers located near the bottom of the aeration chamber. The chamber is diffused through the release of coarse air bubbles through the 1/2" PVC diffuser with holes drilled in the bottom of the pipe. The diffused air provides oxygen for the aerobic bacteria, as well as mixing the wastewater with bacteria. The plant is equipped with an alarm circuit that is activated upon loss of air pressure in the piping

system, whether caused by compressor failure or a break in the air piping system. A high-water sensor/alarm system is also provided in the plant.

A conical-shaped clarifier is located internal to the process tank to provide for separation of the solids from the mixed liquor. The 152-gallon clarification chamber has a hydraulic retention time of 7.3 hours at design flow. The mixed liquor passes into the bottom of the clarifier by hydraulic displacement as wastewater enters the aeration chamber. Solids from the clarifier settle into the aeration chamber from the bottom of the cone. The solids are then dispersed by the mixing induced by the aerator. The clear supernatant (effluent) is released through the 4-inch tee assembly discharge pipe and passed through a Salcor ultraviolet light. The ultraviolet light source for disinfection is mounted in a sub-assembly that 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 of the 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 a keyway 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 flow vertically upward and out the other side of the unit. The flow path is designed to give the fluid proper exposure time.

The UV is not part of the biological process and therefore not required as a part of the NSF/ANSI Standard 245 (2019) approval.

2.1.1 Exposed Surfaces

The exposed surfaces were evaluated pursuant to Section 5.1 of NSF/ANSI Standard 245 (2019) and were determined to comply with this section.

2.1.2 Structural Integrity

A structural analysis was performed to evaluate the model pursuant to Section 5.2 of NSF/ANSI Standard 245 (2019). The fiberglass system was determined to be structurally competent based on vacuum and pressure testing to IAMPO/ANSI Z1000-2013 on May 29, 2019 by Taylor Wallace Designs. An *in situ* visual inspection was performed both during and after the performance testing and evaluation, and the system was determined to comply with this section.

2.1.3 Infiltration/Exfiltration

A 24-hour infiltration/exfiltration test was performed and evaluated pursuant to Section 5.3 of NSF/ANSI Standard 245 (2019). At the end of the 24-hour period, there was less than a 0.5% change in the initial water level of the system.

2.1.4 Air Delivery Component

Pursuant to Section 8.1.8, the Jefe Aire Model JA380 aerator was connected to the system and run for 4 hours prior to the initiation of design loading. The system pressure was measured to be 2.1 psi by a pressure gauge near the exhaust port of the aerator. The Jefe Aire Model JA380 airflow was then measured at the system pressure and determined to be 2.7 cubic feet per minute.

2.2 Test Protocol

Startup of the plant was accomplished by filling the plant with 2/3 water and 1/3 raw sewage. GCT dosed the system at the design loading rate of five-hundred (500) gallons per day as per Table 1.

Table 1
Hydraulic Dosing Schedule

Time Period	Percent of Daily Capacity
6 AM - 9 AM	35 percent
11 AM - 2 PM	25 percent
5 PM - 8 PM	40 percent

Dosing was accomplished by operating a pump to deliver multiple doses in five-gallon increments to the test plant. Doses were spread uniformly over each dosing period. After a startup period of three weeks, the plant was subjected to the loading sequence shown in Table 2.

Table 2
Standard 245 Hydraulic Loading Sequence

Type Loading	Time, Weeks
Design Loading	16 Weeks
Stress Loading	7.5 Weeks
Design Loading	2.5 Weeks

For NSF/ANSI Standard 245 (2019), the influent samples and effluent samples were collected as per Table 3.

As required by Standard 245 (2019), on-site determinations of the temperature, pH, and dissolved oxygen were recorded, and the remaining parameters were collected as flow-proportioned 24-hour composite samples. During the design loading periods, flow-proportioned 24-hour composite samples were collected of the influent and effluent three days per week and twice during each stress recovery period. It was not necessary to continue past the 26-week testing period to collect additional samples.

Stress testing is designed to evaluate how the plant performs under non-ideal conditions, including varied hydraulic loadings and electrical or mechanical failure. The test sequence includes: (1) Wash Day stress, (2) Working Parent stress, (3) Power/Equipment Failure stress, and (4) Vacation stress. Appendix B contains detailed descriptions of the stress sequence.

Table 3
Standard 245 Sample Collection

Parameter	Sample Type	Sample Location	
		Raw Influent	Treated Effluent
BOD ₅ , mg/L	24 Hour Composite	X	---
CBOD ₅ , mg/L	24 Hour Composite	---	X
Total Suspended Solids, mg/L	24 Hour Composite	X	X
pH, SU	Grab	X	X
Temperature °C	Grab	X	X
Dissolved Oxygen (DO), mg/L	Grab	---	X
Alkalinity, mg/L (as CaCO ₃)	24 Hour Composite	X	X
TKN (as N), mg/L	24 Hour Composite	X	X
Ammonia-N (as N), mg/L	24 Hour Composite	X	X
Nitrate/Nitrite (as N), mg/L	24 Hour Composite	X	X

2.3 Test Chronology

The system installation was completed under the direction of Ecological Tanks, Inc. on August 13, 2019. The infiltration/exfiltration was completed August 14, 2019. R&D was conducted from August 15, 2019 until October 11, 2019. The model was pumped out and filled with 2/3 fresh water and 1/3 raw sewage. Dosing was initiated at the rate of five hundred (500) gallons per day beginning October 13, 2019 for three weeks with limited sampling. Sampling for testing began on November 3, 2019. The stress test sequence started on February 24, 2020 and ended on April 15, 2020. Testing was completed on May 2, 2020.

3.0 ANALYTICAL RESULTS

3.1 Summary

Chemical analyses of samples collected during the evaluation were completed using procedures in *Standard Methods for the Examination of*

Water and Wastewater (23rd Edition), and USEPA methods. Appendix C2 contains all the data generated during the evaluation pursuant to Standard 245.

Section 8.2.1 of the NSF/ANSI Standard 245 (2019) defines influent wastewater characteristics as they apply to testing under the Standards. Table 4 below shows the average wastewater characteristics delivered to the system meet the requirements of NSF/ANSI Standard 245 (2019). The average influent wastewater characteristics remained inside this specified range for the duration of this test.

Table 4
Standard 245 Influent Wastewater Characteristics:
Required v. Actual

Influent Characteristic	Standard Required	Actual (Average)
BOD ₅ , mg/L	100 – 300	207
TSS, mg/L	100 – 350	190
TKN (as N), mg/L	35 – 70	47.0
Alkalinity (as CaCO ₃), mg/L	> 175	224
Temperature, °C	10 – 30	21.0
pH, SU	6.5 – 9.0	7.77

Section 8.4.1 of the NSF/ANSI Standard 245 (2019) provides guidance addressing the impact of unusual testing conditions, including sampling, dosing, or influent characteristics, on operation of a system under test. Specific data points may be excluded from average calculations where unusual conditions were determined to have an adverse impact on performance of system, with rationale for the exclusion to be documented in the final report.

No unusual circumstances occurred, so no data points were excluded for this evaluation.

For the plant to achieve Class I effluent, it is required to produce an effluent which meets the EPA guidelines for secondary effluent discharge:

- (1) CBOD₅: The 30-day average of effluent samples shall not exceed 25 mg/L, and each 7-day average of effluent samples shall not exceed 40 mg/L.
- (2) Total Suspended Solids: Each 30-day average of effluent samples shall not exceed 30 mg/L, and each 7-day average of effluent samples shall not exceed 45 mg/L.
- (3) pH: Individual effluent values remain between 6.0 and 9.0.

- (4) Total Nitrogen: The average total nitrogen concentration of all effluent samples shall be less than 50% of all influent samples.

Appendix C1 contains all the results of all the chemical analyses, on-site observations, and measurements made during the evaluation, and Table 5 shows a summary of the results.

Table 5
Summary of All Analytical Data

		Average	Standard Deviation	Median	Minimum	Maximum	Data Points
DO, mg/L	Effluent	3.82	0.82	3.75	1.24	6.73	127
Ambient Temperature, °C	Influent	21.0	1.7	21.0	15.3	25.6	145
	Effluent	21.0	1.8	21.3	16.4	25.3	127
pH, SU	Influent	7.77	0.14	7.78	7.24	8.11	145
	Effluent	7.23	0.13	7.21	6.96	7.53	127
BOD ₅ , mg/L	Influent	209	18	210	160	260	147
CBOD ₅ , mg/L	Effluent	6	2	5	4	12	127
Total Suspended Solids, mg/L	Influent	193	19	188	155	244	144
	Effluent	5	1	5	4	10	127
Alkalinity (as CaCO ₃), mg/L	Influent	216	27	208	178	300	119
	Effluent	119	26	118	84.0	264	85
TKN (as N), mg/L	Influent	46.6	8.66	47.1	19.9	68.5	82
	Effluent	4.20	2.80	3.40	0.100	13.2	72
Ammonia (as N), mg/L	Influent	36.1	8.60	36.8	7.20	56.8	82
	Effluent	3.00	2.35	2.20	1.00	10.7	72
Nitrite/Nitrate (as N), mg/L	Influent	0.151	0.440	0.050	0.050	3.90	82
	Effluent	8.96	3.98	9.70	0.050	19.1	69
Total Nitrogen, mg/L	Influent	46.7	8.59	47.1	20.0	68.6	82
	Effluent	13.3	3.46	14.0	6.00	22.5	69

Standard 245 states for purposes of determining system performance, only samples collected during design loading periods shall be used in the calculations. Design loading includes the first sixteen weeks of testing, the seven-day period followed by each stress test, and the last two- and one-half weeks of testing.

Standard 245 also states the data collected during the stress sequences shall not be included in the calculations but shall be included in the final report. For the

purposes of this report, samples collected during design loading shall be known as the Standard 245 criteria samples. Table 6 presents a summary of the Standard 245 criteria samples.

Table 6
Summary of Standard 245 Criteria Data

		Average	Standard Deviation	Median	Minimum	Maximum	Data Points
DO, mg/L	Effluent	3.91	0.67	3.92	2.54	5.41	59
Temperature, °C	Influent	21.0	1.84	21.0	17.3	25.6	59
	Effluent	21.1	2.09	21.4	16.4	25.3	59
pH, SU	Influent	7.77	0.146	7.78	7.35	8.11	59
	Effluent	7.21	0.128	7.18	7.00	7.50	59
BOD ₅ , mg/L	Influent	207	18	200	160	260	59
CBOD ₅ , mg/L	Effluent	6	2	5	4	12	59
Total Suspended Solids, mg/L	Influent	190	20	186	155	244	59
	Effluent	5	1	5	4	10	59
Alkalinity (as CaCO ₃), mg/L	Influent	224	34	208	178	300	61
	Effluent	119	31	110	84.0	264	55
TKN (as N), mg/L	Influent	47.0	8.74	48.0	19.9	68.5	61
	Effluent	3.90	2.33	3.20	0.100	13.0	61
Ammonia (as N), mg/L	Influent	36.0	9.12	36.8	7.20	56.8	61
	Effluent	2.60	1.91	2.20	1.00	10.7	61
Nitrite/Nitrate (as N), mg/L	Influent	0.122	0.161	0.050	0.050	0.615	61
	Effluent	9.07	3.94	9.60	0.050	19.1	61
Total Nitrogen, mg/L	Influent	47.2	8.72	48.2	20.0	68.6	61
	Effluent	12.9	3.47	12.9	6.00	22.5	61

3.2 Carbonaceous Biochemical Oxygen Demand

The Biochemical Oxygen Demand and the Carbonaceous Biochemical Oxygen Demand analyses were completed using Methods 5210 B and 5220 D, respectively, of the *Standard Methods for the Examination of Water and Wastewater (23rd Edition)*. Appendix C1 contains all the BOD₅ and CBOD₅ data collected for the entire testing period, and Table 5 presents its summary.

Appendix C2 contains the data collected for the Standard 245 BOD₅ and CBOD₅ criteria samples, and Table 6 summarizes the criteria samples. The data shown below only includes the BOD₅ and CBOD₅ criteria samples.

3.2.1 Influent BOD₅

The influent BOD₅ ranged from 160 to 260 mg/L during the evaluation, with an average concentration of 207 mg/L, and a median BOD₅ concentration of 200 mg/L.

3.2.2 Effluent CBOD₅

The effluent CBOD₅ ranged from 4 to 12 mg/L during the evaluation, with an average concentration of 6 mg/L, and a median CBOD₅ concentration of 5 mg/L.

3.2.3 BOD₅/CBOD₅ Criteria

Standard 245 requires the BOD₅ to be between 100 and 300 mg/L. With an average concentration of 207 mg/L, the BOD₅ meets this requirement.

Standard 245 requires the average CBOD₅ of all effluent samples shall not exceed 25 mg/L. With an average CBOD₅ value of 6 mg/L, the Model AS500L exceeds the requirement of the Standard.

3.3 Total Suspended Solids

Total Suspended Solids (TSS) analyses were completed using Method 2540 D in *Standard Methods for the Examination of Water and Wastewater (23rd Edition)*. Appendix C1 contains all the TSS data collected for the entire testing period, and Table 5 presents its summary. Appendix C2 contains the data collected for the Standard 245 TSS criteria samples, and Table 6 summarizes the criteria samples. The data shown below only includes the TSS criteria samples.

3.3.1 Influent TSS

The influent TSS ranged from 155 to 244 mg/L during the testing with an average concentration of 190 mg/L and a median concentration of 186 mg/L.

3.3.2 Effluent TSS

The effluent TSS ranged from 4 to 10 mg/L during the testing with an average concentration of 5 mg/L and a median concentration of 5 mg/L.

3.3.3 TSS Criteria

Standard 245 requires the average influent TSS to be between 100 and 350 mg/L. With an average concentration of 190 mg/L, the influent TSS meets this requirement.

Standard 245 requires the average TSS of all effluent shall not exceed 30 mg/L. With an average effluent TSS value of 5 mg/L, the Model AS500L exceeds the requirement of the Standard.

3.4 pH

The pH is the measure of the concentration of the value of the concentration of the hydrogen ion and is expressed in Standard Units (SU). The pH analyses were completed using Method 4500 H+ in *Standard Methods for the Examination of Water and Wastewater (23rd Edition)*. Appendix C1 contains all the pH data collected for the entire testing period, and Table 5 presents its summary. Appendix C2 contains the data collected for the Standard 245 pH criteria samples, and Table 6 summarizes the criteria samples. The data shown below only includes the pH criteria samples.

3.4.1 Influent pH

The influent pH ranged from 7.35 to 8.11 SU during the testing, with an average value of 7.77 SU. The median influent pH value during the testing was 7.78 SU.

3.4.2 Effluent pH

The effluent pH ranged from 7.00 to 7.50 SU during the testing, with an average value of 7.21 SU. The median effluent pH value during the testing was 7.18 SU.

3.4.3 pH Criteria

Standard 245 requires the average influent pH to be between 6.5 and 9.0 SU. With an average value of 7.77 SU, the influent pH meets this requirement.

Standard 245 requires that all of the individual samples of effluent pH to be between 6.0 and 9.0 SU. With a pH effluent range of 7.00 to 7.50, the effluent pH of the Model AS500L meets the requirements of the Standard.

3.5 Temperature

The temperature analyses were completed using Method 2550 B in *Standard Methods for the Examination of Water and Wastewater (23rd Edition)* with a NIST Traceable Thermometer. Appendix C1 contains all the temperature data collected for the entire testing period, and Table 5 presents its summary.

Appendix C2 contains the data collected for the Standard 245 samples, and Table 6 summarizes its samples. The temperature data shown below only includes the Standard 245 samples.

3.5.1 Influent Temperature

The influent temperature ranged from 17.3°C to 25.6°C with an average temperature of 21.0°C and a median temperature of 21.0°C.

3.5.2 Effluent Temperature

The effluent temperature ranged from 16.4°C to 25.3°C with an average temperature of 21.1°C and a median temperature of 21.4°C.

3.5.3 Temperature Criteria

There are no criteria in Standard 245 (2019) for influent or effluent temperature.

3.6 Dissolved Oxygen (DO)

The Dissolved Oxygen (DO) analyses were completed using Standard Method 4500-O G in *Standard Methods for the Examination of Water and Wastewater (23rd Edition)*. Appendix C1 contains all the DO data collected for the entire testing period, and Table 5 presents its summary. Appendix C2 contains the data collected for the Standard 245 DO criteria samples, and Table 6 summarizes the criteria samples. The data shown below only includes the DO criteria samples.

3.6.1 Influent DO

Measurement of the influent DO is not required by Standard 245 (2019), and therefore the influent DO was not sampled or analyzed.

3.6.2 Effluent DO

The effluent DO range was 2.54 mg/L to 5.41 mg/L with an average DO of 3.91 mg/L and a median DO of 3.92 mg/L.

3.6.3 DO Criteria

There are no criteria in Standard 245 (2019) for effluent DO.

3.7 Total Nitrogen

Total nitrogen is the sum of Total Kjeldahl Nitrogen (TKN) and nitrate-nitrite. TKN is the total concentration of organic nitrogen and ammonia. The TKN was analyzed using EPA Method 351.2 Rev. 2.0. Nitrate-nitrite was analyzed using EPA Method 353.2 Rev. 2.0. Appendix C1 contains all the data collected for the entire testing period, and Table 5 presents a summary of all

data. Appendix C2 contains the data collected for the Standard 245 criteria samples, and Table 6 summarizes the criteria samples. The data shown below only includes the nitrogen criteria samples.

3.7.1 Influent Total Nitrogen

The influent TKN ranged from 19.9 to 68.5 mg/L during the testing, with an average concentration of 47.0 mg/L. The median influent TKN concentration during the evaluation was 48.0 mg/L. The influent nitrate-nitrite ranged from 0.050 to 0.615 mg/L during the testing, with an average concentration of 0.122 mg/L. The median influent nitrate-nitrite concentration during the evaluation was 0.050 mg/L. The influent total nitrogen ranged from 20.0 mg/L to 68.6 mg/L during testing with an average of 47.2 mg/L. The median influent total nitrogen was 48.2 mg/L.

3.7.2 Effluent Total Nitrogen

The effluent TKN ranged from 0.100 to 13.0 mg/L during the testing, with an average concentration of 3.90 mg/L. The median effluent TKN concentration during the evaluation was 3.20 mg/L. The effluent nitrate-nitrite ranged from 0.050 to 19.1 mg/L during the testing, with an average concentration of 9.07 mg/L. The median effluent nitrate-nitrite concentration during the evaluation was 9.60 mg/L. The effluent total nitrogen ranged from 6.00 mg/L to 22.5 mg/L during testing with an average of 12.9 mg/L. The median effluent total nitrogen was also 12.9 mg/L.

3.7.3 Criteria for Total Nitrogen

Standard 245 (2019) requires the average total nitrogen concentration of all effluent samples shall be less than 50 percent of the average total nitrogen concentration of all influent samples. The Model AS500L reduced the nitrogen to 27.4 percent of its original value over the entire evaluation period for an average total reduction of 72.6 percent. This figure was calculated by dividing the sum of the total nitrogen effluent over the Standard 245 test period by the sum of the total nitrogen influent over the Standard 245 test period.

During the test, it is estimated 33.8 pounds of nitrogen were loaded, and 24.6 pounds of nitrogen were removed by the Ecological Tanks, Inc. Model AS500L. Table 7 shows the percentage nitrogen reduction for 30-day periods using the Standard 245 (2019) testing days.

**Table 7
Percent Nitrogen Reduction by 30-Day Period**

Thirty-Day Periods of Percent Nitrogen Reduction					
1	2	3	4	5	6
65.6%	71.6%	70.4%	80.7%	79.1%	65.7%

3.8 Noise

Section 5.4 states noise associated with systems designed for outdoor operation shall be measured at 47 inches above the ground surface, 236 inches in four directions, at 90°, 180°, 270°, and 360° from the system, and its appurtenances shall not exceed 60-dBA. The reading was below the 60-dBA required by NSF/ANSI Standard 245 (2019).

3.9 Failure Sensing and Signaling Equipment

Pursuant to Section 5.8, three employees of Gulf Coast Testing, LLC, performed the visual and audible testing according to Section 5.8.1 and 5.8.2 of Standard 245. The Jefe Aire Model JA380 aerator's visual and audible alarms were turned on and off as required by the test and observed. The observers correctly identified the status of the alarm (On or Off) in each trial. The testing results indicate the Jefe Aire Model JA380 aerator passed the visual and audible alarm requirements in Standard 245 (2019).

3.10 Color, Odor, and Oily Film and Foam

There were 3 samples of effluent that were observed and noted for color, odor, and oily film and foam as described in NSF/ANSI Standard 245. The effluent was acceptable according to the Standard with a non-offensive threshold odor, and there was no visible evidence of oily film or foam. There are no criteria in Standard 245 (2019) for color samples.

4.0 REFERENCES

1. APHA, AWWA, WPCF, *Standard Methods for the Examination of Water and Wastewater*, 23rd Edition, American Public Health Associates, Washington, D.C.
2. NSF/ANSI Standard 40 (2019), *Residential Wastewater Treatment Systems*, NSF International, Ann Arbor, Michigan.
3. NSF/ANSI Standard 245 (2019), *Residential Wastewater Treatment Systems – Nitrogen Reduction*, NSF International, Ann Arbor, Michigan.
4. NSF/ANSI Standard 350 (2019), *Onsite Residential and Commercial Water Reuse Treatment Systems*, NSF International, Ann Arbor, Michigan
5. U.S. EPA, *Methods for Chemical Analysis of Water and Wastes*, U.S. Environmental Protection Agency, Washington, D.C.
6. WEF, *Design of Municipal Wastewater Treatment Plants* (Volume I, II, III); WEF Press, McGraw Hill, New York, 2010.

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INSTALLATION

MANUAL

UV DISINFECTION UNIT

MODEL 3G

February, 2011

I. INSTALLATION INSTRUCTIONS

WARNING! Improper connection of the appliance grounding conductor can result in the risk of electric shock.

Check with a qualified electrician or service representative if you are in doubt about whether the appliance is properly grounded.

Open and carefully unpack the shipping carton. Check for any damage that may have occurred in shipping. If there are any problems, call *SALCOR INC.* at 760-731-0745 or fax to *SALCOR INC.* at 760-731-2405 and explain the problem(s).

The following list describes the components that are contained in the shipping carton.

1. Riser pipe: Four-inch diameter ABS pipe. The one-inch PVC bubble-wrapped insertion and removal handle containing the UV lamp is packed inside the riser pipe.
2. Disinfection chamber: three-inch diameter ABS pipe with 4-inch inlet and outlet hubs.
3. Disinfection subassembly consisting of an anodized aluminum frame supporting a Teflon[®] sleeve containing a pure fused quartz tube. This complete item is packed inside of the three-inch disinfection chamber.
4. One-inch White PVC handle which is used for inserting and removing the disinfection subassembly.
5. Long Life UV lamp packed inside of the PVC handle.
6. Electrical subassembly junction box (rated 6P) with pre wired alarm board, electronic ballast, and the cable supplying power to the UV lamp.
7. Two 4-inch Schedule 40 ABS pipe couplings.
8. Watertight connection(s) for bringing the power and alarm wires into the junction box.

There will be some additional items needed for installation, which are:

1. ABS cement (also multipurpose cement if bonding to PVC pipe)
2. Teflon tape
3. Isopropyl (rubbing) alcohol
4. Glycerin (available from drug stores)
5. Power and Alarm Wires
6. Power and Alarm Wire Watertight Conduit for connecting to the Junction Box
7. Valve Box cover if unit is to be installed above ground

A schematic drawing of the unit is shown in figure 1.

Salcor 3G UV Disinfection Unit

NOTE: Not all dimensions to scale

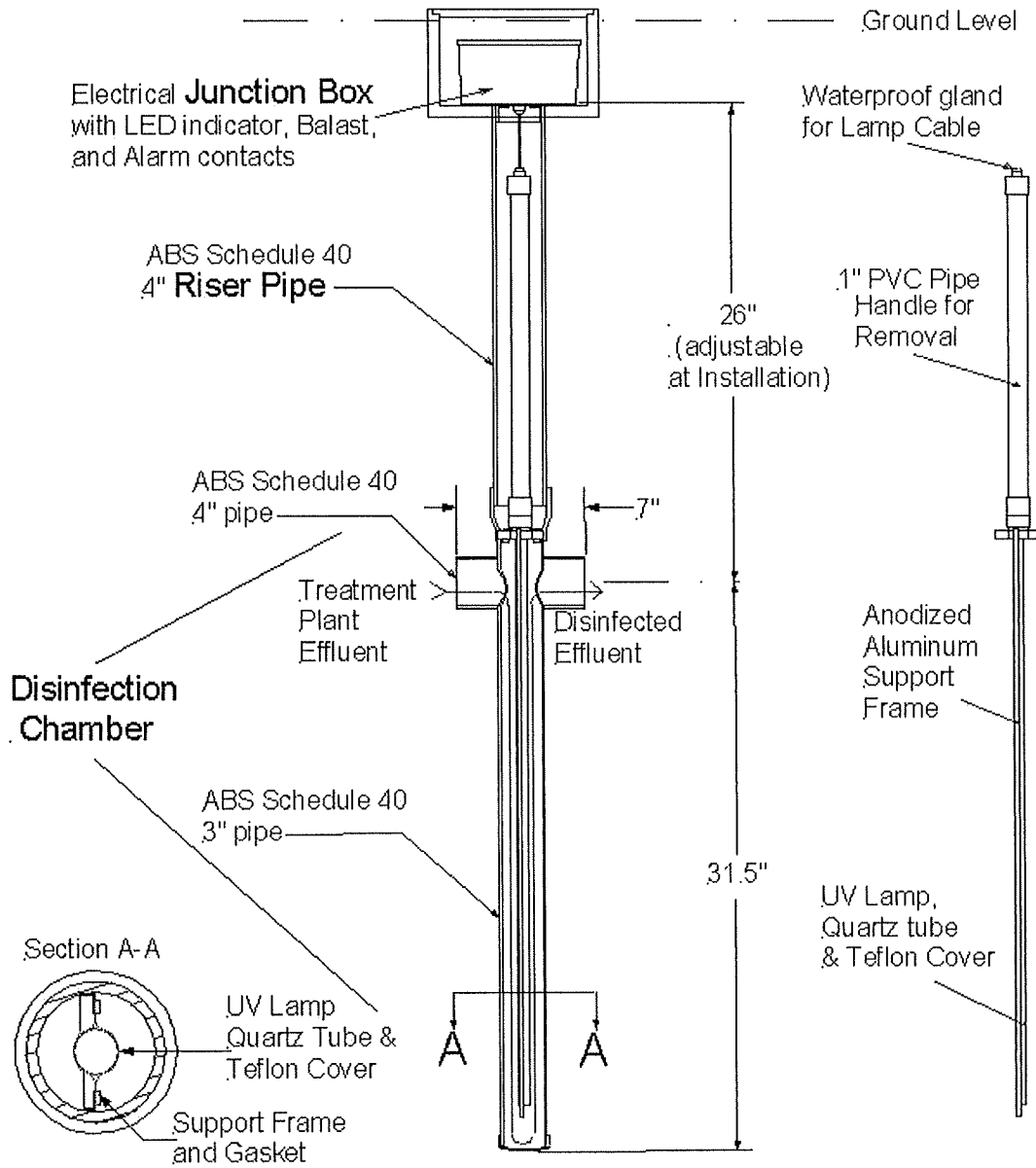


Figure 1

II. TWO INSTALLATION OPTIONS

1. In the ground: couple the 4-inch inlet to the exit pipe of the pretreatment unit, and couple the 4-inch outlet to the drain field pipe. See *Figure 2*.
2. In a Pump Tank: couple the UV unit inlet pipe to the pretreatment unit exit pipe at the entrance of the pump tank. See *Figure 3*.

Note: *Figure 1* indicates that the electrical junction box should be above ground level. If this should pose a problem with lawn mowers, etc., then the box could be placed below grade in an irrigation or water meter box. Another possibility is to use a hollow artificial rock to cover the junction box.

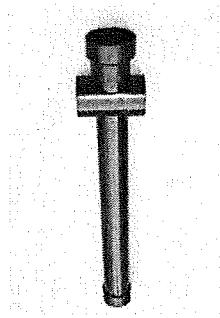
The Junction box is rated NEMA 6P. To be safe, however, the junction box should be protected from flooding.

For in-pump tank installations, care should be taken to prevent flooding of the junction box.

III. DETAILED INSTALLATION STEPS

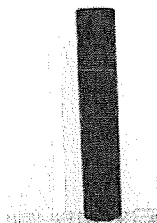
1. Install the 3-inch disinfection chamber in place at the site.

Disinfection Chamber.

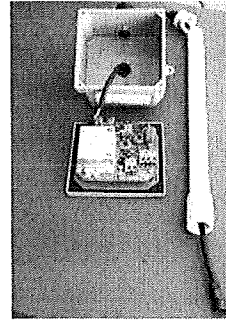
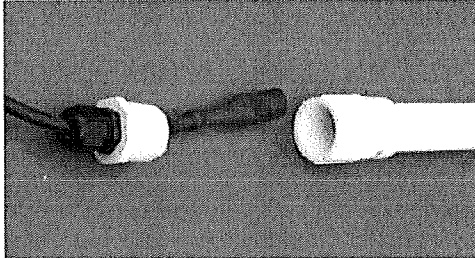


2. Cut the 4-inch riser pipe and 1-inch lamp handle to meet job needs. Use the 4-inch connection to the pretreatment unit as a reference point. The lamp handle upper end should be approximately six inches from the top of the riser pipe. Bond the riser pipe to the chamber assembly and the second FIP to the handle.

Cut Handle and Riser Pipes.

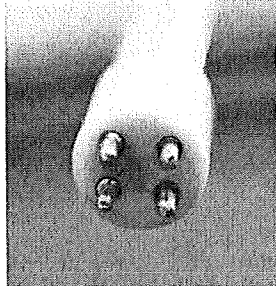


- Carefully slide the lamp cord through the 1-inch handle pipe. The lamp cord wire with the 4 pin lamp socket connector should extend out about 6 inches from the threaded end of the 1-inch white PVC pipe connector.

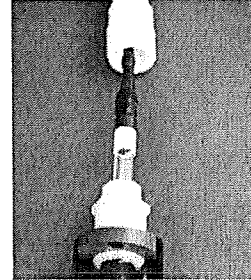


Insert Lamp cord wire into Handle pipe.

- Fully connect the 4 pin socket connector of the lamp cord to the UV lamp pins. Then carefully slide the UV lamp into the quartz tube in the frame assembly. **CAUTION!** The Teflon[®] sleeve is very fragile, so handle it with care.

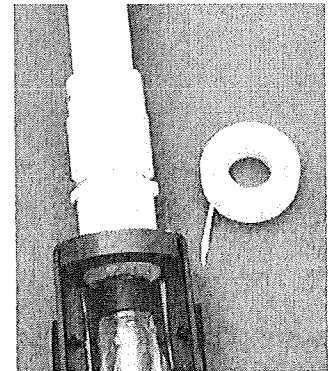


Lamp connector Pins are not square.



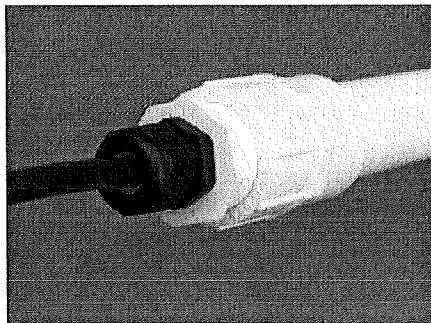
Lamp Cord connected and Lamp inserted into frame

- Wrap both of the 1-inch threaded pipe pieces with Teflon[®] tape. Screw the threaded end of the 1-inch lamp handle onto the upper end of the frame and screw the threaded reducer into the top end of the handle pipe. It is important that Teflon[®] tape is used to seal the threads to maintain waterproof operation of the lamp.



Use Teflon Tape to seal

6. Make sure that the UV lamp is bottomed out in the quartz tube.

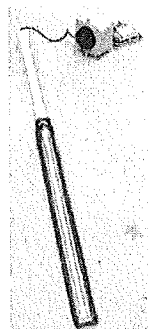


Tighten Gland.

7. Tighten this gland nut to approximately 22 in/lb to make the UV lamp chamber watertight. **CAUTION!** Do not over tighten!
8. Inspect the Teflon ® sleeve. If necessary, use a clean soft cloth and isopropyl (rubbing) alcohol to clean and remove any fingerprints. Then lubricate the rubber gaskets with either water or glycerin.

Note: Do not use silicone or petroleum based lubricants on the gaskets.

Inspect and clean assembly

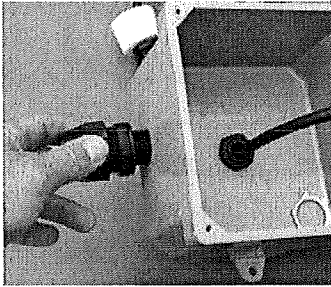


9. Insert the entire frame/handle assembly into the riser/chamber assembly using the white PVC handle. Make sure that the wide part of the subassembly is at right angles to the inlet and outlet pipes, and that the holes on the upper hub of the subassembly are set onto the two pins in the disinfection chamber. The orientation of the frame is very important for successful UV unit operation.

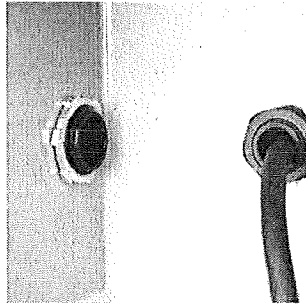


Insert Assembly into Chamber.

10. After tucking the extra lamp cord wire into the riser pipe, place the junction box onto the 4 inch riser pipe and secure it with 2 set screws.
11. Install the Watertight Conduit connector to the side of the Junction Box and secure with the nut on the inside. Use a little RTV on the O-ring to assist in waterproofing.



Install watertight Conduit connector.



Nut on back side of conduit connector

12. Bring the power wires and alarm wires into the junction box via the waterproof conduit connection. Seal the outside of the (NMC) conduit pipe to the waterproof connector with RTV. The *installer* is responsible for ensuring that the external wire conduit connection(s) containing the power and/or alarm wires to the junction box are **WATERTIGHT**.
13. Attach the cable wires to the appropriate terminals on the alarm board. See figure 4. The alarm contacts are compatible with both normally open (N/O) and normally closed (N/C) external alarm circuit units (furnished by others). Note: N/O means the contacts are **OPEN** when there is **NO POWER** to the alarm board relay. The contacts accommodate up to 120 volts and up to 2 Amps. Select the common contact terminal and then the N/C or N/O contact that complies with the receiving alarm panel circuit.
14. Attach the lid to the junction box with 4 screws.
15. The UV unit operates on 120 VAC single-phase (50 or 60 HZ) power and consumes 30 watts. A specific 10-15-amp circuit breaker on the main electrical panel should be used for service to the Model 3G unit.
16. Allow the effluent to start flowing through the unit.
17. Turn on the breaker at the main electrical panel. The LED indicating light on the junction box lid should now be shining, indicating that the unit is operating properly.

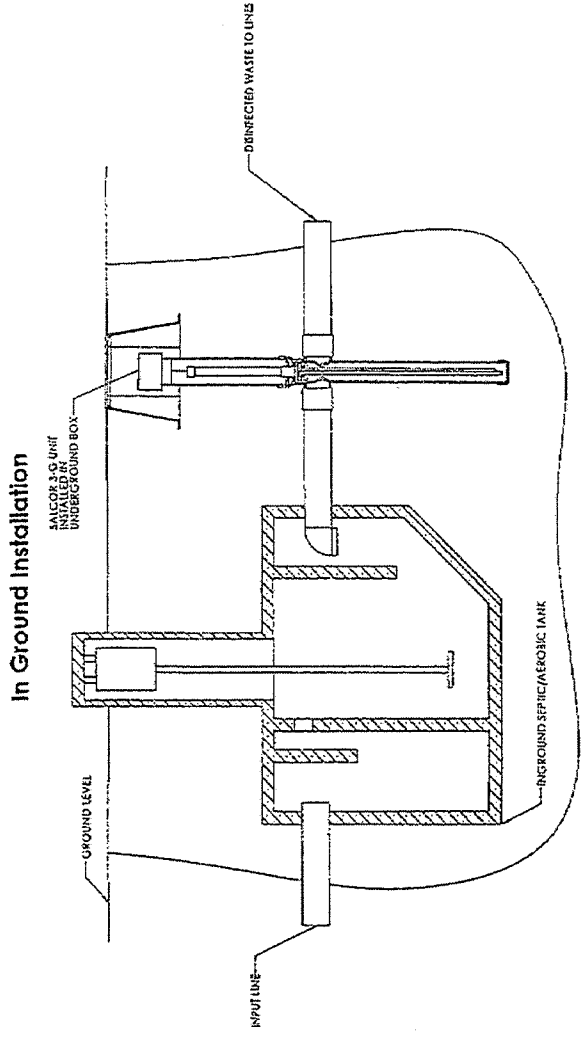


Figure 2

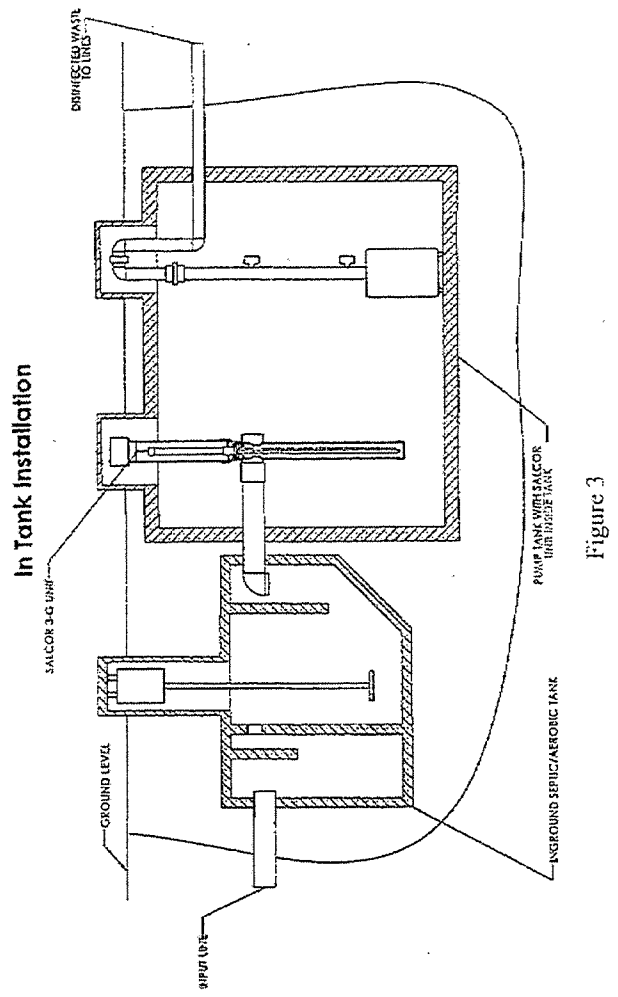


Figure 3

IV. MAINTENANCE AND SERVICE

The Salcor Model 3G UV disinfection unit is designed to provide a long service life. It is recommended that the UV lamp be replaced every two years to insure proper disinfection.

UV LAMP REPLACEMENT PROCEDURE

1. Turn off the dedicated breaker located in the main electrical panel that supplies power to the UV system.
2. Remove the electrical junction box from the UV disinfection chamber and carefully set it aside.
3. Using the power line connected to the UV Lamp Assembly, lift the Assembly out of the disinfection subassembly.
4. Loosen the Lamp Cord Grip at the top of the Lamp Assembly.
5. Disconnect the four pin connector attaching the power line to the UV lamp.
6. Connect the new lamp to the four-pin connector and completely lower the new lamp into the quartz tube of the UV subassembly.
7. Tuck the remaining power line into the riser pipe.
8. Insert the plastic section on the back side of the control center enclosure into the top of the riser pipe.
9. Turn on the dedicated breaker located in the main electrical panel that supplies power to the UV system.

It is recommended that the disinfection subassembly be removed and serviced (cleaned) a minimum of once per year to insure proper effluent disinfection.

TO CLEAN THE TEFLON® SHEATH AND DISINFECTION SUBASSEMBLY

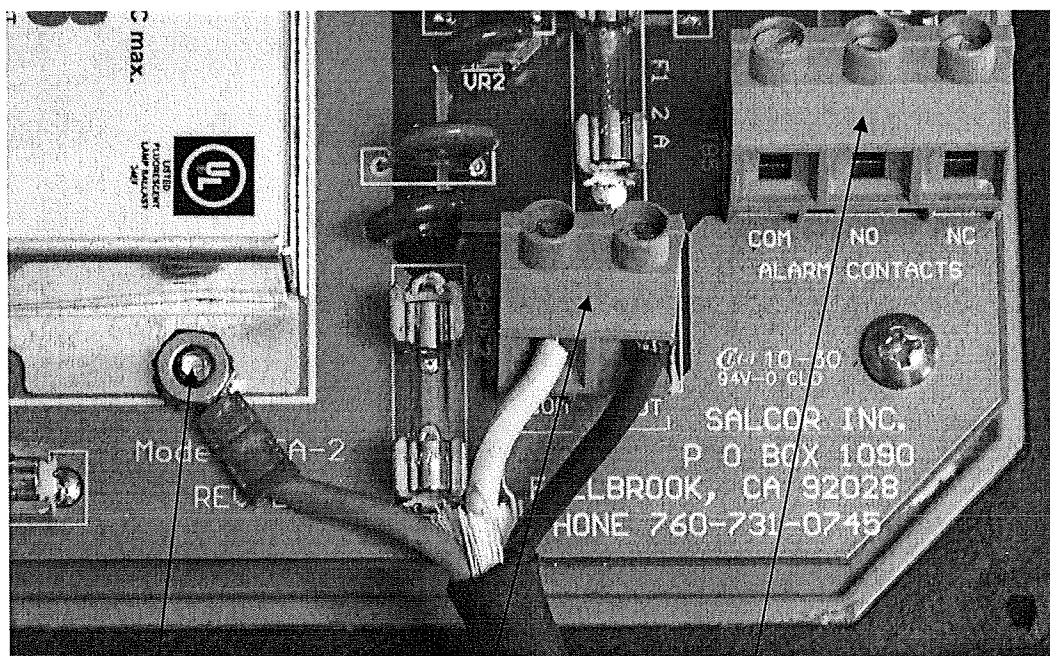
1. Use a soft sponge and detergent to clean the surfaces, especially the Teflon ® sleeve.
2. Use a soft cloth with isopropyl alcohol to remove difficult stains like finger prints and other films.

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V. ELECTRICAL JUNCTION BOX LID

The Ballast and terminal strips are now mounted on the Alarm Board, mounted to the Junction Box Lid.



Grounding Post

Power Inlet Terminal

Alarm Wire terminal block.
Connect alarm wires as needed
for your specific circuit.
N/O and N/C describes the contact
configuration when the
relay has **NO POWER** applied,
or it is **NOT** energized.

Figure 4



2 Year Limited Warranty

This warranty is given by LONGWAVE UV INC. for the benefit of the first purchaser of the product for which this warranty applies. The warranty applies only to those parts which are manufactured and delivered by LONGWAVE UV INC.

The warranty is that the parts manufactured and delivered by LONGWAVE UV INC. will be free from defects in the material or workmanship under normal use and service according to the Installation and Operating Instructions for the time specified below.

In the event of a failure of a part due to such a covered defect, LONGWAVE UV INC. will repair or replace, at its option, the defective part at its factory located at 447 Ammunition Road, Suite E, Fallbrook, CA 92028. At the option of LONGWAVE UV INC., repairs or replacement may be made at the site of equipment installation.

The part must be returned to the factory at the expense of the person claiming the benefit of the warranty unless LONGWAVE UV INC. elects to repair or replace the defective part at the installed site.

The warranty shall be for a period of twenty four (24) months after the date of delivery of the product, or the specified service life of the product, whichever period is the shortest. All products for which warranty claims are filed must be returned as provided above to the factory within thirty (30) days from the date of the claimed malfunction in order for this warranty to be effective. The only entity authorized to do any warranty repairs is LONGWAVE UV INC.

The repairs or replacement by LONGWAVE UV INC. will be accomplished within thirty (30) days from receipt of the defective parts at the factory.

This warranty is expressed in lieu of all other warranties, expressed or implied, including the implied warranty of fitness for a particular purpose, and of all other obligations or liabilities on the part of LONGWAVE UV INC., and it neither assumes nor authorizes any other persons to assume for LONGWAVE UV INC. any other liabilities in connection with the sale of the products.

This warranty does not cover parts or products made by others, or products or any part thereof which have been repaired or altered, except by LONGWAVE UV INC., which shall have been subjected to misuses, negligence, or accident.

LONGWAVE UV INC. shall not be liable for damage or delay suffered by the purchaser regardless of whether such damages are general, special, or consequential in nature whether caused by defective material or workmanship, or otherwise, or whether caused by LONGWAVE UV INC. negligence, regardless of degree.