

Florida Onsite Sewage Nitrogen Reduction Strategies Study

ACCEPTANCE OF SYSTEM OWNERSHIP AND RESPONSIBILITY

FDOH Permit Numbers: 59-S2- [REDACTED]

Location (City/County): Longwood, Florida; Seminole County

Property ID #: [REDACTED]

In July, 2013 an experimental onsite wastewater treatment system was installed at [REDACTED] Longwood, Florida 32779 as part of the Florida Department of Health Onsite Sewage Nitrogen Reduction Strategies Study. As outlined in the agreement between Hazen and Sawyer, P.C. and [REDACTED] Hazen and Sawyer has to date been responsible for permitting, construction, modifications, operation, maintenance, monitoring, and inspections of this experimental nitrogen reduction system over an 18 month study period. This study period has now ended. As indicated in the agreement, Hazen and Sawyer is responsible for transferring ownership and responsibility for the experimental system at study termination, or removal of the system if desired by the homeowner. This agreement documents the decision by the homeowner and replaces the previous homeowner agreement.

OWNER: I (We) [REDACTED] hereby do agree to the transfer of complete ownership and operational responsibilities for the referenced FDOH permitted experimental system, and agree to accept all conditions and responsibilities of the permit. Per my decision, the Vericomm monitoring service will be discontinued, and the system shall be set-up to be operated and monitored manually. I hereby release FDOH and Hazen and Sawyer, P.C. from any and all responsibility or liability for the performance or non-performance of this system after the date this acceptance of system agreement is signed by both parties below.

OWNER: I (We) _____ hereby do not agree to the transfer of complete ownership and operational responsibilities for the referenced FDOH permitted experimental system, and wish the system to be restored to its original condition.

HOMEOWNER

By: _____

Date: _____

2/10/15

HAZEN AND SAWYER, P.C.
10002 Princess Palm Avenue
Registry One, Suite 200
Tampa, FL 33619

By: _____

Damann L. Anderson

Title: Vice President

Date: February 9, 2015

Damann L. Anderson

OPERATION & MAINTENANCE (O&M) MANUAL

Experimental Two Stage Biofiltration Passive Nitrogen Reduction System

██████████ Longwood, FL



I _____ understand the concepts in this manual and received training in proper service of the system.

Signature: _____

Date: _____

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1.0 Introduction

This Operation and Maintenance (O&M) Manual describes the procedures that should be followed for proper operation and maintenance of the two-stage biofiltration passive nitrogen reduction system (PNRS) installed as part of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) at [REDACTED] Longwood, Florida 32779. The nitrogen reducing onsite treatment system for the single family residence was installed in July 2013.

2.0 System Components and Operation

The two-stage PNRS system is configured as illustrated in Figure 1. A flow schematic of the system is shown in Figure 2. The complete as-built system drawings are included in the attached Appendix A.

The two-stage PNRS system operates on a two-step process for nitrogen reduction. The first step is called nitrification, where most nitrogen is converted from organic and ammonia forms to nitrate, NO_3 . This step requires oxygen and is completed in the Stage 1 biofilter, which is a completely drained, unsaturated tank filled with expanded clay porous media. The media pores are air filled, and as the septic tank effluent (STE) percolates through this media the biological process of nitrification occurs in which ammonia is oxidized to nitrite and nitrite is oxidized to nitrate. The second step in the process train is called denitrification, where most of the nitrate that is formed in the first step is converted to nitrogen gas. This step requires the absence of free oxygen and is completed in the Stage 2 biofilter, which is a saturated tank filled with lignocellulosic (wood product) media in the first chamber and elemental sulfur media in the second chamber of the tank. The media pores are filled with water, and as the Stage 1 effluent percolates through this media the biological process of denitrification occurs in which nitrate is reduced to nitrogen gas.

The B-HS5 system tankage consists of a 1,350 gallon concrete primary tank; 1500 gallon plastic tank housing a Stage 1 unsaturated media filter; a 300 gallon concrete pump tank; and a 1,500 gallon two chamber concrete tank housing a Stage 2 saturated media biofilter. The denitrified treated effluent is discharged into the soil via the existing drainfield which is of standard bed geometry.

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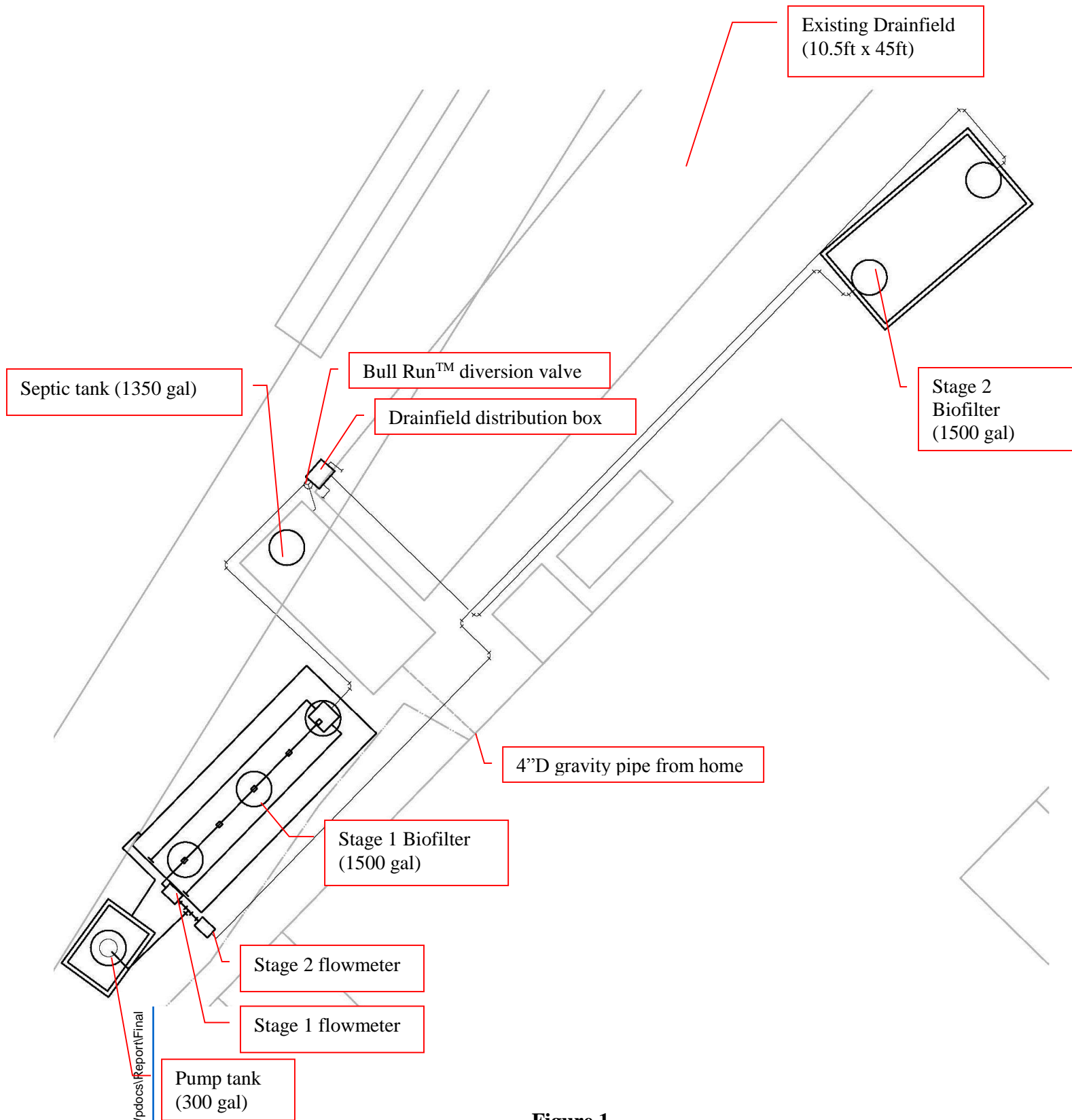


Figure 1
Plan view of System Layout

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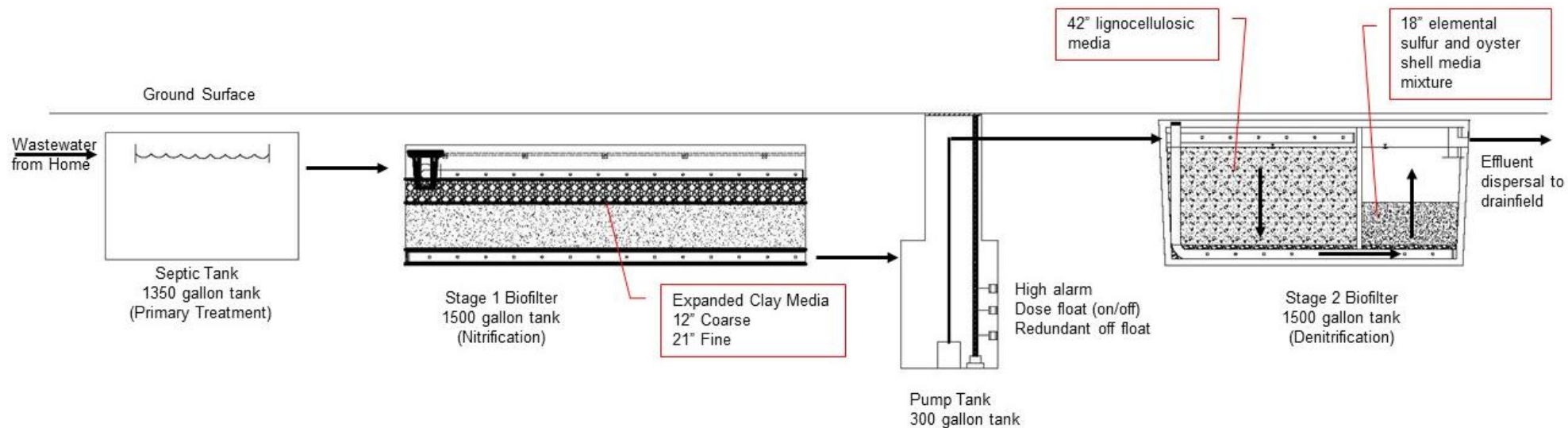


Figure 2
System Flow Schematic

2.1 Primary (septic) tank

The primary (septic) tank is a 1,350 gallon concrete tank with a plastic manhole cover for access (Figure 3). The sewer pipe from the house was plumbed into the 4"D (diameter) inlet. Household wastewater enters the septic tank and exits as septic tank effluent (STE) through an effluent screen into the Stage 1 distribution box. The effluent screen is a Polylok™, PL-68 (Figure 4).



Figure 3
1,350 gallon, primary (septic) tank



Figure 4
Primary (septic) tank effluent screen

2.1.1 Primary (septic) tank maintenance

Primary (Septic) Tank: The EPA recommends that the septic tank should be pumped at least every 3 to 5 years (EPA, 2002), depending on use and solids build-up. This can be handled by a licensed septic system contractor or the maintenance provider for the system.

Effluent Screen: The effluent screen is a Polylok™, PL-68 (see Appendix B) and will require annual maintenance. The effluent screen is removed from the outlet tee by grabbing the red handle at the top and twisting up (Figure 5). The effluent screen should be cleaned with a hose, inside the tank, to remove any solids captured on the screen.



Figure 5
Effluent screen removal

2.2 Stage 1 biofilter

The Stage 1 biofilter is a 1500 gallon plastic tank with three plastic manhole covers for access (Figure 6). The purpose of this tank is to hold the Stage 1 expanded clay media which was mixed with approximately 5% oyster shell for alkalinity. The 4"D influent pipe, connected to the primary (septic) tank discharge (gravity flow), discharges into a distribution box which flows to two 3"D perforated pipes across the top of the expanded clay media (Figure 7). Below the influent distribution network is 12.8-inches of coarse (1/4 Riverlite™) expanded clay media overlying 21-inches of finer (3/16 Riverlite™) expanded clay media. The 4"D underdrain pipe (perforated) with gravel surrounding was installed along the centerline of the bottom of the tank for effluent collection. The 4"D outlet of the pipe is located near the bottom of the tank to allow for unsaturated operation.

In the two-stage biofilter process, a first stage unsaturated biofilter is followed in series by a second stage biofilter operated in a water saturated mode. Septic tank effluent will be applied to the top of the first stage media, resulting in a downward percolation of wastewater over and through the media biofilter bed. The unsaturated pore spaces in the first stage media will allow air to reach microorganisms attached to the media surfaces, enabling aerobic biochemical reactions to occur. The significant target reactions are aerobic oxidation (by microorganisms that oxidize organic material and reduce biochemical oxygen demand), hydrolysis and ammonification (releasing ammonia), and

nitrification (biochemical conversion of ammonia to nitrate and nitrite). Of particular interest are the organic and ammonia nitrogen concentrations in first stage effluent (which should be low), as well as nitrate and nitrite (which should be high).

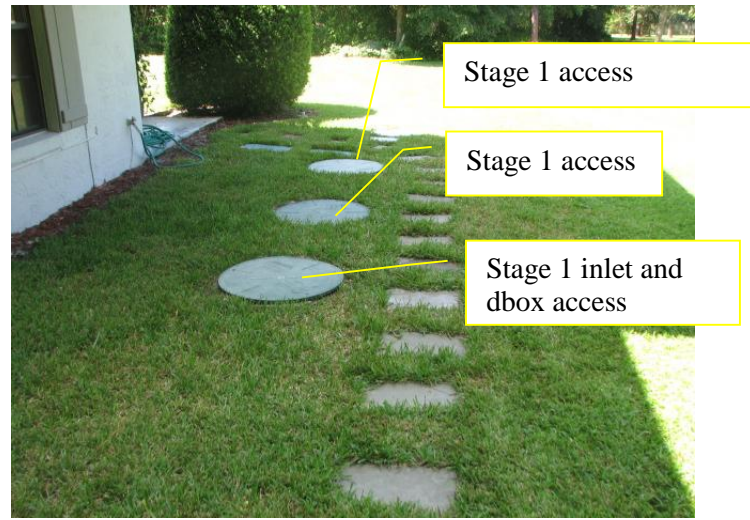


Figure 6
Stage 1 biofilter access

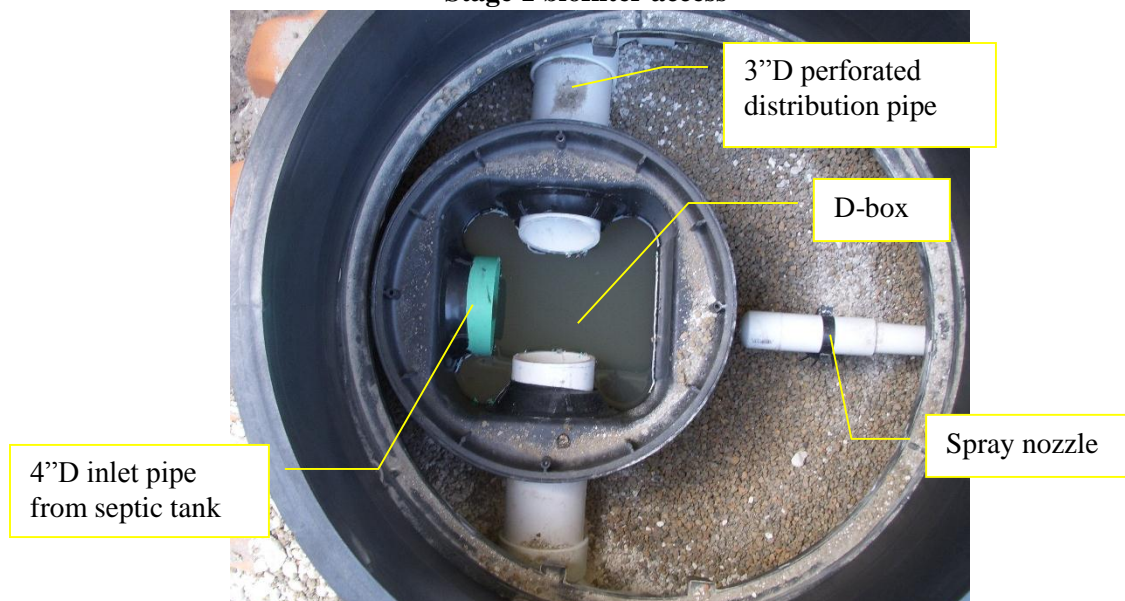


Figure 7
Stage 1 biofilter dbox

2.2.1 Stage 1 biofilter maintenance

The Stage 1 biofilter should be checked regularly. Clogging of the filter surface can occur (a black biomat will form) which will slow infiltration. If the surface remains ponded between doses, insufficient aeration of the media will occur, lowering the effluent quality and life of the system. If the filter surface remains ponded between doses, the filter should be taken out of service (see Section 2.5 diversion valve) for rejuvenation.

Resting and raking of the surface are some applicable rejuvenation techniques. Raking may be sufficient to break up the clogged surface to allow continued loading, but raking combined with 3 or 4 months resting should prolong filter runs. Eventually, however, removal of some of the surficial expanded clay may be necessary.

The dbx should be checked for debris and equalized flow between the two distribution pipes. In addition the 3"D distribution pipe along the top of the media should be checked for proper placement on the pipe supports.

2.3 Pump tank

The pump tank is a 300 gallon concrete tank with one plastic manhole cover for access (Figure 8). Stage 1 biofilter effluent flows by gravity into the pump tank via the 4"D inlet. The 1"D outlet is connected to the effluent pump (1/2 HP, 30 gpm, 115V, 60 Hz Orenco™ item # PF300511). The pump was installed within a holding bracket which also supports the float tree (Figure 9). Three float switches were installed to maintain the effluent level in the pump tank and are attached to a float tree installed in the pump tank and connected to the control panel. The height of the floats is adjustable and once the proper heights were established, screws were used to secure the floats to the float tree.

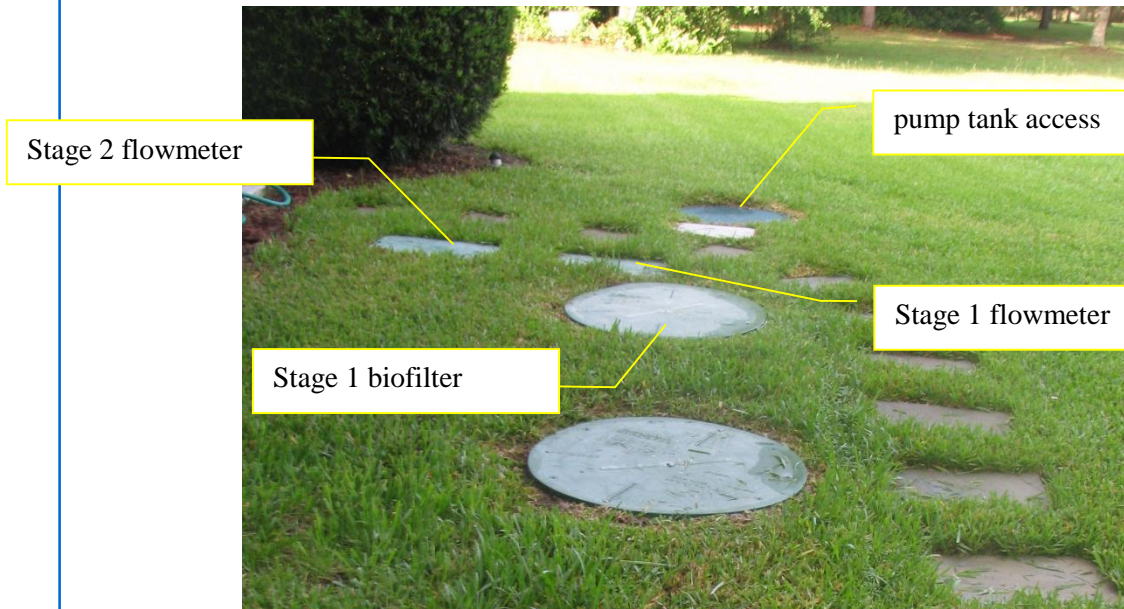


Figure 8
Pump tank access

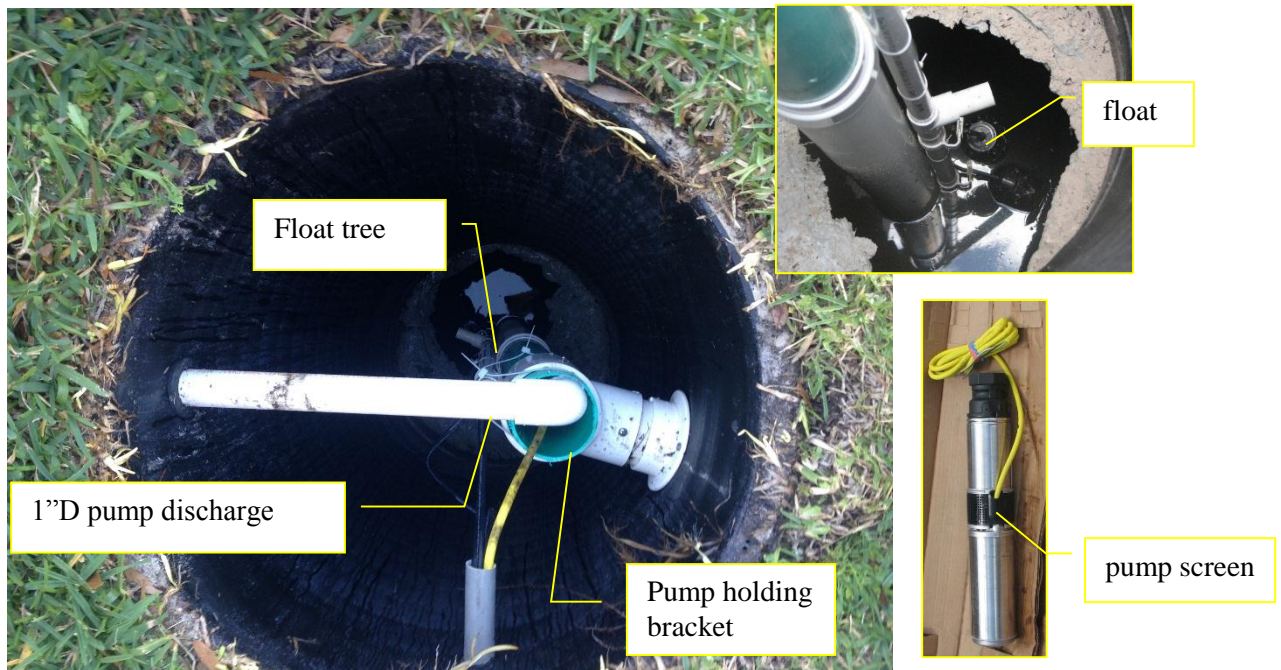


Figure 9
Pump and float tree

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2.3.1 Pump operation

The pump is controlled by a timer (see Section 2.8 Vericomm System) to periodically dose the Stage 2 biofilter. The system control panel allows for a timed pump cycle which can be overridden if the effluent levels are too low or too high in the pump tank. If the floats indicate a low effluent level in the tank, the timed cycle is turned off to protect the pump. If the floats indicate a high effluent tank level, then the pump cycles faster (the off cycle time is reduced) until the water level reaches the optimal range. An alarm will indicate if the water level goes above a critical level.

Redundant Off (RO) Float: The water level must be high enough to overcome the “Redundant Off” (first float) in order for the pump to be permitted to run. The RO float is located near the bottom of the tank. The low water safety float switch (RO float) is normally in the up position to assure enough water is in the pump tank.

Enable (EN) Float: When the water level rises high enough to overcome the (standard dose enable, 2nd from the bottom float) and the time clock has timed out the preset time delay of 60 minutes or 1 hour (standard rest between dosing cycles) the pump will activate. The pump will continue to run for the length of time set for the “On Cycle time” in the Vericomm system (currently set at 0.7 minutes). The pump will remain off until the internal time clock again times out the preset time delay the “Off Cycle time” in the Vericomm system (Standard Rest = 60 minutes) after which the pump will activate (as long as the EN float is still in the up position) and will run until the pump run timer finishes timing out. This process will repeat until the water level drops below the EN float and the pump run timer has timed out.

High Level (HI) Float: If the water level rises enough to overcome the high level (3rd from the bottom) float, the audiovisual alarm will activate. The audio portion of the alarm may be silenced by pressing the Test-Normal-Silence switch (located on the front door of the control panel). The alarm circuit will auto reset when the HI float returns to its normal (down) position. Since a high water level condition can be caused by pump failure, excess infiltration, or an unusually large peak water use, the owner should call the maintenance entity to determine the cause of the alarm.

For the pump to be automatically actuated, the pump switch must be on "auto". The pump may also be operated in the "manual" position by flipping the switch inside the control panel to the “MAN” position (see Section 2.6). However to run the pump in the manual position, the water level in the pump tank should be higher than the dose enable float (EN float is in the up position).

2.3.2 Flowmeters

The PNRS system was designed with two operational modes for Stage 1: single pass and recirculation. For long term operation, the system is set to operate in single pass mode. In single pass mode, 100 percent of the Stage 1 effluent is discharged to the Stage 2 biofilter. In recirculation mode the pump tank discharge is split via two throttling gate valves to provide for recycling of a portion of the Stage 1 biofilter effluent to Stage 1 influent, with the balance of Stage 1 effluent proceeding to the Stage 2 biofilter. In recirculation mode, a portion of the Stage 1 effluent was recirculated to the top of the Stage 1 biofilter and dispersed via five spray nozzles.

Two inline flowmeters are installed following the two throttle gate valves on the pump discharge (Figure 10). The inline flowmeter used to record the recirculated effluent to the Stage 1 biofilter (Figure 11) reading should not change in single pass mode. The second inline flowmeter measures the forward wastewater flow to the Stage 2 biofilter (Figure 12).

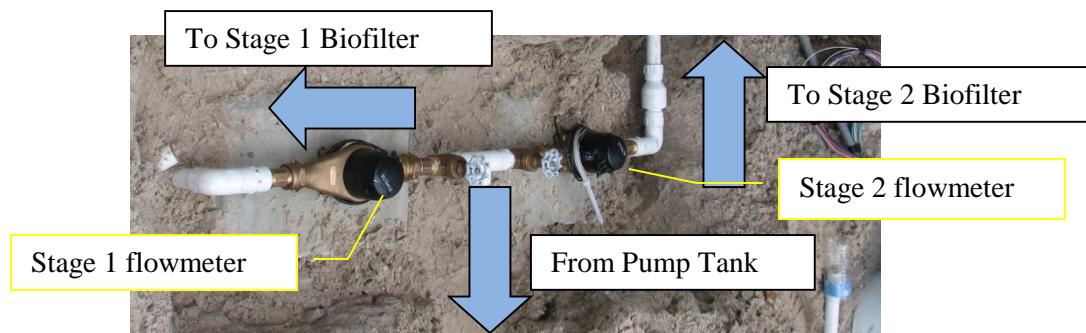
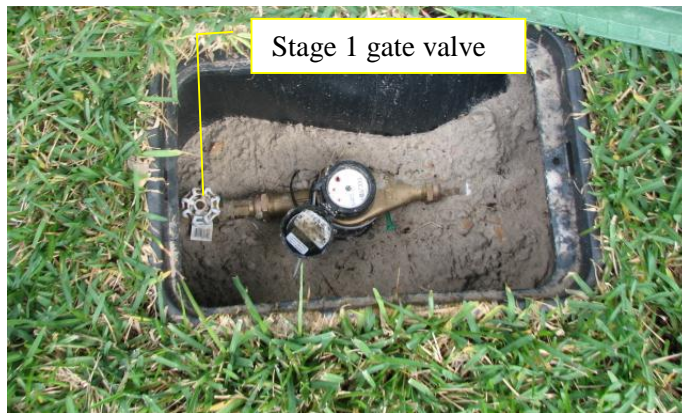


Figure 10
Stage 1 biofilter flowmeter (will not change in single pass mode)

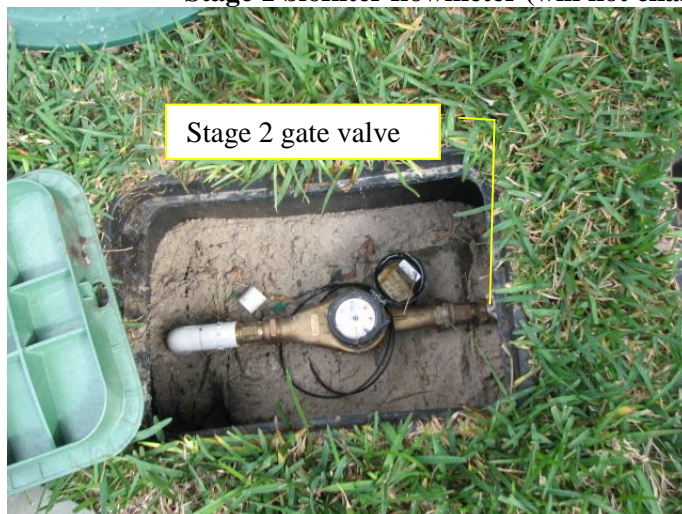


Stage 1 gate valve



Flowmeter reading = 107,962.5 gallons

Figure 11
Stage 1 biofilter flowmeter (will not change in single pass mode)



Stage 2 gate valve



Flowmeter reading = 69,176.65 gallons

Figure 12
Forward flow, Stage 2 biofilter flowmeter

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2.3.3 Pump and flowmeter maintenance

The pump and float switches should be checked annually and immediately if an alarm condition is sent from the Vericomm panel. Troubleshooting guidelines and a technical data sheet for the pump are included in Appendix C. A video showing how to repair the pump can be found at this website: http://www.orenco.com/corporate/O_and_M_Tools/

The pump and flowmeter should be checked to confirm that the target dose volume (checked by the Stage 2 flowmeter reading) is being delivered to the Stage 2 biofilter. The Stage 2 biofilter flowmeter (FM) should be read before and after a dose. The difference between the two readings is the total water passing through the meter during a dose cycle.

Stage 2 FM after dose – Stage 2 FM before dose = Dose Volume = ~6 gallons

If the dose volume is less than 3 gallons, then the flowmeter strainer (Appendix D) and pump screen (see Figure 9) should be checked for clogging. Float switch operation should be checked in the control panel (corresponding lights register in panel) as shown in Figure 13. Additional details are included in the VeriComm control panel manual provided in Appendix E.

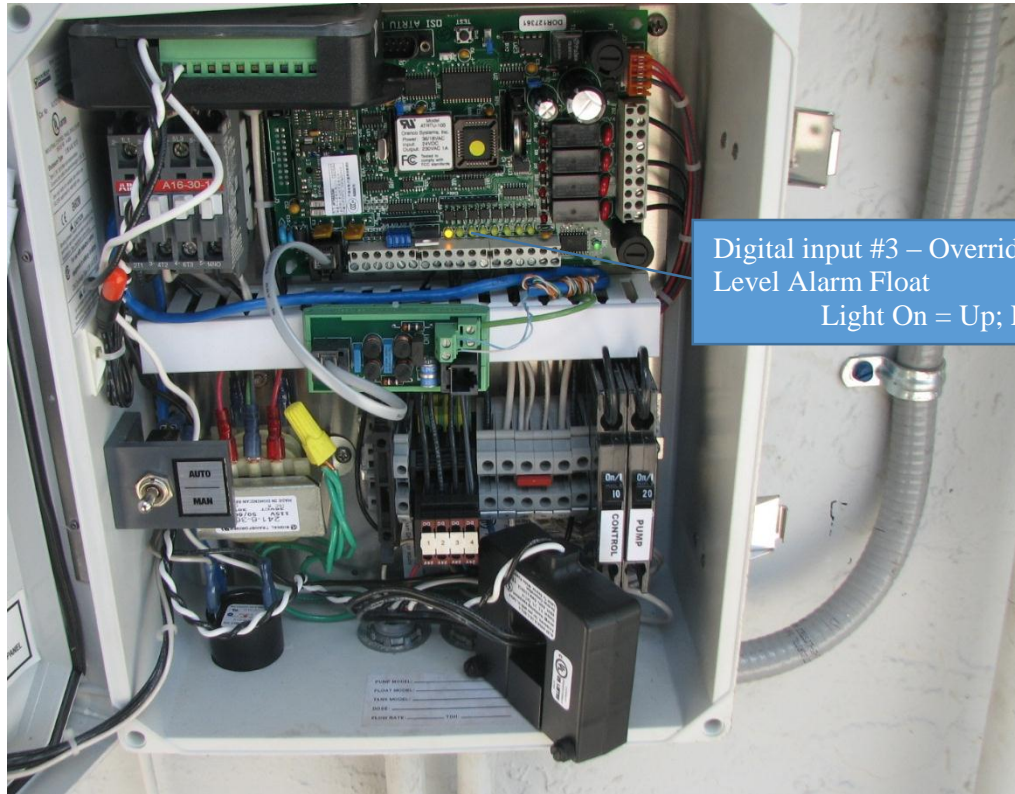


Figure 13
Float switch lights within control panel

2.4 Stage 2 biofilter

The Stage 2 biofilter is a 1,500 gallon two-chamber concrete tank with two plastic manhole covers for access (Figure 14). The purpose of this tank is to hold the Stage 2 lignocellulosic and sulfur media (Figure 15). The 1"D pipe downstream of the Stage 2 flowmeter is expanded to 4"D and connects to a perforated pipe which distributes Stage 1 effluent over the lignocellulosic media within the first chamber of the Stage 2 biofilter (Figure 16). The effluent flows downward through 42-inches of lignocellulosic media (a blended urban waste wood from Mother's Organics, Inc., Thonotosassa, FL) within the first chamber and upward through 18-inches of a mixture of 90% elemental sulfur (99% pastille-shaped elemental sulfur GreenSun™ ES-99) and 10% oyster shell media (Remington Feed) within the second chamber (Figure 17).

A 4"D perforated underdrain pipe with gravel surrounding was installed along the centerline of the bottom of the tank for transfer from the first chamber to the second

chamber. Stainless steel drivepoint sampler trees (Figure 16) are installed within both chambers for vertical profile sampling. A 4"D tee was installed at the outlet of the tank. The 4"D outlet is connected to the distribution box to the existing drainfield.

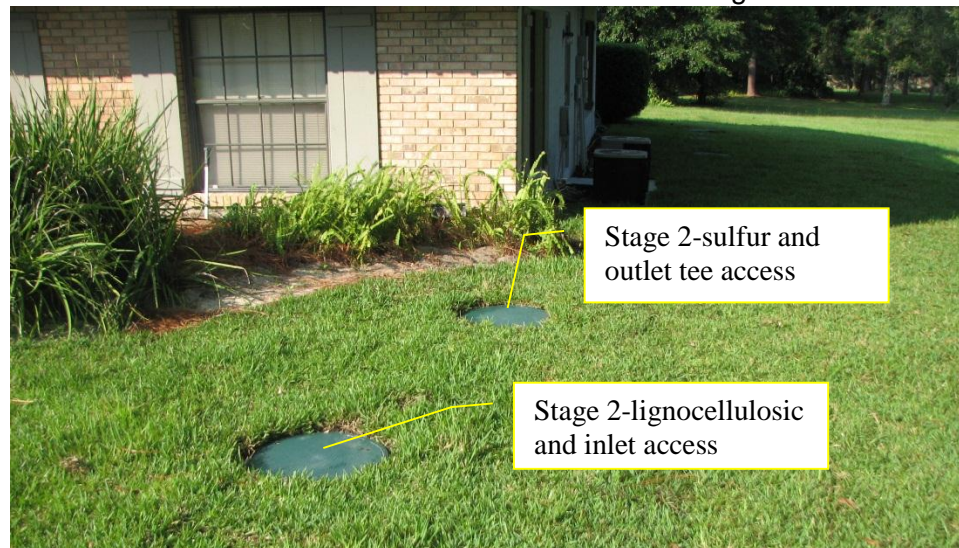


Figure 14
Stage 2 biofilter access

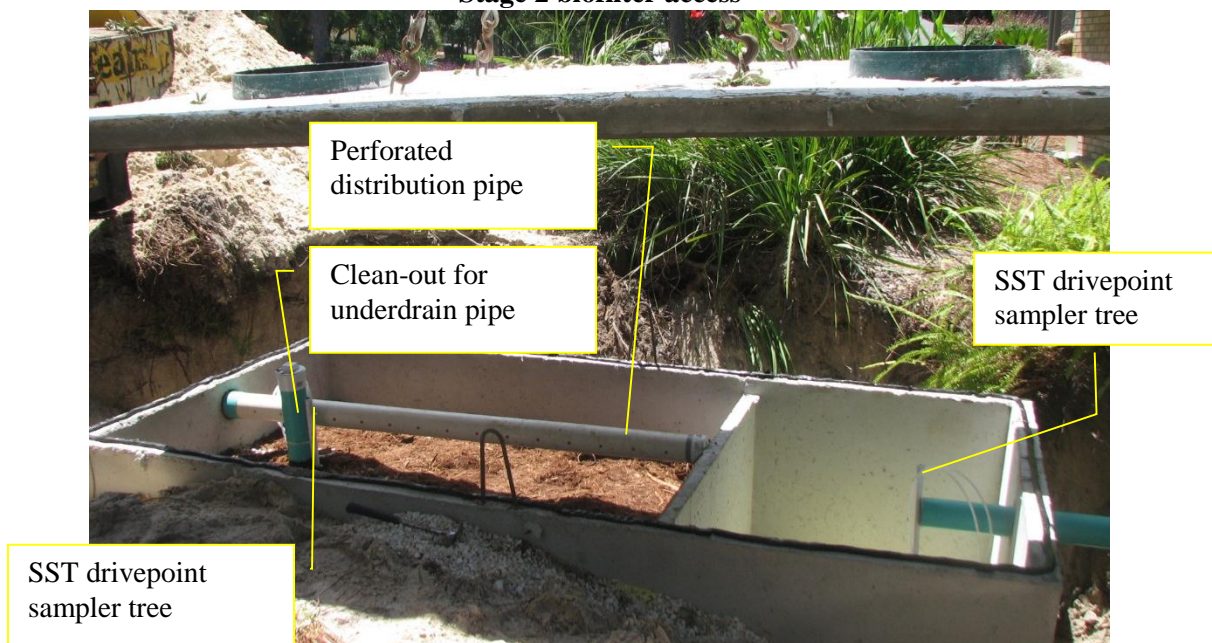


Figure 15
Stage 2 biofilter media during installation

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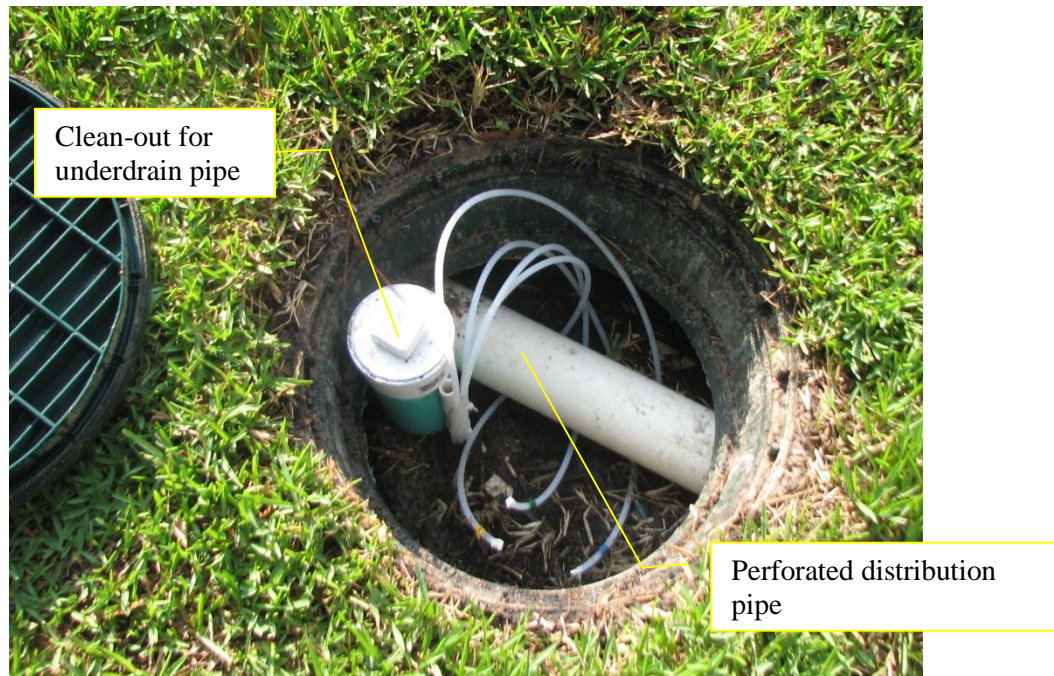


Figure 16
Stage 2 biofilter lignocellulosic chamber



Figure 17
Stage 2 biofilter sulfur chamber

2.4.1 Stage 2 biofilter maintenance

The Stage 2 biofilter should require little maintenance. The reactive media (lignocellulosic and sulfur) is eventually consumed and must be replenished. Also the water level within the tank should be checked. A water level higher than the outlet pipe invert may indicate a problem in the drainfield.

2.5 Bull Run™ diversion valve

A Bull Run™ diversion valve (Figure 18) was installed following the septic tank outlet to allow the flow to either be completely directed to the new PNRS (to the Stage 1 biofilter dbx) or to the drainfield distribution box. A riser pipe was installed to grade over the diversion valve, so that the valve can be turned after installation is complete. The diversion valve is turned with a wrench on a rod which is long enough to reach with the riser installed. The diversion valve should be switched to the drainfield in the event of an emergency (power failure, etc.).

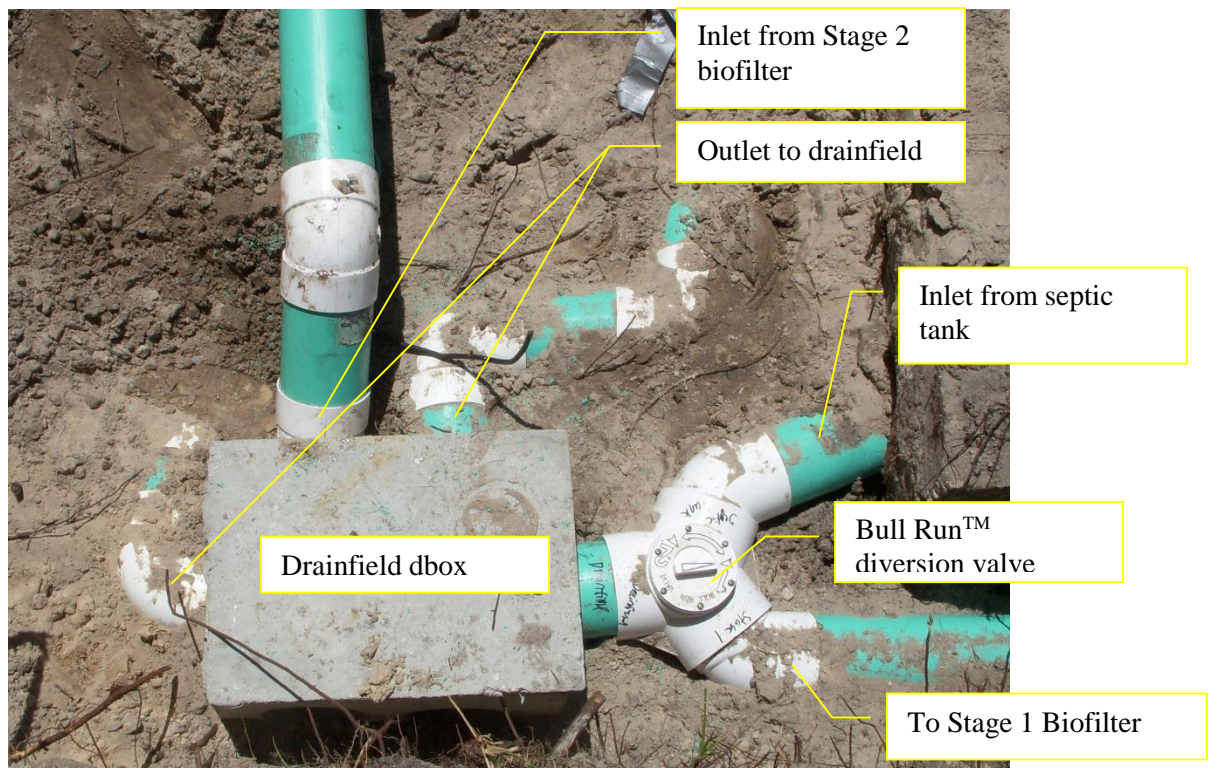


Figure 18
Drainfield distribution box and diversion valve

2.6 Control panel

The system control panel controller (Figure 19) allows for a timed pump cycle which can be overridden if the effluent levels are too low or too high in the pump tank. An alarm will indicate if the water level goes above a critical level. The control panel is connected to a phone line which transmits data to Vericomm for monitoring.

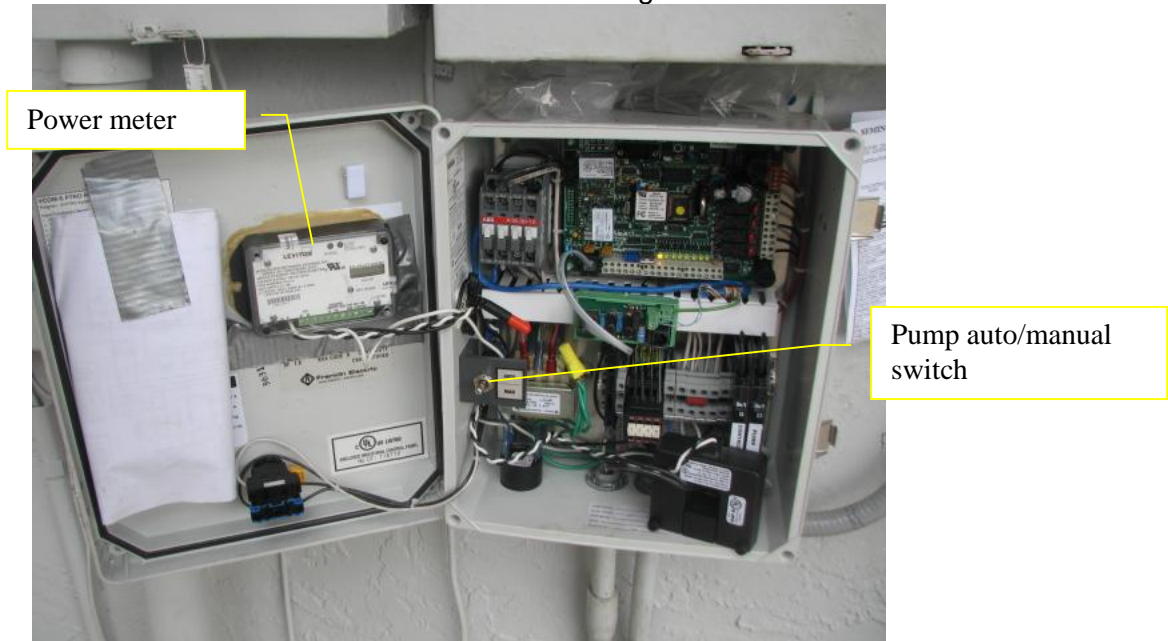


Figure 19
Control Panel

2.7 Vericomm system

The control system calls into the Vericomm system by pushing the front red button on the panel (Figure 20) 15 consecutive times. The Vericomm system is accessed by logging into <http://www.vericomm.net/> where system point data and alarm history can be accessed. Appendix F provides a description with screenshots on how to log into the website and printouts of the reports.

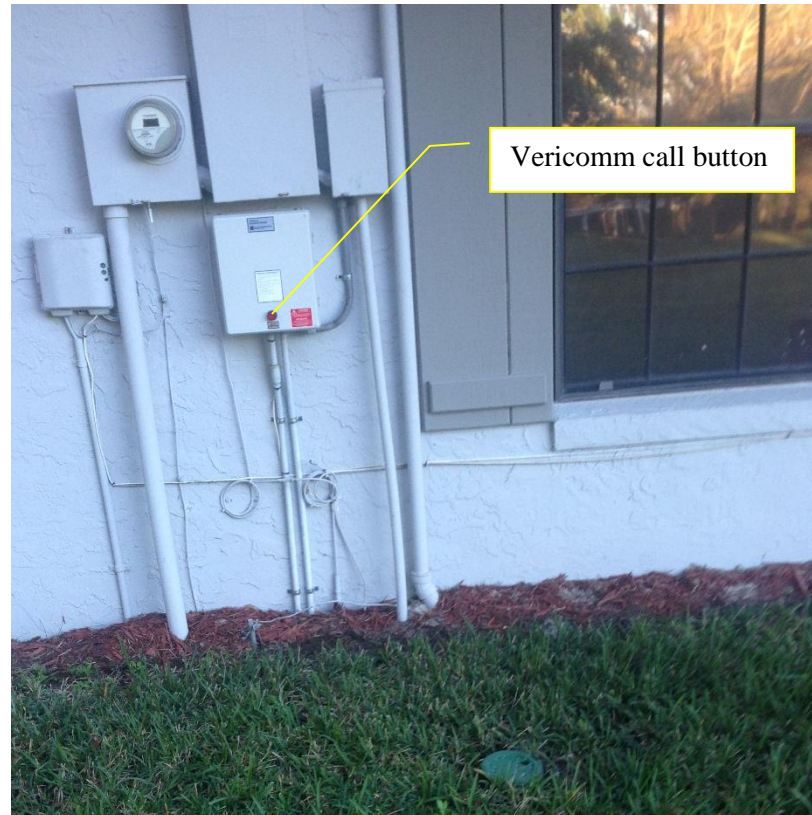


Figure 20
Control Panel

3.0 Maintenance and Monitoring

The treatment system is passive and requires little maintenance. Performance verification and monitoring should be performed routinely, as required by permitting agencies. The lignocellulosic and sulfur media are reactive and therefore must be replenished. The media life is currently estimated as 20+ years of operation. Media replacement can be easily performed through the access manholes illustrated in Figure 14. The various media sources and MSDS sheets are provided in Appendix G.

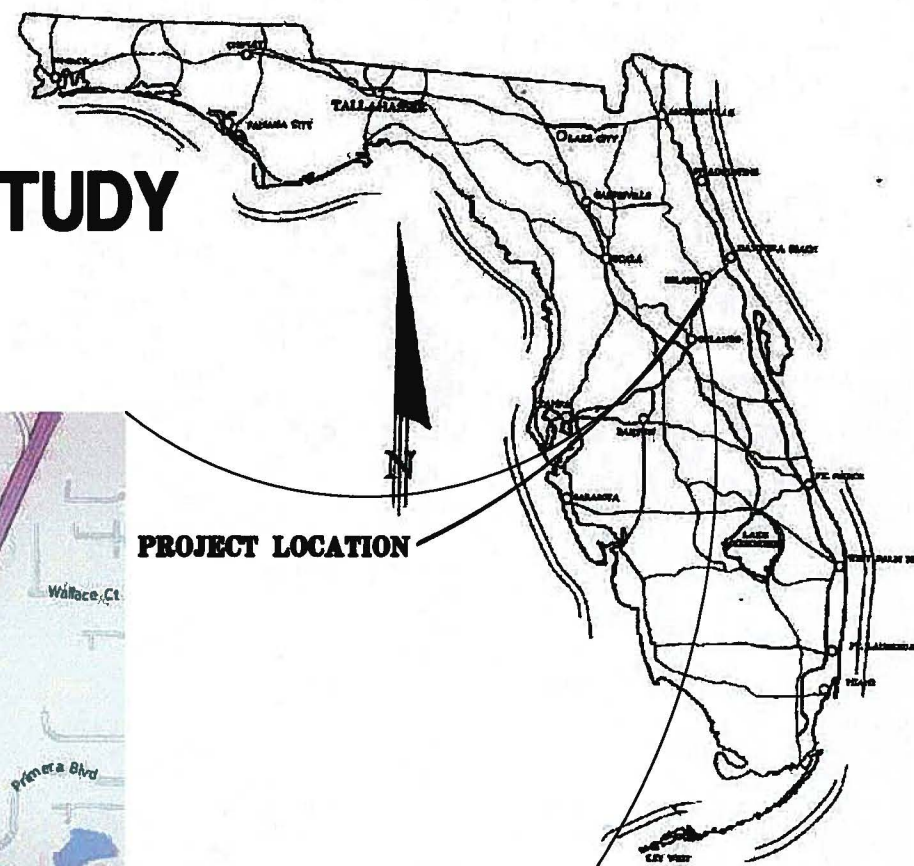
4.0 Inspection Checklist

The following is a checklist of information that should be gathered during system inspection.

Inspection Form			
Owner:		Service Provider:	
Address:		Address:	
City, St, Zip:	Longwood, FL 32779	Phone:	
Tax Map No.:		Certification No.:	
Health Dept. ID:	59-S2-	Date/Time:	
SYSTEM MEASUREMENTS			
Household water meter reading:			
Water use since last reading (gpd):			
Stage 1 biofilter flowmeter reading:			
Stage 2 biofilter flowmeter reading:			
Dose volume:			
SYSTEM MAINTENANCE			
Septic tank			Comments:
	effluent filter		
	Scum/sludge condition		
Stage 1 biofilter			
	Dbox condition, solids carryover?		
	Dbox distribution pipe, equal flow?		
	3"D distribution pipe, proper placement on support?		
	Ponding present?		
	Biomat present?		
	Raking required?		
Pump tank			
	Turn on pump, manual		
	Floats registering?		
Stage 2 biofilter	Depth to top of lignocellulosic media:		
	Depth to top of sulfur media:		
	Check water level		
Drainfield	Odors?		
	Wet, Soggy, Ponding?		
Repairs to system:			
Comments:			

APPENDIX A
RECORD DRAWINGS

FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY B-HS5 RECORD DRAWINGS

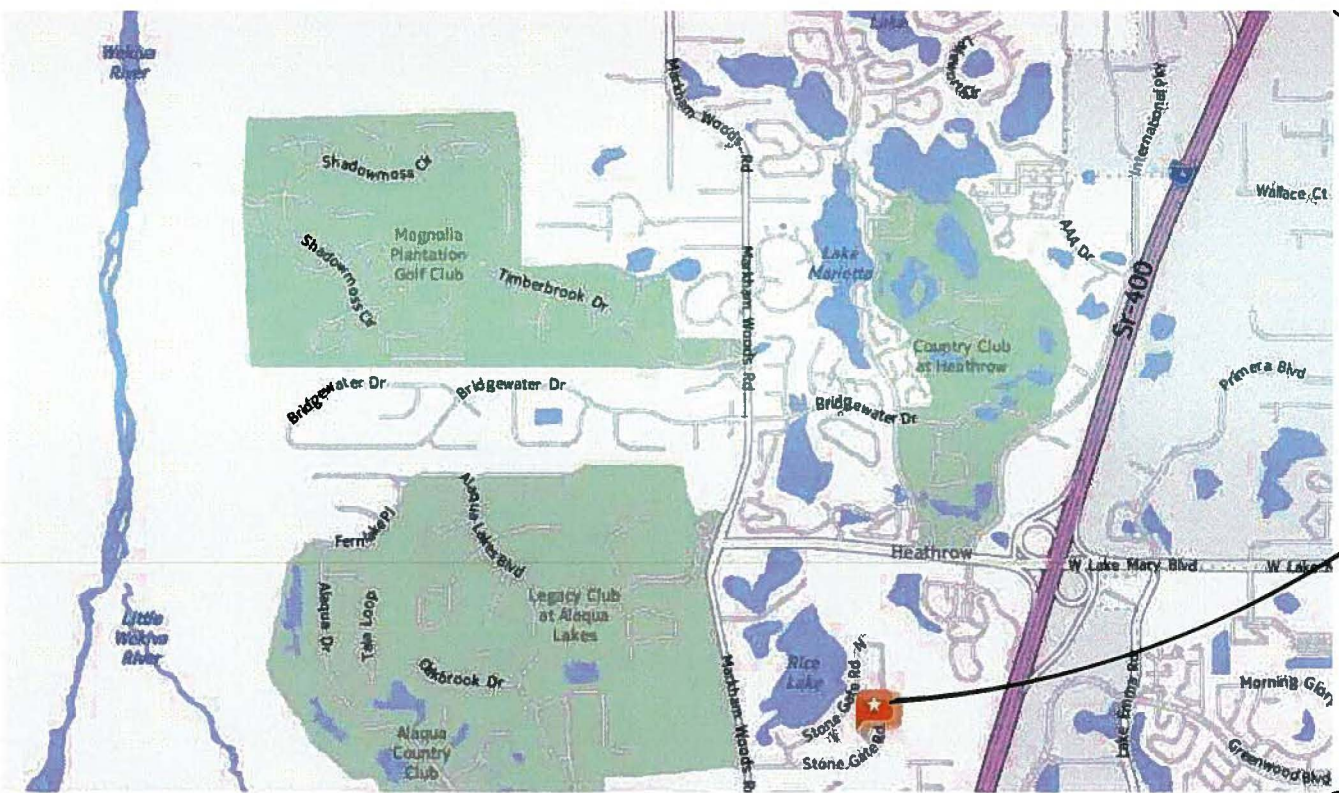


PROJECT LOCATION

PROJECT LOCATION
B-HS5
Longwood, FL

LIST OF DRAWINGS

SHEET COUNT	SHEET NUMBER	SHEET TITLE
GENERAL		
1	G-1	COVER SHEET AND INDEX OF DRAWINGS
CIVIL		
2	C-1	OVERALL PROPOSED SITE PLAN
3	C-2	PROPOSED SYSTEM LAYOUT
4	C-3	SEPTIC TANK AND PUMP TANK DETAILS
5	C-4	STAGE 1 AND 2 CROSS SECTIONS
6	C-5	SYSTEM FLOW DIAGRAM



LOCATION MAP

N.T.S.

HAZEN AND SAWYER
Environmental Engineers & Scientists

10002 Princess Palm Ave., Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771

IN ASSOCIATION WITH



OTIS
ENVIRONMENTAL
CONSULTANTS, LLC

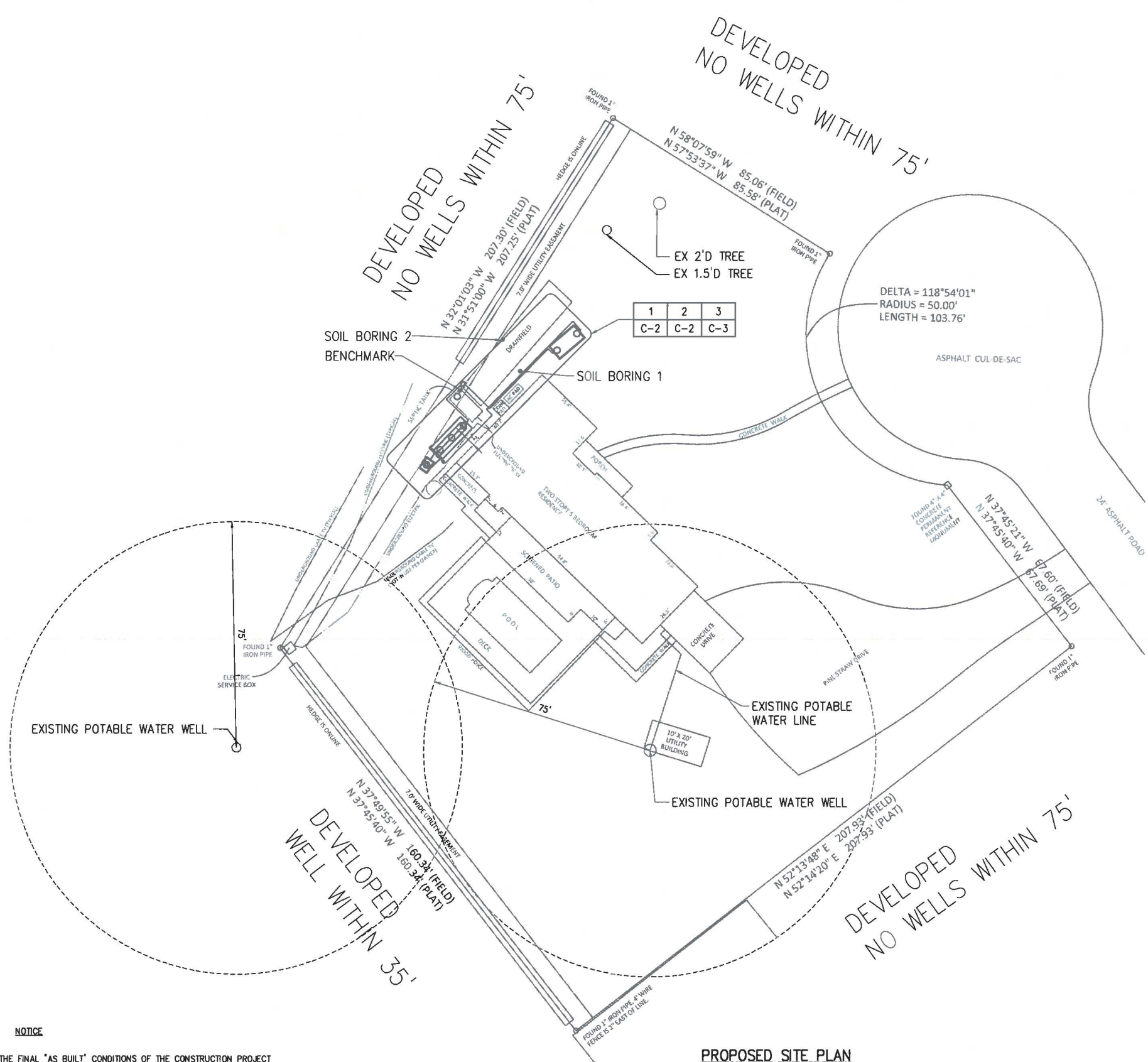
AET
Applied Environmental Technology



FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FLORIDA 32399-1713
(850)-245-4070

NOTICE

THESE "RECORD DRAWINGS" REPRESENT THE FINAL "AS BUILT" CONDITIONS OF THE CONSTRUCTION PROJECT BASED UPON FIELD OBSERVATION AND SUPPORTING PROJECT RECORDS. UNLESS OTHERWISE NOTED ON THE DRAWINGS, WORK SHOWN AS PROPOSED OR TENTATIVE HAS BEEN COMPLETED, AND DIMENSIONS SHOWN AS PROPOSED OR TENTATIVE ARE FINAL. NOTES DIRECTING THE CONTRACTOR TO PERFORM SPECIFIC TASKS REMAIN ON THE DRAWINGS AS A RECORD OF CONSTRUCTION ACTIVITIES.



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3	RECORD DRAWINGS	06/13	JEH
2	REVISED PER RFI	05/13	JEH
1	PERMIT DOCUMENTS	03/13	JEH
NO.	ISSUED FOR	DATE	BY

DESIGNED	JME
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	
APPROVED	

JOSEFIN M. EDEBACK-HIRST
Name: Date:
Florida Professional Engineer's Registration Number: 69835

HAZEN AND SAWYER
Environmental Engineers & Scientists
10002 Princess Palm Avenue
Regency One Building, Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771



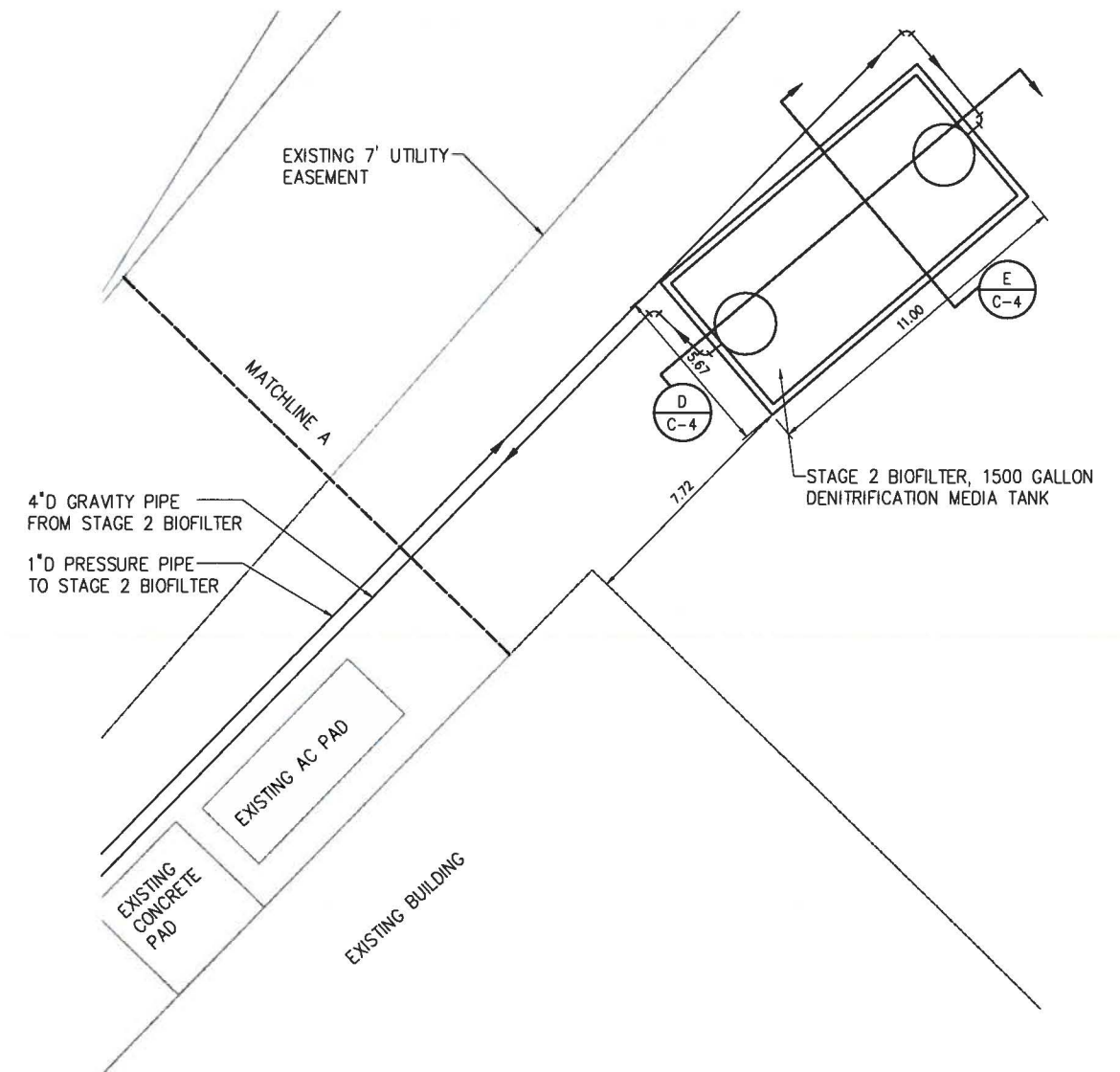
FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FL 32399-1713
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

FOSNRS SITE B-HS5
OVERALL PROPOSED SITE PLAN

THE SCALE BAR
SHOWN BELOW
MEASURES ONE
INCH LONG ON
THE ORIGINAL
DRAWING.

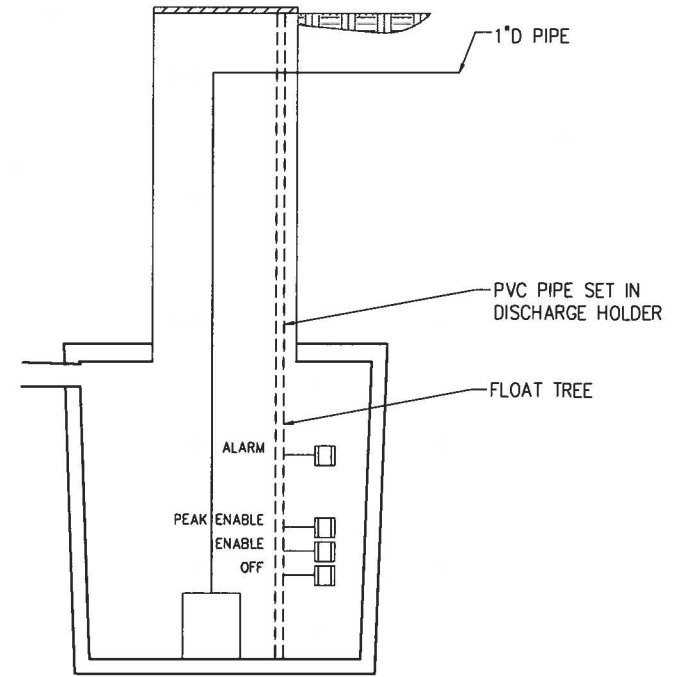
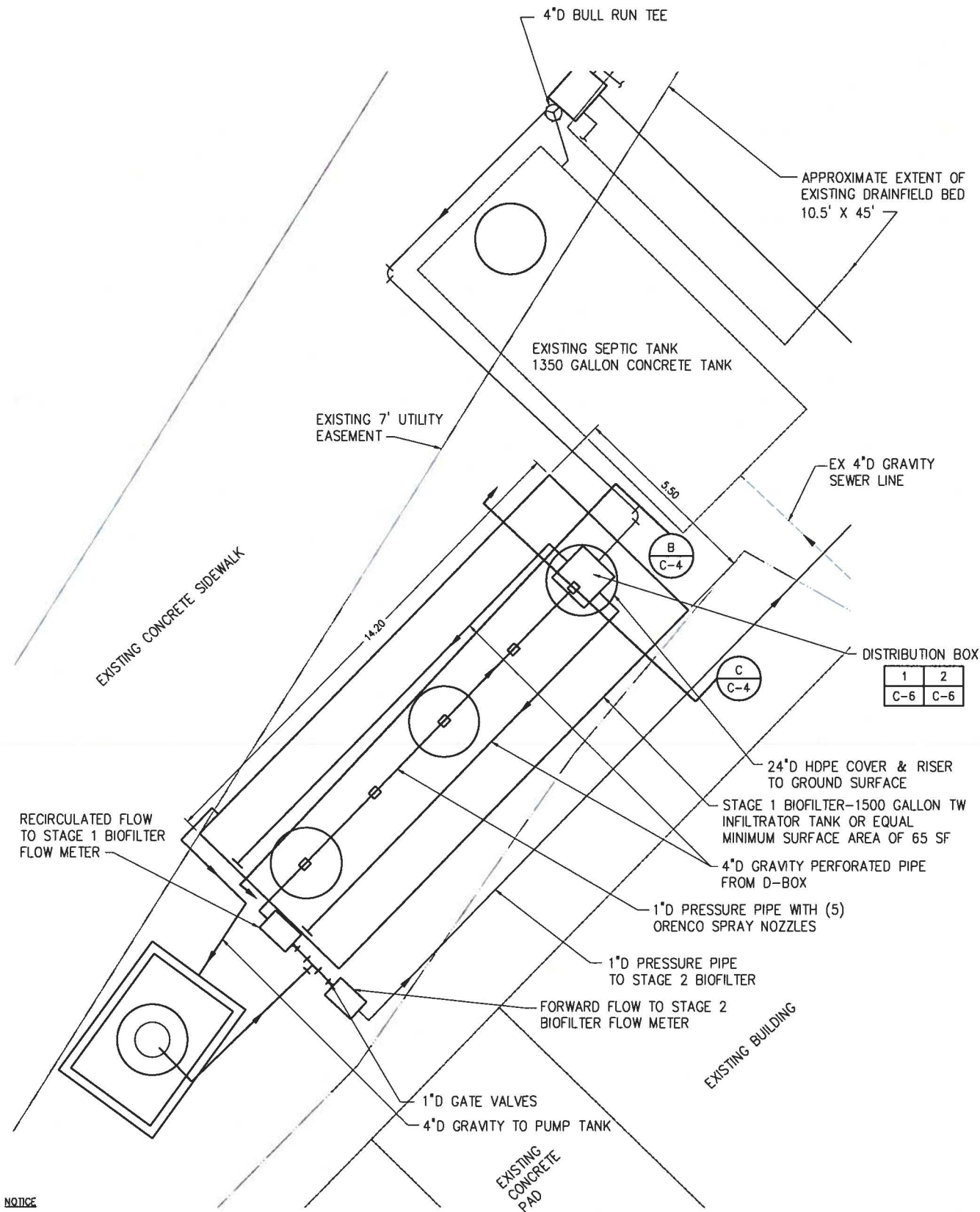
DATE	JUNE 2013
H & S JOB NUMBER	44237-001
CONTRACT NUMBER	CORCL
DRAWING NUMBER	C-1



1°=3'-0"

A horizontal graphic scale bar with tick marks at 0, 1.5, and 3 feet. The segment between 0 and 1.5 is divided into three equal parts, each containing a small square. The segment between 1.5 and 3 is a solid black rectangle.

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	JUNE 2013
	H & S JOB NUMBER	44237-001
	CONTRACT NUMBER CORCL	
	DRAWING NUMBER	C-2



PUMP TANK - 300 GAL TANK
SECTION A
NTS C-2

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DETAIL 3
1" = 2'-0" C-1

1" = 2'-0" 2 1 0 2'

PLT DATE: 7/23/2013 8:34 PM BY: JDEBACK

3	RECORD DRAWINGS	06/13	JEH
2	REVISED PER RFI	05/13	JEH
1	PERMIT DOCUMENTS	03/13	JEH
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DESIGNED JME
DRAWN CMS
CHECKED DBS
PROJ. ENGR. JME
DLA
APPROVED

JOSEFIN M. EDEBACK-HIRST
Name: Date:
Florida Professional Engineer's Registration Number: 69835

HAZEN AND SAWYER
Environmental Engineers & Scientists
10002 Princess Palm Avenue
Registry One Building, Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771

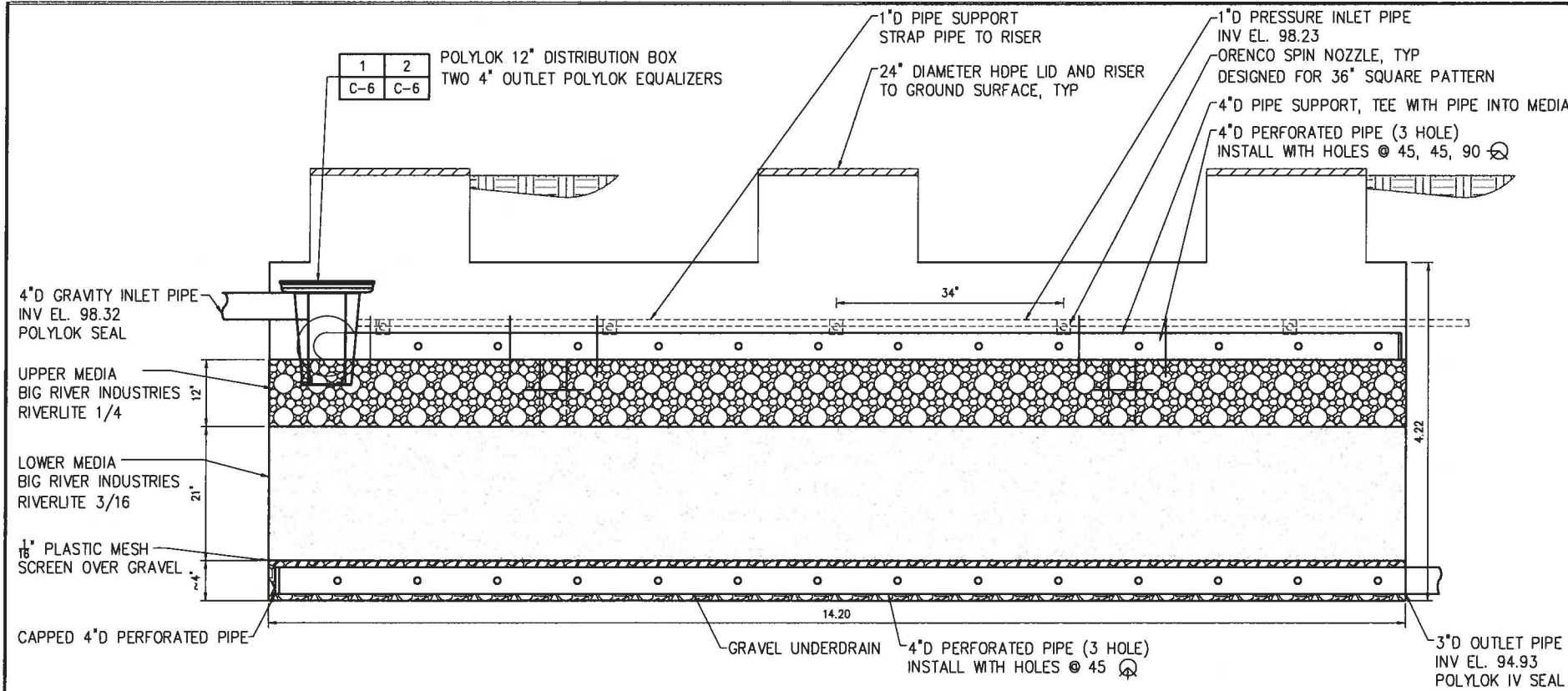


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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
FOSNRS SITE B-HS5
SEPTIC TANK AND PUMP TANK DETAILS

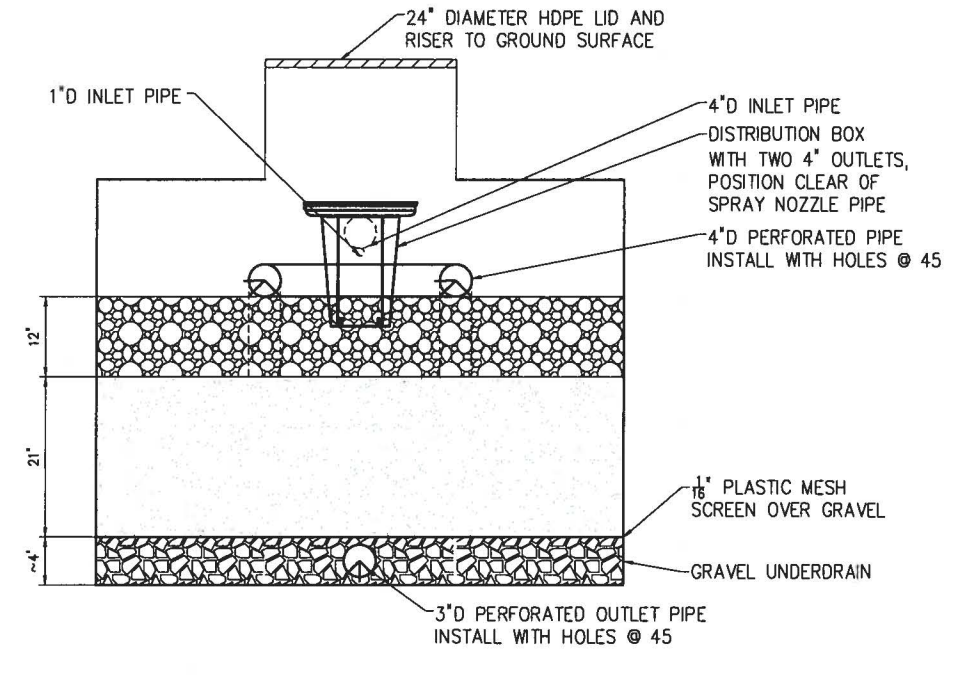
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.
DATE JUNE 2013
H & S JOB NUMBER 44237-001
CONTRACT NUMBER CORCL
DRAWING NUMBER C-3

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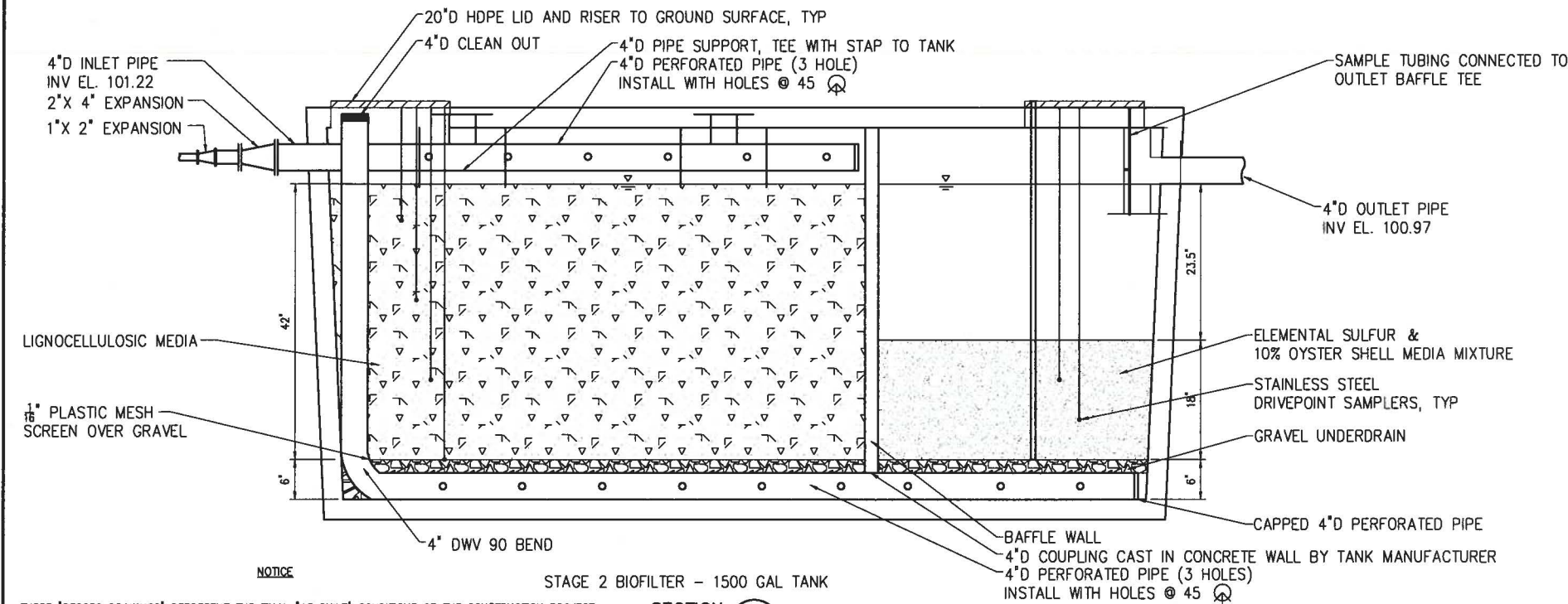
STAGE 1 BIOFILTER - 1500 TW INFILTRATOR TANK

SECTION **B**
1' = 1' C-3



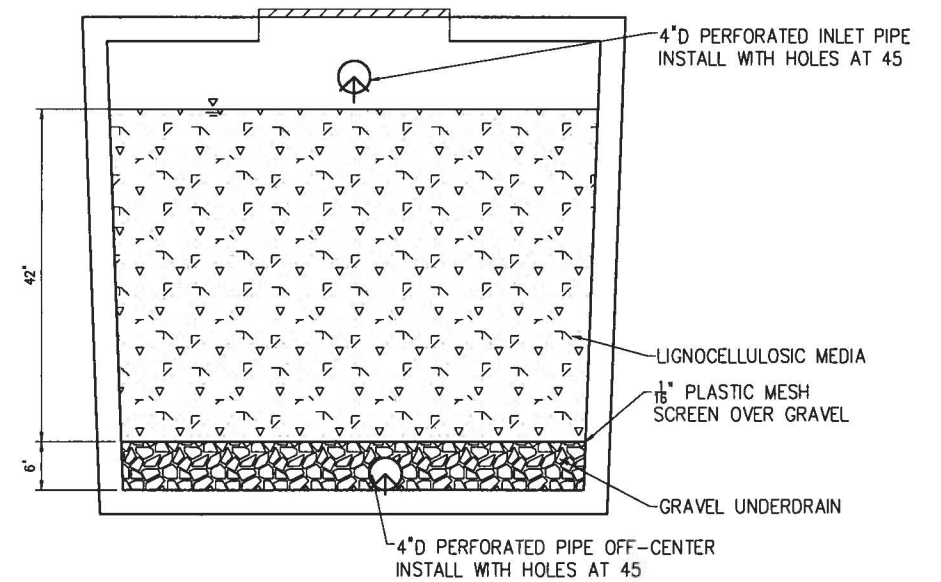
STAGE 1 BIOFILTER - 1500 TW INFILTRATOR TANK

SECTION **C**
1' = 1' C-3



STAGE 2 BIOFILTER - 1500 GAL TANK

SECTION **D**
1' = 1' C-2



STAGE 2 BIOFILTER - 1500 GAL TANK

SECTION **E**
1' = 1' C-2

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DESIGNED	JME
DRAWN	CMS
CHECKED	OBS
PROJ. ENGR.	JME
DLA	
APPROVED	
NO.	ISSUED FOR
3	RECORD DRAWINGS
2	REVISED PER RFI
1	PERMIT DOCUMENTS
NO.	ISSUED FOR

JOSEFIN M. EDEBACK-HIRST
Name: Josefin M. Edeback-Hirst
Date: 7/23/13
Florida Professional Engineer's Registration Number: 69835

HAZEN AND SAWYER
Environmental Engineers & Scientists
10002 Princess Palm Avenue
Regency One Building, Suite 200
Tampa, Florida 33618
Certificate of Authorization Number: 2771



FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FL 32399-1713
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

FOSNRS SITE B-HS5
STAGE 1 AND 2 CROSS SECTIONS

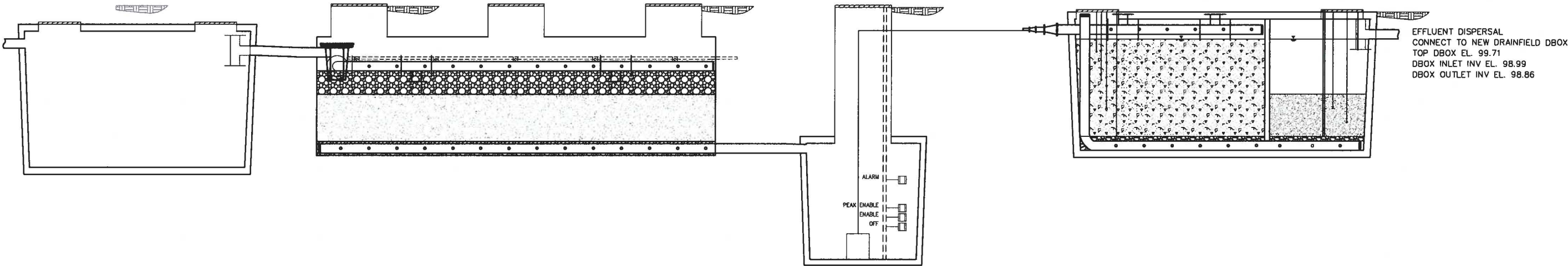
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE JUNE 2013
	H & S JOB NUMBER 44237-001
	CONTRACT NUMBER CORCL
	DRAWING NUMBER C-4

EX SEPTIC TANK-1350 GAL
TOP EL. 99.96
4"D INLET INV EL. 99.11
4"D OUTLET INV EL. 98.90

STAGE 1 BIOFILTER-1500 TW INFILTRATOR TANK
TOP EL. 98.83
4"D INLET INV EL. 98.32
1"D INLET INV EL. 98.23
4"D OUTLET INV EL. 94.93

PUMP TANK-300 GAL
TANK TOP EL. 96.13
4" INLET INV EL. 94.85

STAGE 2 BIOFILTER
DENITRIFICATION TANK- 1500 GAL
TOP EL. 102.04
4"D INLET INV EL. 101.22
4"D OUTLET INV EL. 100.97



DESIGN CALCULATIONS
A. FLOW CALCULATIONS
NUMBER OF BEDROOMS = 5
BUILDING AREA = 3315 SF
 $Q = (5 \text{ BR} \times 100 \text{ GPD/BR}) = 500 \text{ GPD}$
F.A.C. MINIMUM DESIGN FLOW = 500 GPD
B. TREATMENT DESIGN
STAGE 1 BIOFILTER = 1500 TW INFILTRATOR TANK SINGLE
SURFACE AREA 14.2' X 5.5' = 78.1 SF
STAGE 2 BIOFILTER = 1500 GAL DUAL
SURFACE AREA 10.5' X 5.2' = 54.2 SF
EFFLUENT DISPERSAL TO EXISTING DRAINFIELD BED 10.5 FT X 45 FT

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				DRAWN	CMS
				CHECKED	DBS
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2	REVISED PER RFI	05/13	JEH		
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NO.	ISSUED FOR	DATE	BY	APPROVED	

Josefin Edeback
7/23/13
JOSEFIN M. EDEBACK-HIRST
Name: _____ Date: _____
Florida Professional Engineer's Registration Number: 69835

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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

FOSNRS SITE B-HS5
SYSTEM FLOW DIAGRAM

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE JUNE 2013
	H & S JOB NUMBER 44237-001
	CONTRACT NUMBER CORCL
	DRAWING NUMBER C-5

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APPENDIX B
EFFLUENT SCREEN

PL-68 Filter and Tee

PL-68 is much more than just an effluent filter. The housing can also be used as an inlet baffle (tee) or an outlet baffle. The housing is designed to accept Polylok's snap in gas deflector to deflect gas bubbles away from the tee and to keep the solids in the tank.

Features:

- Offers 68 linear feet of 1/16" filter slots, which significantly extends time between cleaning.
- Accepts 3/4" PVC handle.
- Locks in any 360° position when used with PL-68 Tee.
- PL-68 Housing can be used as an inlet or outlet tee.
- Gasket prevents bypass.

PL-68 Installation:

Ideal for residential waste flows up to 800 gallons per day (GPD). Easily installs in any new or existing 4" outlet tee.

1. Locate the outlet of the septic tank.
2. Remove the tank cover and pump tank if necessary.
3. Glue the filter housing to the outlet pipe, or use a Polylok Extend & Lok if not enough pipe exists.
4. Insert the PL-68 filter into tee.
5. Replace and secure the septic tank cover.

PL-68 Maintenance:

The PL-68 Effluent Filter will operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped, or at least every three years.

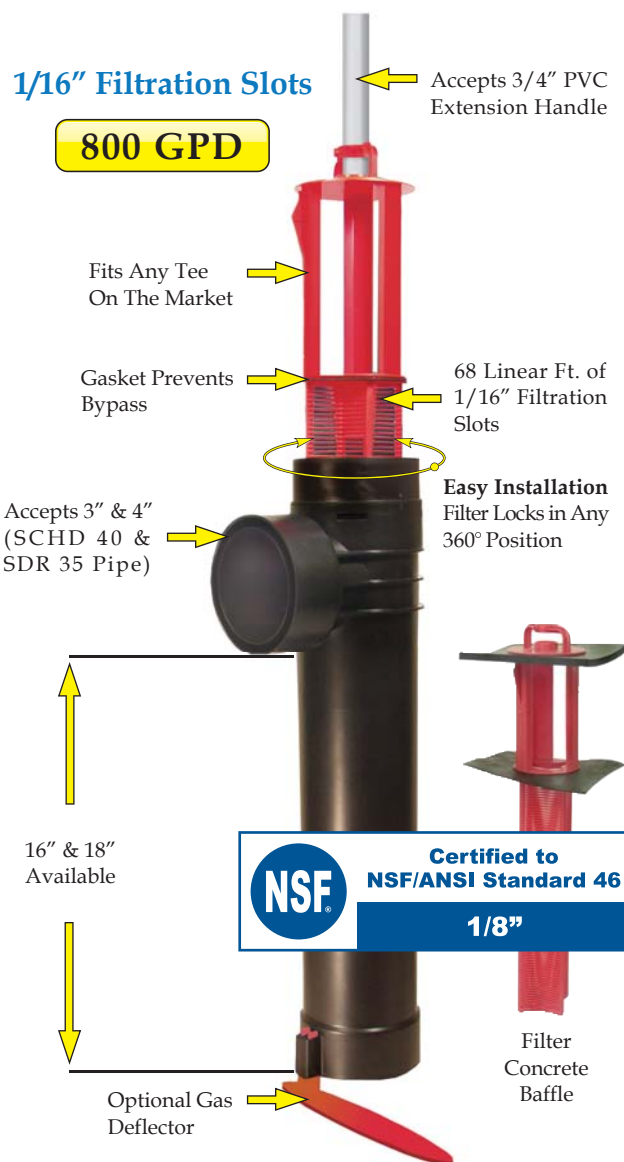
1. Do not use plumbing when filter is removed.
2. Pull PL-68 out of the tee.
3. Hose off filter over the septic tank. Make sure all solids fall back into septic tank.
4. Insert filter back into tee/housing.

Related Products:

PL-68 Filter Concrete Baffle
Extend & LokTM



Extend & LokTM
Easily installs
into existing tanks.



Spacer Bushing
4" SCHD 40
to SDR 35



Spacer Bushing
4" SCHD 40
to 110mm Pipe



2" Extender

APPENDIX C

PUMP

PF Series 4-inch (100-mm) Submersible Effluent Pumps

Applications

Our 4-inch (100-mm) Submersible Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic tanks or separate dosing tanks. All our pumps are constructed of lightweight, corrosion-resistant stainless steel and engineered plastics; all are field-serviceable and repairable with common tools; and all 60-Hz PF Series models are CSA certified to the U.S. and Canadian safety standards for effluent pumps, meeting UL requirements.

Orenco's Effluent Pumps are used in a variety of applications, including pressurized drainfields, packed bed filters, mounds, aerobic units, effluent irrigation, effluent sewers, wetlands, lagoons, and more. These pumps are designed to be used with a Biotube® pump vault or after a secondary treatment system.



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LR80980
LR2053896



Powered by
Franklin Electric

Features/Specifications

To specify this pump for your installation, require the following:

- Minimum 24-hour run-dry capability with no deterioration in pump life or performance*
- Patented 1/8-inch (3-mm) bypass orifice to ensure flow recirculation for motor cooling and to prevent air bind
- Liquid end repair kits available for better long-term cost of ownership
- TRI-SEAL™ floating impeller design on 10, 15, 20, and 30 gpm (0.6, 1.0, 1.3, and 1.9 L/sec) models; floating stack design on 50 and 75 gpm (3.2 and 4.7 L/sec) models
- Franklin Electric Super Stainless motor, rated for continuous use and frequent cycling
- Type S00W 600-V motor cable
- Five-year warranty on pump or retrofit liquid end from date of manufacture against defects in materials or workmanship

* Not applicable for 5-hp (3.73 kW) models

Standard Models

See specifications chart, pages 2-3, for a list of standard pumps. For a complete list of available pumps, call Orenco.

Product Code Diagram

Pump	PF Series			-	
					Cord length, ft (m): [‡] Blank = 10 (3) 20 = 20 (6) 30 = 30 (9) 50 = 50 (15)
					Voltage, nameplate: 1 = 115* 200 = 200 2 = 230† 4 = 460
					Frequency: 1 = single-phase 60 Hz 3 = three-phase 60 Hz 5 = single-phase 50 Hz
					Horsepower (kW): 03 = ½ hp (0.25) 05 = ½ hp (0.37) 07 = ¾ hp (0.56) 10 = 1 hp (0.75) 15 = 1-½ hp (1.11) 20 = 2 hp (1.50) 30 = 3 hp (2.24) 50 = 5 hp (3.73)
					Nominal flow, gpm (L/sec): 10 = 10 (0.6) 15 = 15 (1.0) 20 = 20 (1.3) 30 = 30 (1.9) 50 = 50 (3.2) 75 = 75 (4.7)

* Pump, PF Series

* ½-hp (0.37kW) only

[†]220 volts for 50 Hz pumps

*Note: 20-foot cords are available only for single-phase pumps through 1-½ hp

Specifications, 60 Hz

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF100511	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100512	10 (0.6)	0.50 (0.37)	1	230	240	6.3	6.3	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF10053200	10 (0.6)	0.50 (0.37)	3	200	208	3.8	3.8	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100712 ^{4,5}	10 (0.6)	0.75 (0.56)	1	230	240	8.3	8.3	8	1 ¼ in. GFP	25.9 (658)	17 (432)	30 (14)	300
PF10073200 ^{4,5}	10 (0.6)	0.75 (0.56)	3	200	208	5.1	5.2	8	1 ¼ in. GFP	25.4 (645)	17 (432)	31 (14)	300
PF101012 ^{5,6}	10 (0.6)	1.00 (0.75)	1	230	240	9.6	9.6	9	1 ¼ in. GFP	27.9 (709)	18 (457)	33 (15)	100
PF10103200 ^{5,6}	10 (0.6)	1.00 (0.75)	3	200	208	5.5	5.5	9	1 ¼ in. GFP	27.3 (693)	18 (457)	37 (17)	300
PF102012 ^{5,6,7,8}	10 (0.6)	2.00 (1.49)	1	230	240	12.1	12.1	18	1 ¼ in. SS	39.5 (1003)	22 (559)	48 (22)	100
PF102032 ^{5,6,8}	10 (0.6)	2.00 (1.49)	3	230	240	7.5	7.6	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF10203200 ^{5,6,8}	10 (0.6)	2.00 (1.49)	3	200	208	8.7	8.7	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF150311	15 (1.0)	0.33 (0.25)	1	115	120	8.7	8.8	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF150312	15 (1.0)	0.33 (0.25)	1	230	240	4.4	4.5	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF200511	20 (1.3)	0.50 (0.37)	1	115	120	12.3	12.5	4	1 ¼ in. GFP	22.3 (566)	18 (457)	25 (11)	300
PF200512	20 (1.3)	0.50 (0.37)	1	230	240	6.4	6.5	4	1 ¼ in. GFP	22.5 (572)	18 (457)	26 (12)	300
PF20053200	20 (1.3)	0.50 (0.37)	3	200	208	3.7	3.8	4	1 ¼ in. GFP	22.3 (566)	18 (457)	26 (12)	300
PF201012 ^{4,5}	20 (1.3)	1.00 (0.75)	1	230	240	10.5	10.5	7	1 ¼ in. GFP	28.4 (721)	20 (508)	33 (15)	100
PF20103200 ^{4,5}	20 (1.3)	1.00 (0.75)	3	200	208	5.8	5.9	7	1 ¼ in. GFP	27.8 (706)	20 (508)	33 (15)	300
PF201512 ^{4,5}	20 (1.3)	1.50 (1.11)	1	230	240	12.4	12.6	9	1 ¼ in. GFP	34.0 (864)	24 (610)	41 (19)	100
PF20153200 ^{4,5}	20 (1.3)	1.50 (1.11)	3	200	208	7.1	7.2	9	1 ¼ in. GFP	30.7 (780)	20 (508)	35 (16)	300
PF300511	30 (1.9)	0.50 (0.37)	1	115	120	11.8	11.8	3	1 ¼ in. GFP	21.3 (541)	20 (508)	28 (13)	300
PF300512	30 (1.9)	0.50 (0.37)	1	230	240	6.2	6.2	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF30053200	30 (1.9)	0.50 (0.37)	3	200	208	3.6	3.6	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF300712	30 (1.9)	0.75 (0.56)	1	230	240	8.5	8.5	5	1 ¼ in. GFP	24.8 (630)	21 (533)	29 (13)	300
PF30073200	30 (1.9)	0.75 (0.56)	3	200	208	4.9	4.9	5	1 ¼ in. GFP	24.6 (625)	21 (533)	30 (14)	300
PF301012 ⁴	30 (1.9)	1.00 (0.75)	1	230	240	10.4	10.4	6	1 ¼ in. GFP	27.0 (686)	22 (559)	32 (15)	100
PF30103200 ⁴	30 (1.9)	1.00 (0.75)	3	200	208	5.8	5.8	6	1 ¼ in. GFP	26.4 (671)	22 (559)	33 (15)	300
PF301512 ^{4,5}	30 (1.9)	1.50 (1.11)	1	230	240	12.6	12.6	8	1 ¼ in. GFP	32.8 (833)	24 (610)	40 (18)	100
PF30153200 ^{4,5}	30 (1.9)	1.50 (1.11)	3	200	208	6.9	6.9	8	1 ¼ in. GFP	29.8 (757)	22 (559)	34 (15)	300
PF301534 ^{4,5}	30 (1.9)	1.50 (1.11)	3	460	480	2.8	2.8	8	1 ¼ in. GFP	29.5 (685)	22 (559)	34 (15)	300
PF302012 ^{5,6,7}	30 (1.9)	2.00 (1.49)	1	230	240	11.0	11.0	10	1 ¼ in. SS	35.5 (902)	26 (660)	44 (20)	100
PF30203200 ^{5,6}	30 (1.9)	2.00 (1.49)	3	200	208	9.3	9.3	10	1 ¼ in. SS	34.0 (864)	24 (610)	41 (19)	300
PF303012 ^{5,6,7,8}	30 (1.9)	3.00 (2.23)	1	230	240	16.8	16.8	14	1 ¼ in. SS	44.5 (1130)	33 (838)	54 (24)	100
PF303032 ^{5,6,8}	30 (1.9)	3.00 (2.23)	3	230	240	10.0	10.1	14	1 ¼ in. SS	44.3 (1125)	27 (686)	52 (24)	300
PF305012 ^{5,6,7,8}	30 (1.9)	5.00 (3.73)	1	230	240	25.6	25.8	23	1 ¼ in. SS	66.5 (1689)	53 (1346)	82 (37)	100
PF305032 ^{5,6,8}	30 (1.9)	5.00 (3.73)	3	230	240	16.6	16.6	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF30503200 ^{5,6,8}	30 (1.9)	5.00 (3.73)	3	200	208	18.7	18.7	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF500511	50 (3.2)	0.50 (0.37)	1	115	120	12.1	12.1	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500512	50 (3.2)	0.50 (0.37)	1	230	240	6.2	6.2	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500532	50 (3.2)	0.50 (0.37)	3	230	240	3.0	3.0	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF50053200	50 (3.2)	0.50 (0.37)	3	200	208	3.7	3.7	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500534	50 (3.2)	0.50 (0.37)	3	460	480	1.5	1.5	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500712	50 (3.2)	0.75 (0.56)	1	230	240	8.5	8.5	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF500732	50 (3.2)	0.75 (0.56)	3	230	240	3.9	3.9	3	2 in. SS	23.7 (602)	25 (635)	32 (15)	300
PF50073200	50 (3.2)	0.75 (0.56)	3	200	208	4.9	4.9	3	2 in. SS	23.1 (587)	26 (660)	32 (15)	300

Specifications, 60 Hz (continued)

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF500734	50 (3.2)	0.75 (0.56)	3	460	480	1.8	1.8	3	2 in. SS	34.8 (884)	25 (635)	31 (14)	300
PF501012	50 (3.2)	1.00 (0.75)	1	230	240	10.1	10.1	4	2 in. SS	27.0 (686)	26 (660)	35 (16)	100
PF50103200	50 (3.2)	1.00 (0.75)	3	200	208	5.7	5.7	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501034	50 (3.2)	1.00 (0.75)	3	460	480	2.2	2.2	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF5015124	50 (3.2)	1.50 (1.11)	1	230	240	12.5	12.6	5	2 in. SS	32.5 (826)	30 (762)	41 (19)	100
PF501532004	50 (3.2)	1.50 (1.11)	3	200	208	7.0	7.0	5	2 in. SS	29.3 (744)	26 (660)	35 (16)	300
PF503012 ^{4,5,7,8}	50 (3.2)	3.00 (2.23)	1	230	240	17.7	17.7	8	2 in. SS	43.0 (1092)	37 (940)	55 (25)	100
PF50303200 ^{4,5,8}	50 (3.2)	3.00 (2.23)	3	200	208	13.1	13.1	8	2 in. SS	43.4 (1102)	30 (762)	55 (25)	300
PF503034 ^{4,5,8}	50 (3.2)	3.00 (2.23)	3	460	480	5.3	5.3	8	2 in. SS	40.0 (1016)	31 (787)	55 (25)	300
PF505012 ^{5,6,7,8}	50 (3.2)	5.00 (3.73)	1	230	240	26.2	26.4	13	2 in. SS	65.4 (1661)	55 (1397)	64 (29)	300
PF505032 ^{5,6,7,8}	50 (3.2)	5.00 (3.73)	3	230	240	16.5	16.5	13	2 in. SS	59.3 (1506)	49 (1245)	64 (29)	300
PF751012	75 (4.7)	1.00 (0.75)	1	230	240	9.9	10.0	3	2 in. SS	27.0 (686)	27 (686)	34 (15)	100
PF751512	75 (4.7)	1.50 (1.11)	1	230	240	12.1	12.3	4	2 in. SS	33.4 (848)	30 (762)	44 (20)	100

Specifications, 50 Hz

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF100552	10 (0.6)	0.50 (0.37)	1	220	230	3.9	4.1	6	1 ¼ in. GFP	23.0 (584)	17 (432)	26 (12)	300
PF100752 ^{4,5}	10 (0.6)	0.75 (0.56)	1	220	230	6.2	6.2	9	1 ¼ in. GFP	26.8 (658)	17 (432)	30 (14)	300
PF101552 ^{5,6}	10 (0.6)	1.50 (1.11)	1	220	230	10.5	11.4	18	1 ¼ in. SS	39.5 (1003)	22 (559)	46 (21)	300
PF300552	30 (1.9)	0.50 (0.37)	1	220	230	4.1	4.1	4	1 ¼ in. GFP	22.5 (572)	19 (483)	26 (12)	300
PF300752	30 (1.9)	0.75 (0.56)	1	220	230	6.1	6.1	5	1 ¼ in. GFP	24.8 (630)	19 (483)	29 (13)	300
PF301052	30 (1.9)	1.00 (0.75)	1	220	230	7.4	7.4	7	1 ¼ in. GFP	28.4 (721)	20 (508)	32 (15)	100
PF301552 ^{4,5}	30 (1.9)	1.50 (1.11)	1	220	230	9.3	9.3	8	1 ¼ in. GFP	35.4 (899)	24 (610)	40 (18)	100
PF500552	50 (3.2)	0.50 (0.37)	1	220	230	4.0	4.0	2	2 in. SS	20.3 (516)	25 (635)	29 (13)	300
PF500752	50 (3.2)	0.75 (0.56)	1	220	230	6.3	6.4	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF501052	50 (3.2)	1.00 (0.75)	1	220	230	7.3	7.4	4	2 in. SS	27.0 (686)	26 (660)	35 (16)	100
PF501552	50 (3.2)	1.50 (1.11)	1	220	230	9.1	9.1	5	2 in. SS	32.5 (826)	30 (762)	42 (19)	100
PF751052	75 (3.2)	1.00 (0.75)	1	220	230	7.3	7.3	4	2 in. SS	30.0 (762)	27 (686)	34 (15)	100

¹ GFP = glass-filled polypropylene; SS = stainless steel. The 1 ¼-in. NPT GFP discharge is 2 7/8 in. octagonal across flats; the 1 ¼-in. NPT SS discharge is 2 1/8 in. octagonal across flats; and the 2-in. NPT SS discharge is 2 7/8 in. hexagonal across flats. Discharge is female NPT threaded, U.S. nominal size, to accommodate Orenco® discharge hose and valve assemblies. Consult your Orenco Distributor about fittings to connect hose and valve assemblies to metric-sized piping.

² Minimum liquid level is for single pumps when installed in an Orenco Biotube® Pump Vault or Universal Flow Inducer. In other applications, minimum liquid level should be top of pump. Consult Orenco for more information.

³ Weight includes carton and 10-ft (3-m) cord.

⁴ High-pressure discharge assembly required.

⁵ Do not use cam-lock option (Q) on discharge assembly.

⁶ Custom discharge assembly required for these pumps. Contact Orenco.

⁷ Capacitor pack (sold separately or installed in a custom control panel) required for this pump. Contact Orenco.

⁸ Torque locks are available for all pumps, and are supplied with 3-hp and 5-hp pumps.

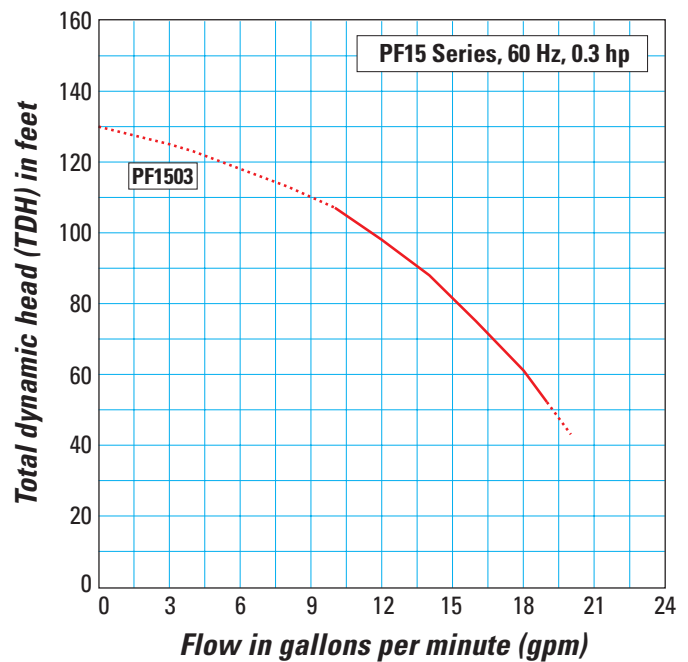
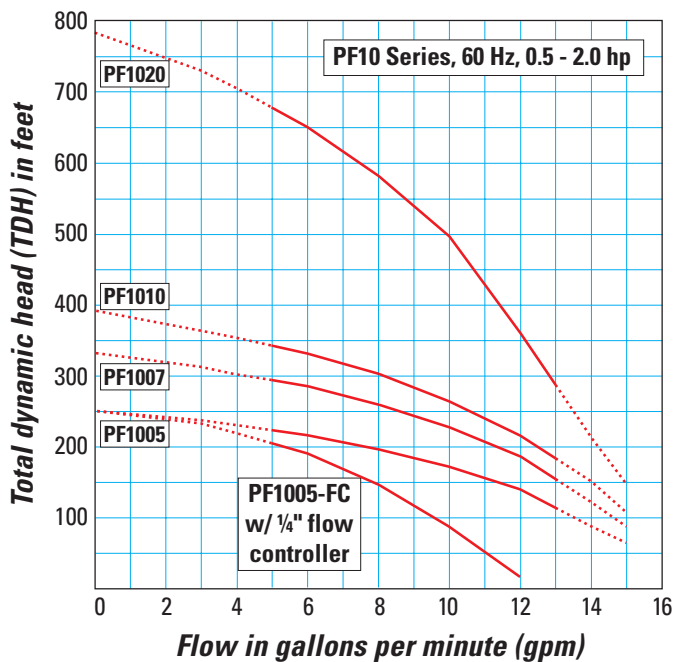
Materials of Construction

Discharge	Glass-filled polypropylene or stainless steel
Discharge bearing	Engineered thermoplastic (PEEK)
Diffusers	Glass-filled PPO (Noryl GFN3)
Impellers	Celcon® acetal copolymer on 10-, 20, and 30-gpm models; 50-gpm impellers are Noryl GFN3
Intake screen	Polypropylene
Suction connection	Stainless steel
Drive shaft	7/16 inch hexagonal stainless steel, 300 series
Coupling	Sintered stainless steel, 300 series
Shell	Stainless steel, 300 series
Motor	Franklin motor exterior constructed of stainless steel. Motor filled with deionized water and propylene glycol for constant lubrication. Hermetically sealed motor housing ensures moisture-free windings. All thrust absorbed by Kingsbury-type thrust bearing. Rated for continuous duty. Single-phase motors and 200 and 230 V 3-phase motors equipped with surge arrestors for added security. Single-phase motors through 1.5 hp (1.11 kW) have built-in thermal overload protection, which trips at 203-221° F (95-105° C).

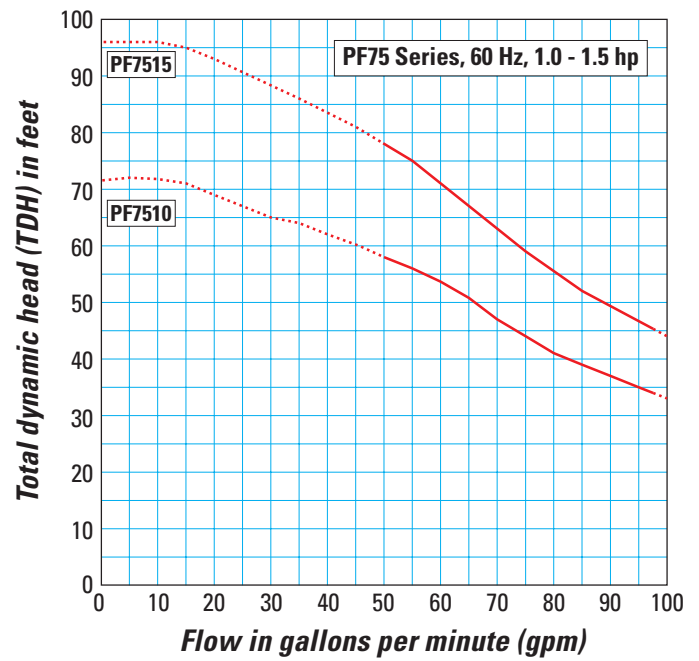
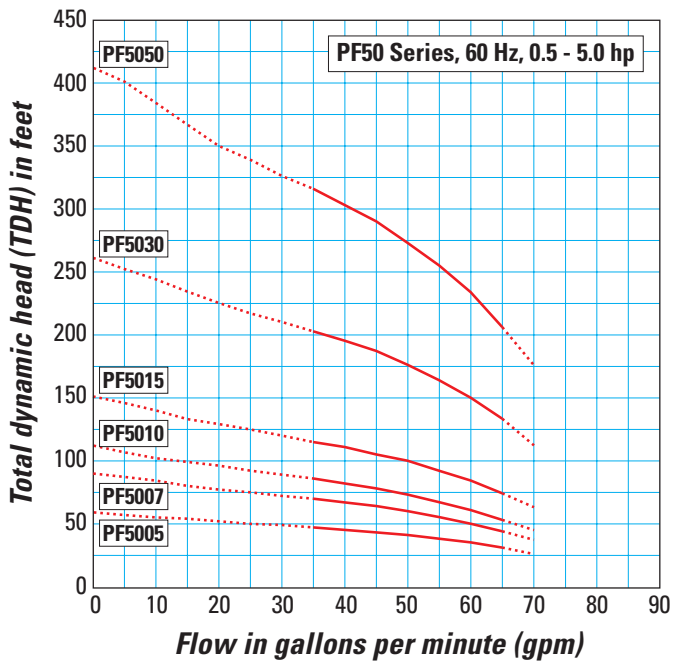
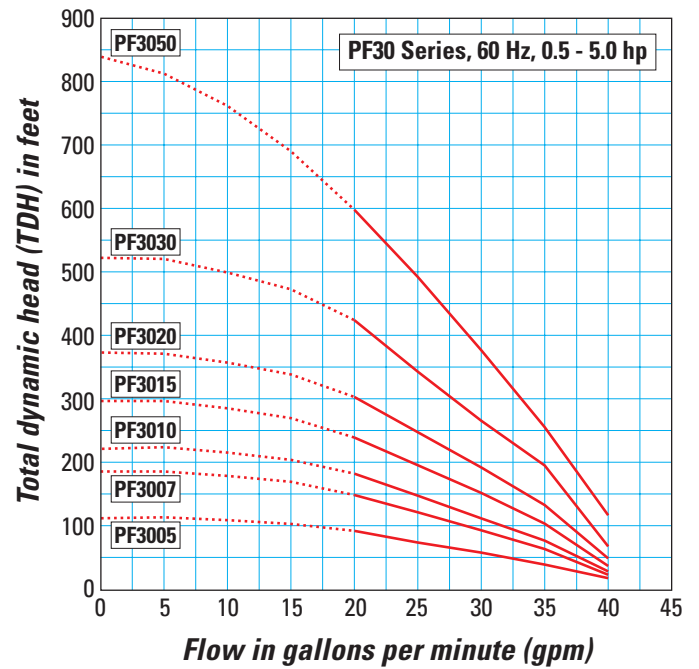
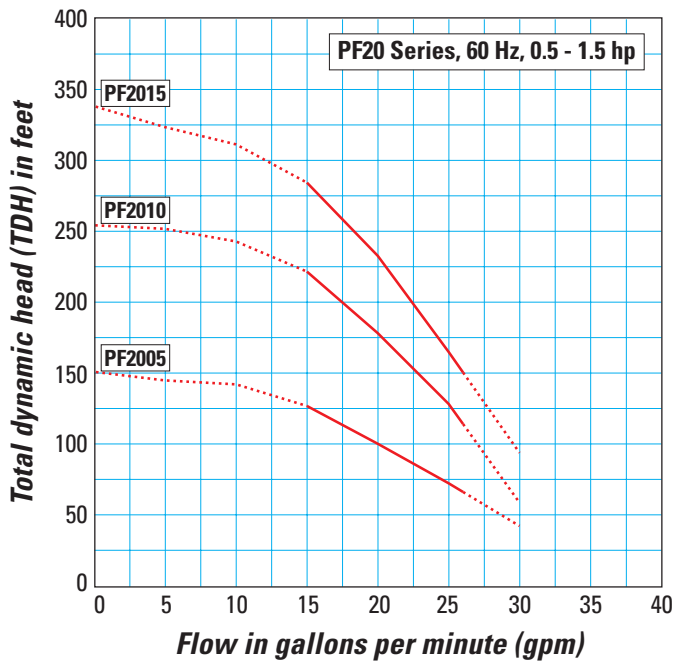
Using a Pump Curve

A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow (gpm or L/sec) and pressure (total dynamic head, or TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their nominal flow rate — the value, measured in gpm, expressed by the first two numerals in an Orenco pump nomenclature. The graphs in this section show optimal pump operation ranges with a solid line. Flow flow rates outside of these ranges are shown with a dashed line. For the most accurate pump specification, use Orenco's PumpSelect™ software.

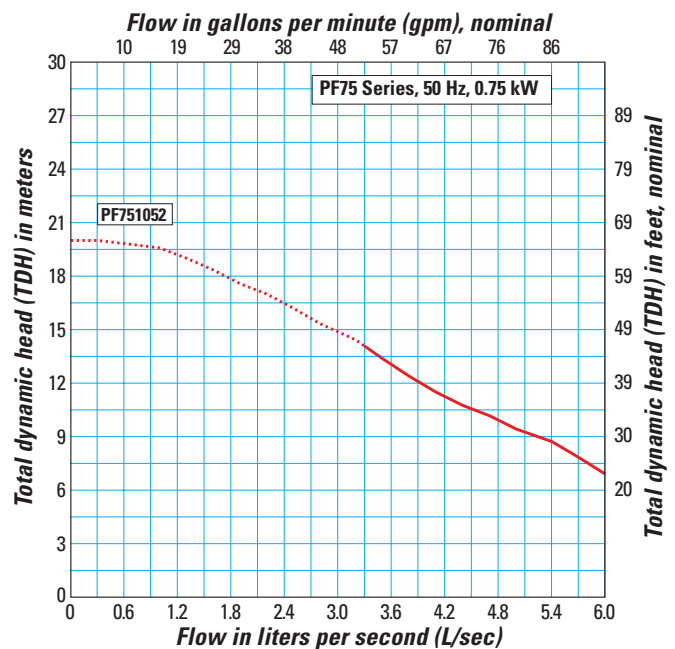
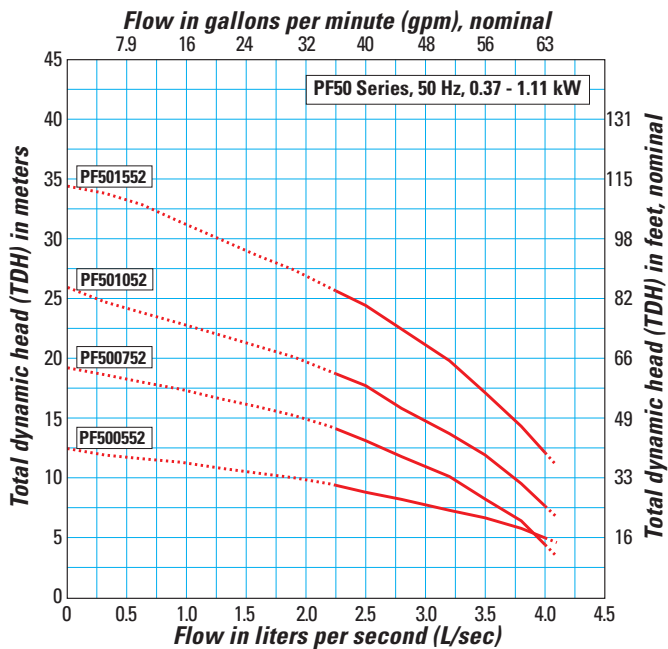
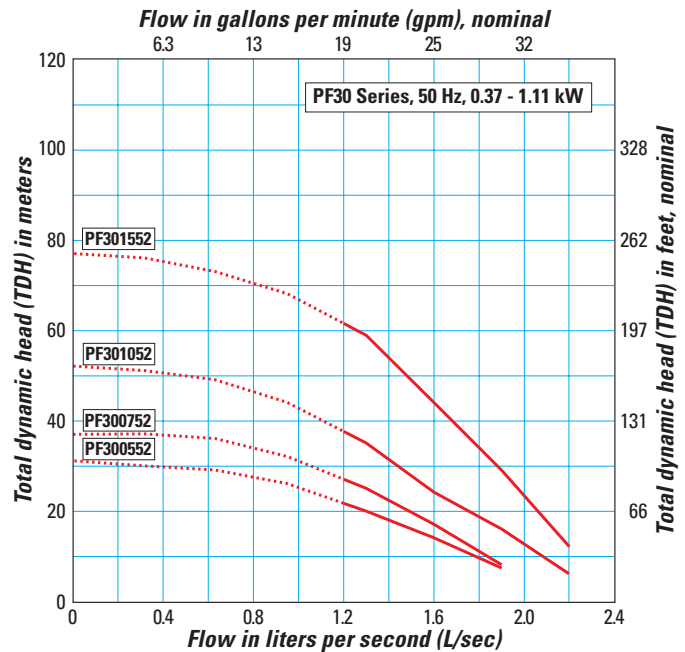
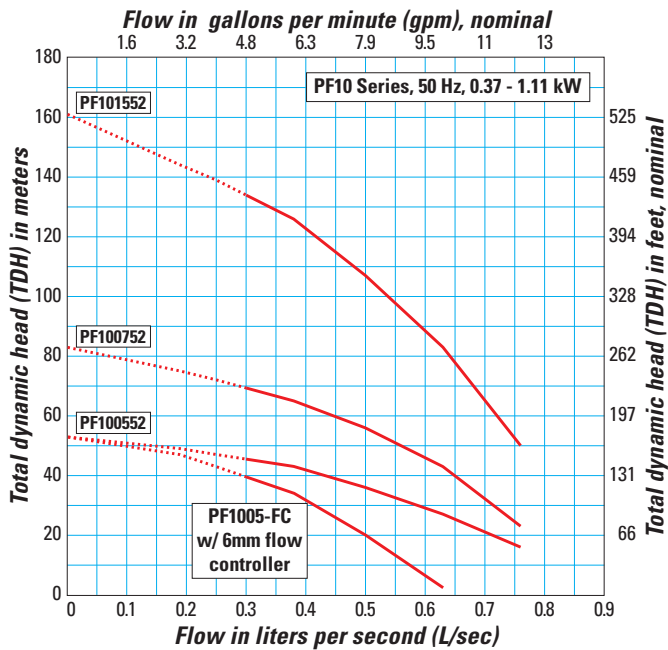
Pump Curves, 60 Hz Models



60 Hz Models (continued)



Pump Curves, 50 Hz Models



Pump Troubleshooting Tips

Troubleshooting Pumps That Don't Run

When one of your customers returns a pump to you for a warranty evaluation, is that pump really warrantable? Our years of experience with returned pumps show that 95% of pumps returned to us for a warranty evaluation because they “failed at start-up” or “wouldn't run” actually have no problems at all and work just fine.

To save yourself the time, expense, and hassle of cleaning, packaging, and shipping a pump back to Orenco for a warranty evaluation, it's important to troubleshoot the pump first. Especially since, once a pump has been wired and submerged, it can't simply be restocked and resold as a new pump. If the pump evaluation shows that it tests out okay, the pump will be returned to you.

So what should you do? Ideally, it's best to troubleshoot the pump in the field with the installer. We frequently find that the pump isn't getting adequate power. If you didn't get the opportunity to troubleshoot the pump in the field, **at a minimum, you can test the motor by wiring it to a pigtail and plugging it into a working outlet before bothering with a warranty return.**

Some common causes of pumps not operating at start up are listed below.

Pump Problem

The first step in diagnosing a pump problem is to test the panel in manual mode. In general, a pump that does not operate in manual mode will not operate in automatic mode.

- Check the pump in manual by switching the panel's MOA toggle switch to the “Manual” position.
 - ~ If the pump will not run and the panel includes a redundant off and low level alarm, be sure that the alarm is not activated, as indicated by the illuminated push button on the face of the panel.
 - ~ If the panel has a motor contactor, but it does not engage when the MOA switch is placed in manual, there may not be power to the controls.
 - ~ If the pump is an Orenco 4" submersible high-head pump, you will need to wait approximately five seconds between switching the pump off and back on again to allow the motor to shift from the run winding back to the start winding.

Power Problem

All Orenco control panels have individual circuits for the pump power and controls/alarm power. The loss of the controls/alarm power will result in loss of the alarm system and possibly the pump controls.

- Check the circuit breakers.
 - ~ The control panel includes a circuit breaker that passes power on to the pump. The control panel is usually fed power from the service panel in the home. Check the breakers in the control panel

and the service panel to make sure that power has not been cut off to the pump. A tripped pump circuit breaker can be caused by water infiltration into the splice box, loose connections, a failing pump, temporary power fluctuations, or the use of inadequately sized wire.

- Check the incoming power. A voltmeter or multimeter is required to perform these tests. Inexpensive multimeters can be purchased for under \$20.
 - ~ To check for power to the panel, use a voltmeter. In 120VAC systems, one lead of the meter should contact the top screw of the pump circuit breaker, and the other lead should contact any terminal labeled “N” (do not use the back plate). In 240VAC systems, the leads of the meter should be placed across the two poles of the pump circuit breaker. The meter should read 120VAC $\pm 3\%$ or 240VAC $\pm 3\%$ respectively.
 - ~ To check for power to the pump, use a voltmeter. The leads of the meter should be placed across the two pump terminals. (Refer to the appropriate panel wiring diagram to determine pump connections.) Depending on the panel, the meter should read 120VAC $\pm 3\%$ or 240VAC $\pm 3\%$. Low voltage can be caused by loose wiring connections, excessive voltage drop due to using too small a field wire, or temporary power fluctuations. Some pumps may start with a low voltage condition; however, a motor running at low voltage may not produce the expected output, resulting in lower head and flow capabilities.

Generator Use

Using a generator for startup testing. Generators must be sized appropriately to overcome the pump motor’s starting torque. Most generators are externally regulated so that the regulator increases the output voltage of the generator as the voltage dips at motor startup. We frequently find that the generator being used will not satisfy the motor requirements. This is especially important when using an Orenco 4" submersible high-head pump, which has higher starting torque. The following generator requirements are also included in the pump’s installation instruction manual.

Motor Rating *		Minimum Rating of Generator			
HP	KW	Externally Regulated		Internally Regulated	
		KW	KVA	KW	KVA
0.50	0.37	3.0	3.75	2.25	2.85
0.75	0.55	4.5	5.70	3.00	3.75
1.00	0.75	6.0	7.50	3.75	4.69
1.50	1.10	7.5	9.38	4.50	5.70

* These ratings are for Orenco pumps utilizing Franklin Electric 2-wire motors.

If, after troubleshooting, your pump still doesn’t run properly, Orenco’s Technical Sales Reps are here for you. Give us a call. We can offer additional suggestions or get the warranty evaluation process started for you.

APPENDIX D

FLOWMETER



Master Meter's Multi-Jet meter exceeds the AWWA C708 standard. With sensitivity to measure water flowing as low as 1/8 gallon per minute and accuracy unaffected by common particulates and build-up that would freeze other types, you can count on our Multi-Jet technology.

Technical Specifications:

AWWA Standard - Meets or exceeds all sections of AWWA Standard C-708, most recent revision. Compliant with SDWA, NSF ANSI 372 and NSF ANSI 61 standards.

Register - Standard Direct Read, DIALOG® 3G AMR System registers, AccuLinx Encoder, and IP 68 Electrical Output registers available. Together, an integrated and migratable technology environment is attained; direct, proximity (touch), mobile AMR, and Fixed Network AMI.

Register Sealing - Direct Read and DIALOG registers are permanently sealed with a scratch resistant glass lens, stainless steel base and wrap-around gasket to prevent intrusion of dirt or moisture.

Features & Benefits:

- Rugged basket strainer built from advanced polymer materials for superior wear mitigation.
- Proprietary design produces smooth, laminar flow profile for improved accuracy
- Award-winning DIALOG 3G register design houses all vital components — encoder, RF transmitter, battery and antennae — safely within the register's stainless steel and tempered glass enclosure. Free of external wires, components and connections — the #1 cause of field related issues on competitive designs.
- Assures compliance with the Safe Drinking Water Act (SDWA).
- Measures with only one moving part that is hydro-dynamically balanced on a sapphire bearing to preserve accuracy and promote a positive bottom line.
- Exceptional performance in passing entrained solids and operating in environments with high mineral content.
- Clean, elegant measurement design is highly sensitive to leaks and low flow while limiting wear for excellent revenue protection.

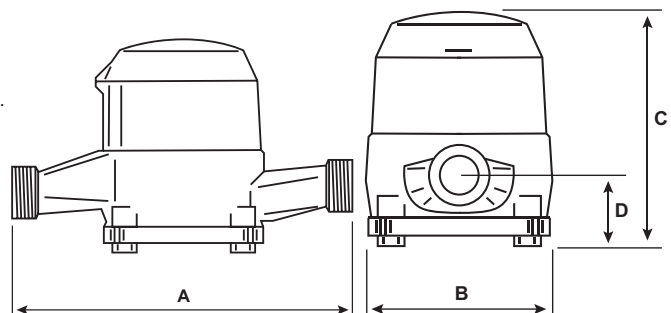
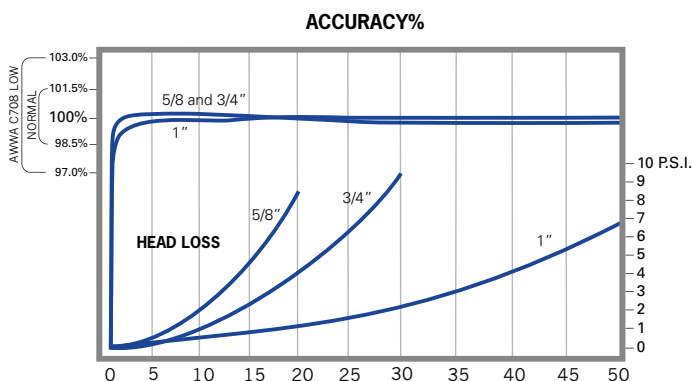
Technical Specs (Cont'd):

- **Register Unit** - Registration available in U.S. gallons, cubic feet or cubic meters.
- **Test Circle** - Large center sweep hand with one hundred (100) clearly marked gradations on the periphery of the dial face (available on Direct Read and DIALOG 3G registers).
- **Design/Operation** - Velocity-type flow measurement. Water that is evenly distributed by multiple converging inlet ports flows past an impeller in the measuring chamber, creating an impeller velocity directly proportional to water flow rate. The meter's register integrates that velocity into totalized flow.
An inherent advantage for this design is unparalleled wear mitigation leading to sustained revenues. The register assembly is removable under line pressure permitting seamless, simplified upgrades in reading technology.

- **Strainer** - A rugged, 360-degree advance polymer basket strainer protects the critical measuring element from damage. The unique strainer design smoothes the flow of water entering into the meter creating a laminar flow that is gentle on the meter's internal components. Tough materials operating in a smooth, balanced environment enable the meters to perform more accurately over time. Utilities' investments last longer while capturing more revenue.
- **Measuring Chamber** - The measuring chamber housing and measurement element are built with an advanced synthetic polymer. Measurement surfaces are not wear surfaces, providing sustained accuracy despite the presence of entrained solids in the water. A long life, synthetic sapphire bearing serves as a wear surface with radially balanced water flows. The chamber housing is constructed in two parts to allow access to the impeller. Bottom plates available in Bronze, Cast Iron (CI) or Engineered Plastic.

METER OPERATING CHARACTERISTIC/DIMENSION	5/8"	3/4" x 7-1/2"	3/4" x 9"	3/4" x 9" x 1"	1"
Flow Rating (gpm)	20	30	30	30	50
Continuous Flow (gpm)	15	20	20	20	30
Normal Flow Range (gpm)	1-20	2-30	2-30	2-30	3-50
Extended Low Flow (gpm)	1/4	1/2	1/2	1/2	3/4
Maximum Working Pressure (psi)	150	150	150	150	150
Maximum Working Temperature (F)	120	120	120	120	120
Length (A below)	7-1/2"	7-1/2"	9"	9"	10-3/4"
Width (B below)	3-5/8"	3-5/8"	3-5/8"	3-5/8"	4"
Height, standard register with lid (C below)	5"	5"	5"	5"	5-1/4"
Height, bottom to center line (D below)	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-3/4"
Weight (lbs)	3.95	4.0	4.1	4.6	5.25
Packed To Carton	6	6	6	4	4
Carton Weight (lbs)	25.1	25.4	26	19.8	22.4

Accuracy and Head Loss Chart

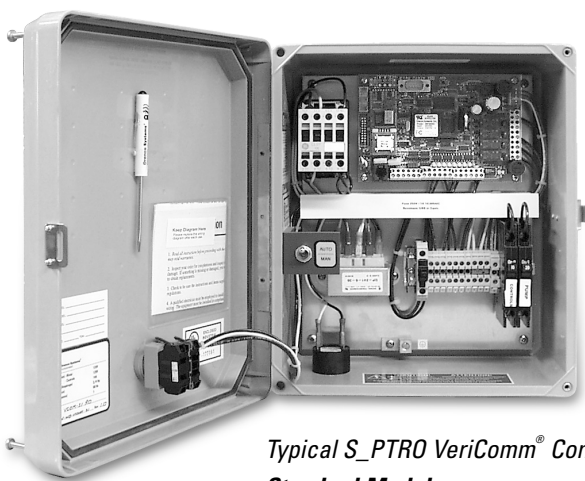


APPENDIX E

CONTROL PANEL MANUAL & WIRING DIAGRAM

Applications

VeriComm S1PTRO and S2PTRO remote telemetry control panels are used with timed dosing in simplex pumping operations. Coupled with the VeriComm web-based Monitoring System, these affordable control panels give water/wastewater system operators and maintenance organizations the ability to monitor and control each individual system's performance remotely, with real-time efficiency, while remaining invisible to the homeowner. VeriComm S1PTRO and S2PTRO panels allow remote operators to change system parameters, including timer settings, from the web interface.



Typical S_PTRO VeriComm® Control Panel

Standard Models:
VCOM S1PTRO, VCOM S2PTRO

To Specify...

To specify this panel for your installation, require the following:

Basic Control Logic: Two Operating Modes

- A "Normal Mode" that manages day-to-day functions.
- A "Test Mode" that suspends data collection and alarm reporting during installation and service.

Data Collection and Utilization

- Data logs of system conditions and events, such as pump run time, pump cycles, and alarm conditions.

Troubleshooting and Diagnostic Logic

- Troubleshooting capabilities that can report suspected failed components, which then trigger Alarms.

Advanced Control Logic

- Advanced control logic that activates during float malfunctions to diagnose the situation and keep the system operating normally until servicing.

Communication and Alarm Management

- Remote telemetry capabilities coupled with a web-based monitoring application (see *VeriComm Monitoring System*, ATD-WEB-VCOM-1) for communication and alarm management. Updating of point values (including timer settings) and receipt of queued changes during each communication session with host. Communication sessions that occur monthly, at a minimum, and more frequently during alarm conditions.
- Multiple methods of communication, as follows:

Call-In to VeriComm® Host

- Automatic notification to host of "Alarms," which signal fault conditions that need to be addressed immediately (e.g., pump failure).
- Automatic notification to host of "Alerts," which signal less critical fault conditions and which trigger the panel's troubleshooting logic and alternative operating mode (e.g., stuck float switch).
- Automatic notification to host of "Updates," which include alarm updates or all-clear notifications following Alarms/Alerts, as well as normally scheduled monthly panel reports.
- Manual, forced communication from panel to host to effect an updating of point values and receipt of queued changes.

Real-Time Direct Connection to Panel

- Manual, direct connection at the site via RS-232 serial port, to allow a local operator real-time access to detailed logged data and the ability to change point values from a laptop.
- Manual, forced communication by local operator/homeowner at the site to initiate an auto-answer mode, allowing a remote operator real-time access to detailed logged data and the ability to change point values.

During real-time, manual connections, software with open architecture (and password security) is used; no proprietary software is required. VT100 protocol allows access and control from any computer modem (Mac or PC) with a simple communication program (e.g., Windows® HyperTerminal); multilevel password protection in panel ensures that only qualified personnel can access the panel's data.

Additional Features

- Status light indicators on the board, including ...
 - Flashing green LED for normal operation
 - Yellow LEDs for status of digital inputs
 - Red LEDs for status of digital outputs and modem activity
- UL-recognized and FCC-approved

For more information, try our online demo at www.vericomm.net (no password required).



Oreco Systems®
Incorporated

*Changing the Way the
World Does Wastewater®*

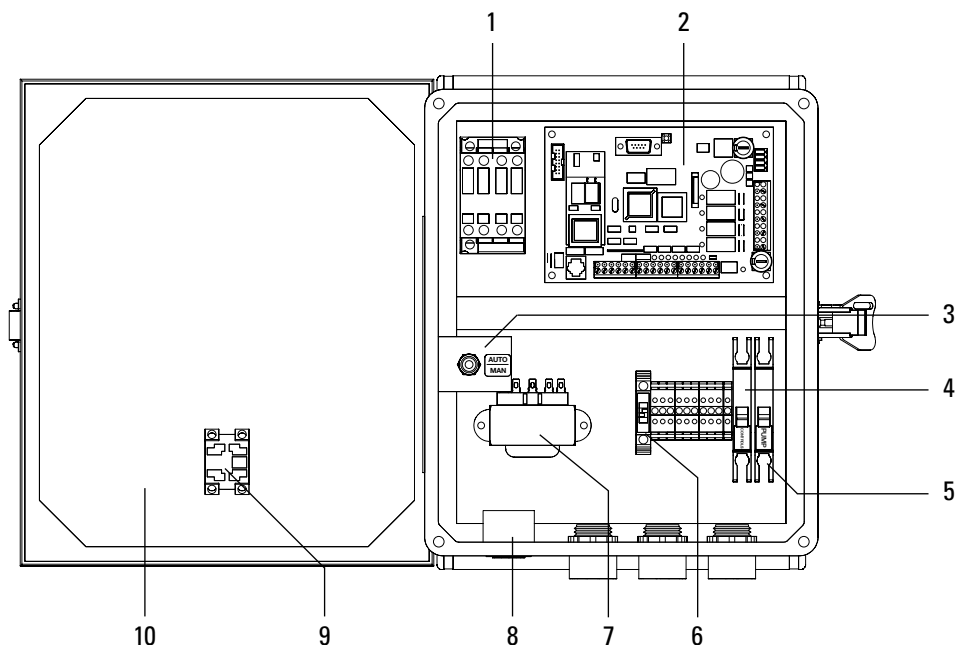
www.oreco.com

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Page 1 of 2

VeriComm® S_PTRO Control Panels

Technical Data Sheet

1. Motor-Start Contactor
2. VeriComm® Remote Telemetry Board
3. Toggle Switch
4. Control Circuit Breaker
5. Pump Circuit Breaker
6. Fuse
7. Transformer
8. Audio Alarm
9. Visual Alarm
10. Panel Enclosure



Standard Components

Feature	Specifications
1. Motor-Start Contactor	120 VAC: 16 FLA, 1 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA). 240 VAC: 16 FLA, 3 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA).
2. VeriComm® Remote Telemetry Unit*	ATRTU-100: 36/18 VAC (center tap transformer), 8 digital inputs, 4 analog inputs, 4 digital outputs, 0 analog outputs, on-board modem (2400 baud), LED input and output indicators, 1-year battery backup of data and program settings.
3. Toggle Switch	Single-pole switch, automatic On, with spring-loaded, momentary, manual On. 20 amps, 1 hp.
4. Control Circuit Breaker	10 amps, OFF/ON switch. Single-pole 120 VAC, double-pole 240 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
5. Pump Circuit Breaker	20 amps, OFF/ON switch. Single-pole 120 VAC, double-pole 240 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
6. Fuse	120 VAC Primary, 36 VCT @ 0.85A Secondary.
7. Transformer	250 VAC, 1A.
8. Audio Alarm	95 dB at 24", warble-tone sound.
9. Visual Alarm	7/8" diameter red lens, "Push-to-silence." NEMA 4, 1 Watt bulb, 120 VAC.
10. Panel Enclosure	Measures 13.51" high x 11.29" wide x 5.58" deep. NEMA 4X rated. Constructed of UV-resistant fiberglass; hinges and latch are stainless steel. Conduit couplings provided.
VCOM-S1PTRO	120 VAC, 3/4 hp, 14 amps, single-phase, 60 Hz.
VCOM-S2PTRO	240 VAC, 2 hp, 14 amps, single-phase, 60 Hz.

Optional Components

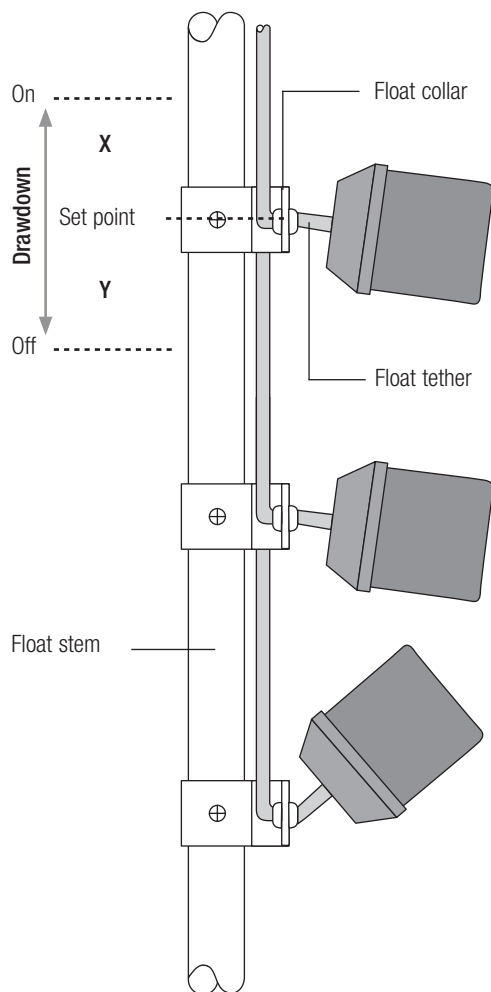
Feature	Specifications	Product Code Adder
Pump Run Light	7/8" diameter green lens. NEMA 4, 1 Watt bulb, 120 VAC.	PRL
Heater	Anticondensation heater. Self-adjusting: radiates additional Wattage as temperature drops.	HT

* See VeriComm® Remote Telemetry Unit (ATD-CP-VCOM-1) and VeriComm® Monitoring System (ATD-WEB-VCOM-1) for more detail.

Float Switch Assemblies

Applications

Float switches are used to signal liquid level positions for alarm and pump control applications. Orenco float switch assemblies can be mounted in pump vaults, effluent screens, pump basins, and risers.



*The "On" and "Off" positions describe normally open floats.
For normally closed floats, the functions are reversed.*

Materials of Construction

Float housing	Impact-resistant, noncorrosive PVC plastic for use in liquids up to 140° F (60° C)
Float cord, A and T models	Flexible 2-conductor (UL, CSA) SJ00W; Super Vu-Tron® Supreme, yellow
Float cord, All other models	Flexible 2-conductor (UL, CSA) SJ0W; water-resistant (CPE); neoprene coating
Float collar	ABS

General

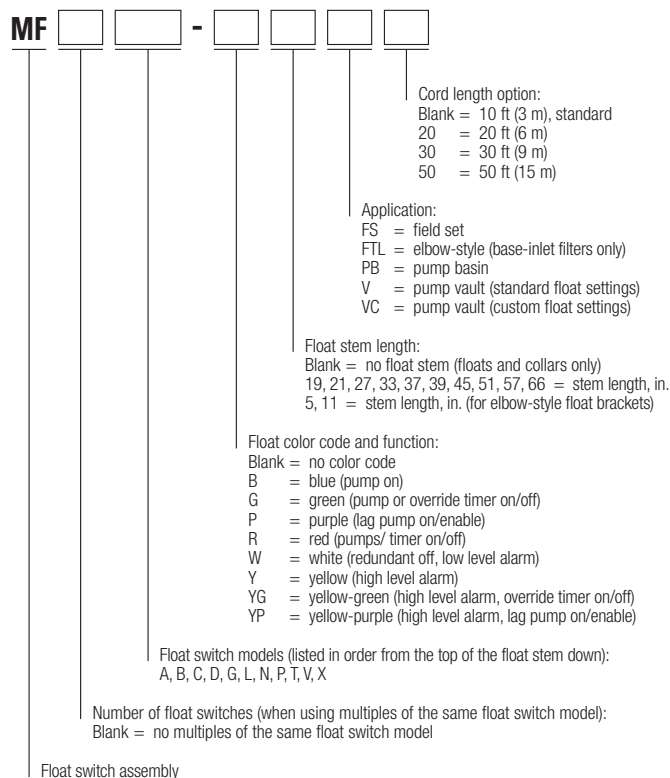
All models listed are UL listed and CSA certified for use in water or sewage. "A" model float switches are also CE certified for sale in European Union countries. Non-mercury float switches (models B, C, D, L, N, P, V and X) are used where components containing mercury are prohibited.

Float switches are typically ordered in assemblies that include one or more switches mounted on a 1-inch PVC float stem. ABS float collars are used to provide secure mounting that is easily adjustable. "A" and "T" model float switches use Super Vu-Tron® electrical cords for superior chemical and water resistance.

Standard Models

A, B, C, D, G, L, N, P, T, V, X

Product Code Diagram



When ordering float switch assemblies, remember to list float switches from the top of the float stem down. An “MFABT-” nomenclature indicates one “A” switch at the top of the stem, one “B” in the middle of the stem, and one “T” switch at the bottom of the stem; an “MF2AT-” indicates “A” switches at the top and middle of the stem, and one “T” switch at the bottom of the stem.

Signal- and Motor-Rated Float Switch Matrix

Float	State ¹	Type ²	IR ³	Volts	Amps	hp	Tether	X	Y	Drawdown ⁴
Signal-rated mercury floats⁵ (for control switch applications)										
A Model ^a	Normally open	Mercury	Yes	n/a	n/a	n/a	2.00 in.	n/a	n/a	n/a
T Model	Normally closed	Mercury	Yes	n/a	n/a	n/a	2.00 in.	n/a	n/a	n/a
Signal-rated mechanical floats⁵ (for control switch applications)										
L Model ^a	Normally open	Mechanical	Yes	n/a	n/a	n/a	2.00 in.	1.50 in.	1.50 in.	3.00 in.
N Model ^b	Normally closed	Mechanical	No	n/a	n/a	n/a	2.00 in.	1.50 in.	1.50 in.	3.00 in.
P Model ^b	Normally open	Mechanical	No	n/a	n/a	n/a	2.00 in.	1.50 in.	1.50 in.	3.00 in.
V Model ^a	Normally open	Mechanical, small drawdown	Yes	n/a	n/a	n/a	2.00 in.	< 1 in.	< 1 in.	< 1 in.
X Model	Normally closed	Mechanical, small drawdown	Yes	n/a	n/a	n/a	2.00 in.	< 1 in.	< 1 in.	< 1 in.
Motor-rated floats⁵ (for pump switch applications)										
B Model ^b	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in. ^c	2.50 in.	1.50 in.	4.00 in.
				240V	13A	1 hp	3.00 in.	3.00 in.	1.50 in.	4.50 in.
							4.00 in.	3.25 in.	1.50 in.	4.75 in.
C Model ^b	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.	3.00 in.	2.50 in.	5.50 in.
				240V	15A	2 hp	3.00 in. ^c	3.50 in.	3.00 in.	6.50 in.
							4.00 in.	4.00 in.	3.50 in.	7.50 in.
							5.00 in.	4.50 in.	4.00 in.	8.50 in.
							6.00 in.	5.25 in.	4.25 in.	9.50 in.
D Model ^b	Normally open	Mechanical	No	120V	15A	3/4 hp	2.00 in. ^c	3.00 in.	2.50 in.	5.50 in.
				240V	15A	2 hp	3.00 in.	3.50 in.	3.00 in.	6.50 in.
							4.00 in.	4.00 in.	3.50 in.	7.50 in.
							5.00 in.	4.50 in.	4.00 in.	8.50 in.
							6.00 in.	5.25 in.	4.25 in.	9.50 in.
G Model	Normally open	Mercury	Yes	120V	15A	3/4 hp	2.00 in.	1.50 in.	3.00 in.	4.50 in.
				240V	15A	2 hp	3.00 in. ^c	1.75 in.	3.00 in.	4.75 in.
							4.00 in.	2.00 in.	3.50 in.	5.50 in.

a. Suitable for use with VCOM and MVP.

b. Suitable for use with potable water.

c. Standard tether length

Notes

¹ State: normally open or normally closed

The default state of a float — normally open or normally closed — refers to the contact positions in the float when the float is resting (down). Float switches have an internal contact. The terms “normally open” (N/O) and “normally closed” (N/C) refer to the state of the float switch contact in the down position. A normally open float switch has an open contact (off) in the down position and a normally closed float switch has a closed contact (on) in the down position. Different panel functions require different types of float switches. Most applications require float switches that are normally open. One notable exception is the redundant off and low-level alarm function that requires a normally closed float switch, except with MVP and VCOM panels.

² Type

Floats have mechanical or mercury contactor types. The important distinction between these is that mercury floats are not rated for potable water.

³ IR (intrinsically safe relay)

Approved for use with intrinsically safe, Class I, Division 1 applications, where reliable float switch operation with very low current is required.

⁴ Drawdown

Drawdown (in inches) refers to the difference in liquid level between a float switch's activation and deactivation points. Drawdown can be altered by adjusting the tether length of the float switch cord. When selecting float switches, keep in mind that any float switch that can directly start and stop a pump (one that has no motor contactor in the control panel) should have a drawdown capability, to avoid rapid cycling of the pump.

⁵ Signal-rated or motor-rated

Every float has a maximum amount of current it can handle. Exceeding these limits may cause premature failure. Signal-rated or “control” floats are used to activate pump control panels and alarms. Only low amperage signals pass through these float switches, hence the float switch is “signal-rated.” All Orenco panels that use motor contactors can use signal-rated float switches. In some systems, a float switch is used to directly start and stop a pump. In this application, the current that is running the pump passes through the float switch as well, and the float switch must be “motor-rated.” In most instances, a motor-rated float switch can be used as a signal float switch.

APPENDIX F

VERICOMM MONITORING

VERICOMM MONITORING SYSTEM

<http://www.vericomm.net/>

VeriComm[®] monitoring system web-based monitoring system

Login

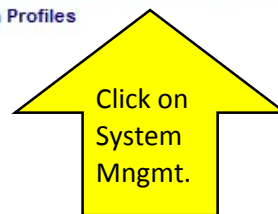
Welcome to the VeriComm[®] Monitoring System for onsite wastewater collection and treatment.

User:

Password:

If you have a User ID and have forgotten your password, [click here](#)

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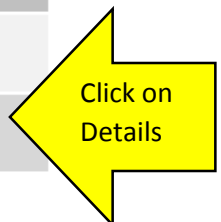
Sites

FDOH-FOSNRS

This page lists all of the sites that are registered with this System. To view detailed site information, click on the "Details" link. To view or add Notes for a Site, click on the "Site Notes" link.

Sort by:

Site ID	Panel Type	Address	Description	Options
			AdvanTex	Details Notes
			AdvanTex	Details Notes



Scroll to the bottom of the page...

Call History Past 7 Calls Past 30 Calls Past 60 Calls All Calls			
Date	Time	Call Description	Options
Jan 23, 2015	03:11 AM (ET)	Regular Call-In OK - No Condition Detected	Analysis Point Data
Jan 21, 2015	08:22 AM (ET)	Alert/Update OK - No Condition Detected	Analysis Point Data
Jan 21, 2015	07:57 AM (ET)	Alert/Update OK - No Condition Detected	Analysis Point Data
Jan 21, 2015	07:53 AM (ET)	Alert/Update OK - No Condition Detected	Analysis Point Data
Jan 18, 2015	05:45 PM (ET)	Alert/Update High Pump Time	Analysis Point Data
Jan 17, 2015	07:53 PM (ET)	Alert/Update High Pump Time	Analysis Point Data
Jan 01, 2015	08:23 PM (ET)	Alert/Update High Pump Time	Analysis Point Data

Click on
Point Data

Describes alert/alarm

Current Point Data

FDOH-FOSNRS
RTU127361 - S1PTRO

Call Received: **January 23, 2015 3:11 AM (ET)**

The following table gives you a "snapshot" of the referenced Site's operating data at the time of this call. You can alter any point settings for this Site wherever there is a "Change" option. Your new settings will be effective the next time the telemetry unit calls home. Points are logically grouped by functionality. Select which group to display using the links below or select "All Points" to display all the points.

[System Status](#) [Settings](#) [Troubleshooting](#) [Flow Data](#) [Library Data](#) [Totalized Pump Data](#) [Miscellaneous](#)
[Alarm Points](#) [Inputs & Outputs](#) | [All Points](#)

Click on
All Points

[Previous Call](#)

System Status				
Point	Description	Value	Status	Options
1	Alarm Status	OK	Automatic	
2	Alert Status	OK	Automatic	
3	System Mode	Normal	Automatic	
5	Timer Mode	Off	Automatic	
6	Active Off Time	60.0 Minutes	Automatic	
7	Active On Time	0.7 Minutes	Automatic	
9	Pump Mode	Off	Automatic	
10	Pump Status	Off	Automatic	
12	Pump Cycles Today	1.0 Cycles	Automatic	
13	Override Cycles Today	0.0 Cycles	Automatic	
14	Pump Run Time Today	0.8 Minutes	Automatic	

Able to track the entire list included in the O&M including 30 Day History Data.

Settings

Point	Description	Value	Status	Options
17	Off Cycle Time	60.0 Minutes	Constant/Setpoint	Change
18	On Cycle Time	0.7 Minutes	Constant/Setpoint	Change
19	Override Off Cycle Time	30.0 Minutes	Automatic	Change
20	Override On Cycle Time	2.1 Minutes	Constant/Setpoint	Change
21	Minimum Override Cycles	3.0 Cycles	Automatic	Change
23	Override Cycle Limit per Day	7.0 Cycles	Automatic	Change
24	Time Limit per Day	50.0 Minutes	Constant/Setpoint	Change
25	High Level Pump Test	2.0 Minutes	Automatic	Change
28	Alarm Update Interval	120.0 Minutes	Automatic	
29	Page Delay	960.0 Minutes	Automatic	Change
30	Page Interval	30.0 Minutes	Automatic	Change
31	Local Alarm Delay	1140.0 Minutes	Constant/Setpoint	Change
32	Local Reactivate Delay	120.0 Minutes	Automatic	Change

Troubleshooting

Point	Description	Value	Status	Options
33	Top Float Status	OK	Automatic	
34	Middle Float Status	OK	Automatic	
35	Bottom Float Status	OK	Automatic	
37	Contactor Status	OK	Automatic	
38	Pump Status	OK	Automatic	
40	Filter Status	OK	Automatic	
41	Tank Status	OK	Automatic	
43	Power Status	OK	Automatic	

Flow Data

Point	Description	Value	Status	Options
49	Pump Run Time Today	0.8 Minutes	Automatic	
50	Override Cycles Today	0.0	Automatic	
51	Pump Cycles Today	1.0 Cycles	Automatic	
52	Average Run Time per Cycle Today	0.8 Minutes	Automatic	
54	Brownouts Today	0.0	Automatic	

30-Day History Data

Point	Description	Value	Status	Options
65	30 Day Average Run Time per Day	16.5 Minutes	Automatic	
66	30 Day Average Override Cycles per Day	0.0 Cycles	Automatic	
67	30 Day Average Cycles per Day	14.3 Cycles	Automatic	
68	30 Day Average Run Time per Cycle	1.2 Minutes	Automatic	
71	30 Day Total Pump Run Time	494.5 Minutes	Automatic	
72	30 Day Total Override Cycles	0.0 Cycles	Automatic	
73	30 Day Total Cycles	428.0 Cycles	Automatic	
76	30 Day Total Brownouts	0.0	Automatic	

Totalized Pump Data

Point	Description	Value	Status	Options
82	Pump Total Run Time	96.3 Hours	Automatic	
83	Pump Total Cycles	5840.0 Cycles	Automatic	

Miscellaneous

Point	Description	Value	Status	Options
145	Pump On Auto	Off	Automatic	
147	Pump Test Today	Off	Automatic	
148	Pump Check Enable	Off	Automatic	
149	Total Override Cycles	0.0	Automatic	
150	High Level Condition	Off	Automatic	
151	Leak Check Enable	Off	Automatic	Change
152	Brownout State	Off	Automatic	Change
153	Test Mode	Off	Automatic	

Alarm Points

Point	Description	Value	Status	Options
161	General Alarm	Off	Automatic	
162	New Alarm	Off	Automatic	
163	Update Central Enable	On	Automatic	
167	Page Alarm Start	Off	Automatic	
168	Pager Signal	Off	Override Off	Change
169	Local Alarm Start	Off	Automatic	
170	Local Alarm Silence	Off	Automatic	

Inputs & Outputs

Point	Description	Value	Status	Options
177	High Level/Override Timer Float Input	Off	Automatic	Change
178	Timer Float Input	Off	Automatic	Change
179	Redundant Off Float & Low Level Alarm Input	On	Automatic	Change
181	Push To Silence Input	Off	Automatic	Change
182	Auxiliary Contact Input	Off	Automatic	Change
186	Pump Output	Off	Automatic	Change
188	Alarm Light Output	Off	Automatic	Change
189	Audible Alarm Output	Off	Automatic	Change

APPENDIX G

MEDIA

SOURCES OF MEDIA

STAGE 1 (EXPANDED CLAY)

Big River Industries
Sales Rep: Mark Towle
3600 Mansell Road
Suite 575
Alpharetta, GA 30022
407-538-0590
toll free 1-800-324-5483
mark.towle@oldcastleapg.com

STAGE 2 (WOOD)

Mothers Organics
Contact: Steve Magriby
6727 CR 579
Seffner, FL 33584
Phone 813-628-0600 FAX 813-628-0664
steve.mothersorganics@gmail.com

STAGE 2 (SULFUR)

Southern Agricultural Insecticides, Inc.
Contact: Darrin Diem
7400 Bayshore Road
Rubonia, FL 34221
(941) 722-3285 Office (941) 723-2974 Fax
darrin.diem@southernag.com.

STAGE 2 (OYSTER SHELL MIXED WITH SULFUR)

Shell's Feed & Garden Supply
9513 Nebraska Ave.
Tampa, FL 33612
813-932-9775
Email: customerservice@shellsfeed.com



GRAVELITE® - LIGHTWEIGHT AGGREGATE

Big River Industries, Inc. produces an expanded clay lightweight aggregate at its Erwinville, Louisiana plant. The aggregate is sold under the trade name "GRAVELITE".

GRAVELITE expanded clay lightweight aggregate is structural grade aggregate for use in ready-mixed concrete products, as well as asphalt paving and geotechnical engineering projects. The aggregate is produced by mining clay from deposits found on plant property and calcining the clay at a temperature of approximately 2000 degrees Fahrenheit in rotary kilns. The resulting lightweight aggregate is graded to conform to the requirements of ASTM C-330, Specification for Lightweight Aggregate for Structural concrete, and ASTM C-331, Specification for Lightweight Aggregate for Concrete Masonry Units. In addition, special gradations are available upon request.



The Erwinville plant is the original facility of Big River Industries, having opened in 1948. At that time, it consisted of one rotary kiln, 8 feet in diameter and 160 feet long, with a rated capacity of 150,000 cubic yards per year. Today, the plant, which is situated on 660 acres owned by Big River Industries, has four kilns, each 8 foot in diameter and 160 feet long, and a rated capacity of more than 600,000 cubic yards annually.



GRAVELITE expanded clay lightweight aggregate is available throughout the eastern two-thirds of the United States, portions of Canada, and Mexico. The aggregate is shipped from the Erwinville plant via rail, truck and barge. It has been used extensively for structural lightweight concrete and concrete masonry in Louisiana, Florida, Minnesota and the metropolitan Chicago area. Recent structural lightweight concrete project locations include Grand Rapids, Michigan and Cleveland, Ohio.

PHYSICAL PROPERTIES	GRAVELITE	SPECIFICATIONS (ASTM C 330)
Unit Weight, Dry Loose, lb/ft ³		
ASTM C 330 Coarse Aggregate, ½ In. to .4 Standard Fineness	34 to 37	55, max
Modulus, 6.3		
ASTM C 330 Fine Aggregate, No. 4 to 0 Standard Fineness Modulus, 3.1	44 to 48	70, max
Organic Impurities, ASTM C 40	Lighter than Standard	Standard or Lighter
Staining Index, ASTM C 641	Very Light	Less than "heavy stain"

Loss on Ignition, ASTM C 114	< 1 %	5 %, max
Drying Shrinkage	< 0.07 %	0.07 %, max
Popouts, ASTM C 151	None	None



Big River Industries, Inc.
3700 Mansell Road
Suite 250
Alpharetta, GA 30022
1-800-342-LITE

GRAVELITE expanded clay lightweight aggregate is made by Big River Industries, Inc. to conform to the requirements of ASTM C33, *Standard Specification for Lightweight Aggregates for Structural Concrete*. GRAVELITE is classified in the category "expanded shale, clay or slate", and therefore must comply with the most stringent requirements of the specification. GRAVELITE® is a registered trademark of Big River Industries, Inc.



Big River Industries, Inc.

Material Safety Data Sheet

This complies with OSHA'S Hazard Communication Standard 29 CFR 1910.1200

IDENTITY (As used on Label and List) Expanded Clay Lightweight Aggregate (CAS # 68334-37-2)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------

Section I

Manufacturer's Name BIG RIVER INDUSTRIES, INC	Emergency Telephone Number (225) 627-4242
Address (Number, Street, City, State, and ZIP Code) P. O. Box 190	Telephone Number for Information (225) 627-4242
Erwinville, LA 70729	Date Prepared 01/05/04
	Signature of Preparer (optional)

Section II – Hazard Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
SiO ₂ SILICON DIOXIDE (CAS # 14808-60-7)		10*		64.60
Fe ₂ O ₃ FERRIC OXIDE (CAS # 1309-37-1)		10*		6.55
Al ₂ O ₃ ALUMINUM OXIDE (CAS # 1344-28-1)		10*		20.57
CaO CALCIUM OXIDE (CAS # 1305-78-8)		3*		0.84
MgO MAGNESIUM OXIDE (CAS # 1309-48-4)		10*		2.91
* Milligrams per cubic meter (Mg/M ³)				

Section III – Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H₂O = 1)	1.32 (SSD)
Vapor Pressure (mm Hg.)	N/A	Melting Point	2100 F
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	Not Available
Solubility in Water N/A			
Appearance and Odor Reddish, brown angular with no odor			

Section IV – Fire and Explosion Hazard Data

Flash Point (Method Used) N/A	Flammable Limits N/A	LEL N/A	UEL N/A
Extinguishing Media N/A			
Special Fire Fighting Procedures N/A			
Unusual Fire and Explosion Hazards None known			

Section V – Reactivity Data

Stability	Unstable		Conditions to Avoid None Known
	Stable	X	
Incompatibility (Materials to Avoid) None Known			
Hazardous Decomposition or Byproducts None Known			
Hazardous Polymerization	May Occur		Conditions to Avoid None Known
	Will Not Occur	X	

Section VI – Health Hazard Data

Route(s) of Entry:	Inhalation? X	Skin? X	Ingestion? X
Health Hazards (<i>Acute and Chronic</i>) Exposure to dust may irritate respiratory system, eyes and skin			
Carcinogenicity: No	NTP? No	IARC Monographs? No	OSHA Regulated? No
Signs and Symptoms of Exposure Irritated eyes from dust, difficulty in breathing, irritated skin.			
Medical Conditions Generally Aggravated by Exposure Respiratory system, irritated eyes or open wounds.			
Emergency and First Aid Procedures Eyes-Flush with running water. Dust Inhalation-Move to fresh air. Skin-Wash with soap and water. Contact physician if irritation persists.			

Section VII – Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled Spilled material may generate dust. Wetting will help reduce dust levels. Respiratory protective equipment may be necessary.
Waste Disposal Method Pickup and reuse clean material. Dispose of waste material in accordance with applicable federal, state and local regulations.
Precautions to be Taken in Handling and Storing Respirable dust may be generated during processing, handling or storage. Control measures as outlined in section VIII should be followed.

Other Precautions	None Known

Section VIII – Control Measures

Respiratory Protection (<i>Specify Type</i>) NIOSH – MSHA Approved Dust Respirators		
Ventilation	Local Exhaust X	Special N/A
	Mechanical (<i>General</i>) X	Other N/A
Protective Gloves Recommended but not required		Eye Protection Safety glasses with side shields
Other Protective Clothing or Equipment Long sleeves and trousers recommended, but not required.		
Work/Hygienic Practices Wash exposed skin with soap and water. Wash work cloths as necessary.		

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.** DATE: Apr. 1, 2002
8750 – 53rd Ave. PHONE: 780-468-4064
Edmonton, AB T6E 5G2 FAX: 780-469-1899

PRODUCT NAME: **SAWDUST**

PRODUCT USE: Oil well drilling fluid additive
CHEMICAL FAMILY: Wood by-product CAS #: None

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: Not a controlled product under WHMIS.
WORKPLACE HAZARD: Not applicable.

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated under TDG
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

<u>INGREDIENT</u>	<u>PERCENT</u>	<u>CAS NUMBER</u>	<u>LD₅₀ Oral-Rat</u>	<u>LC₅₀ Inhal-Rat</u>	<u>ACGIH-TLV</u>
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Contains no WHMIS controlled ingredients

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: ☐ EYE CONTACT ☐ SKIN ☐ INHALATION ☐ INGESTION
EYE CONTACT: Mechanical irritant.
SKIN CONTACT: No effects expected. Abrasion may occur with prolonged contact.
INGESTION: No toxic effects expected.
INHALATION: Possible irritation of nasal passages, throat and bronchial passages.
People with existing respiratory problems should avoid wood dust.
CARCINOGENICTY: Not applicable
TERATOGENICITY: Not applicable
REPRODUCTIVE TOXICITY: Not applicable
MUTAGENICTY: Not applicable

SYNERGISTIC
PRODUCTS: Not applicable

SECTION IV: FIRST AID MEASURES

SKIN CONTACT: Wash with soap and water. If irritation develops, obtain medical attention.

EYE CONTACT: Flush eye to remove debris. If irritation persists, obtain medical attention.

INGESTION: If a large amount is ingested, consult a physician.

INHALATION: Move patient from dusty environment. Apply oxygen or artificial respiration if required. If breathing difficulties or distress continues obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR: Yellow granular flake; woody odour

SPECIFIC GRAVITY: Variable

BOILING POINT (C): Not applicable

MELTING POINT (C): Not applicable

SOLUBILITY IN WATER: Insoluble pH: No data

PERCENT VOLATILE BY VOLUME: Not applicable

EVAPORATION RATE: Not applicable

VAPOUR PRESSURE (mmHg): Not applicable

VAPOUR DENSITY (air = 1) Not applicable

BULK DENSITY: Not applicable

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Not applicable

FLAMMABLE LIMITS: LEL: 40 gm/m³ UEL: Variable

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, water spray or foam. Suggest water spray for large fires.

SPECIAL FIRE FIGHTING
PROCEDURES: Self-contained breathing apparatus required for fire fighting personnel. Move containers from fire area, or cool with water spray, if possible.

UNUSUAL FIRE AND
EXPLOSION HAZARDS: Material will burn under fire conditions. Autoignition temperature = 400-500F.

SECTION VII: REACTIVITY DATA

STABILITY: STABLE [XX] UNSTABLE []

INCOMPATIBILITY (CONDITIONS TO AVOID):	Incompatible with oxidizers. Avoid open flames and high temperatures.
CONDITIONS OF REACTIVITY:	Contact with strong oxidizers. May undergo autoignition at high temperatures.
HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition will result in the following: Water, carbon dioxide, formic acid, acetic acid, carbon monoxide, methane, wood coal and aldehydes.
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX] MAY OCCUR []

SECTION VIII: PREVENTATIVE MEASURES

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	Suggest NIOSH approved dust mask. OEL = 5 mg/m ³ for non-allergenic wood dust.
VENTILATION:	General mechanical sufficient for normal conditions of use.
PROTECTIVE GLOVES:	Suggest PVC or rubber.
EYE PROTECTION:	Suggest goggles.
OTHER PROTECTIVE EQUIPMENT (Specify):	Long-sleeve shirt and coveralls. Ensure eye wash station and emergency shower available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Eye and respiratory protection suggested when handling this material. Store in a cool dry area away from incompatibles and open flames.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Wear suitable protective equipment. Eliminate ignition sources. Sweep up and collect uncontaminated material for repackaging. Sweep up and collect contaminated material in approved containers for disposal.

WASTE DISPOSAL METHOD

Dispose/incinerate in accordance with all federal, provincial and local regulations. It is the responsibility of the user to determine if material meets the criteria of hazardous waste at the time of disposal.

SECTION IX: PREPARATION

THE INFORMATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH, BUT NO WARRANTY EXPRESSED OR IMPLIED, IS MADE.

DATE ISSUED: April 1, 2002
SUPERSEDES: March 29, 1999

BY: Product safety committee

**Diversity Technologies Corp. is the parent company of
Canamara-United Supply Ltd., Hollimex Products Ltd. and Canamara SDS**

MATERIAL SAFETY DATA SHEET

WOOD DUST

Company Name, Address

TRADE NAME: Wood Dust
SYNONYMS: None
CAS. NO.: None
DESCRIPTION: Particles generated by any manual or mechanical cutting or abrasion process performed on wood.

PHYSICAL DATA

Boiling PointNot Applicable
Specific Gravity.....Variable
(Dependent on wood species and moisture content).
Vapor Density.....Not Applicable
% Volatiles by Volume.....Not Applicable
Melting Point.....Not Applicable
Vapor Pressure.....Not Applicable
Solubility in H₂O (% by wt.).....Insoluble
Evaporation Rate -
(Butyl Acetate=1).....Not Applicable
pH.....Not Applicable
Appearance & Odor.....Light to dark colored
granular solid
Color and odor are dependent on the wood species and time since dust was generated.

FIRE & EXPLOSION DATA

Flash Point.....Not Applicable
Autoignition Temperature.....Variable
(typically 400-500°F)
Explosive Limits in Air.....40 grams/m³ (LEL)
Extinguishing Media.....Water, CO₂, Sand
Special Fire Fighting
Procedures.....Wet down with water
Wet down wood dust to reduce likelihood of ignition or dispersion of dust into the air.
Remove burned or wet dust to open area after fire is extinguished.
Unusual Fire &
Explosion Hazard.....Strong to severe
explosion hazard
(if wood dust "cloud" contacts an ignition source)

HEALTH EFFECTS DATA

Exposure Limit.....ACGIH TLV^(R):
TWA - 5.0 mg/m³;

STEL_(15 min.) - 10 mg/m³ (softwood)
TWA - 1.0 mg/m³;
(certain hardwoods such as beech and oak)
OSHA PEL: TWA (see Footnote 1) -
(total dust) - 15.0 mg/m³

(respirable factor) - 5.0 mg/m³
Skin & Eye Contact.....Eye Irritation &
Allergic Contact
Dermatitis
(Wood dust can cause eye irritation.
Various species of wood dust can elicit allergic contact dermatitis in sensitized individuals)

Ingestion.....Not Applicable
Skin Absorption.....Not known to occur
Inhalation.....May cause:
nasal dryness, irritation & obstruction.
Coughing, wheezing, & sneezing: sinusitis
& prolonged colds have also been reported.

Chronic Effects.....May cause:
Wood Dust, depending on species, may cause dermatitis on prolonged repetitive contact; may cause respiratory sensitization and/or irritation. IARC classifies wood dust as a carcinogen to humans (Group 1). This classification is based primarily on IARC's evaluation of increased risk in the occurrence of adenocarcinomas of the nasal cavities and paranasal sinuses associated with exposure to wood dust. IARC did not find sufficient evidence to associate cancers of the oropharynx, hypopharynx, lung, lymphatic and hematopoietic systems, stomach, colon, or rectum with exposure to wood dust.

REACTIVITY DATA

Conditions Contributing
to Instability.....Stable
(under normal Conditions)
Incompatibility.....Avoid Contact with:

oxidizing agents, drying oils and flame. Product may ignite at temperatures in excess of 400° F.

Hazardous Decomposition

Products.....Thermal-oxidative degradation of wood produces: irritating & toxic fumes and gases, including CO, aldehydes and organic acids.

Conditions Contributing to

Polymerization.....Not Applicable

PRECAUTIONS AND SAFE HANDLING

Eye Contact.....Avoid

Skin Contact.....Avoid:

Repeated or Prolonged Contact with Skin. Careful bathing and Clean clothes are indicated after exposure.

Inhalation.....Avoid:

Prolonged or Repeated breathing of Wood Dust in Air.

Oxidizing agents and drying oils.....Avoid contact

Open flame.....Avoid

GENERALLY APPLICABLE CONTROL MEASURES

Ventilation.....Provide:

adequate general and local exhaust ventilation to maintain healthful working conditions.

Safety Equipment.....Wear goggles or

safety glasses.

Other protective equipment such as gloves and approved dust respirators may be needed depending upon dust conditions.

EMERGENCY AND FIRST AID PROCEDURES

Eyes.....Flush with water

to remove dust particles. If irritation persists, get medical attention.

Skin.....Get Medical advice

If a rash or persistent irritation or dermatitis occur, get medical advice where applicable before returning to work where wood dust is present.

Inhalation.....Remove to fresh air.

If persistent irritation, severe coughing, breathing difficulties occur, get medical advice before returning to work where wood dust is present.

Ingestion..... Not Applicable

SPILL/LEAK CLEAN-UP PROCEDURES

Recovery or Disposal.....Clean-up:

Sweep or vacuum spills for recovery or disposal; avoid creating dust conditions. Provide good ventilation where dust conditions may occur. Place recovered wood dust in a container for proper disposal.

FOOTNOTE

Footnote 1: In AFL-CIO v. OSHA 965 F. 2d 962 (11th Cir. 1992), the court overturned OSHA's 1989 Air Contaminants Rule, including the specific PELs for wood dust that OSHA had established at that time. The 1989 PELs were: TWA - 5.0 mg/m³; STEL (15 MIN.) - 10.0 mg/m³ (ALL SOFT AND HARD WOODS, EXCEPT WESTERN RED CEDAR); WESTERN RED CEDAR: TWA - 2.5 mg/m³. Wood dust is now officially regulated as an organic dust under the Particulates Not Otherwise Regulated (PNOR) or Inert or Nuisance Dust categories at PELs noted under Health Effects Information section of this MSDS. However, a number of states have incorporated provisions of the 1989 standard in their state plans.

IMPORTANT

The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. There is no warranty of any kind, express or implied, concerning the accuracy or completeness of the information and data herein. The supplier of this form will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete or otherwise misleading.



Sawdust & Shavings

Material Safety Data Sheet

Product Name: Screened Sawdust, Screened Shavings

SECTION I--DIVISION AND LOCATION

Pioneer Sawdust
621 Fulton Street
Salt Lake City, Utah 84104
Telephone: (801) 972-4432

SECTION II--HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Ingredients in Product: Kiln Dried White Pine Wood
Chemical Name and Synonyms: Cellulosic Wood Fibre
Chemical Family: Cellulose
Molecular Formula: Complex

SECTION III--PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: N/A
Vapor Pressure: N/A
Vapor Density: N/A
Solubility in Water: Insoluble
Specific Gravity: (WATER = 1): <1
Melting Point: N/A
Evaporation Rate: N/A
Appearance: Yellowish particles of wood/sawdust
Odor: None to typical wood smell

SECTION IV--FIRE AND EXPLOSION DATA

Flash Point: N/A
Flammable Limits: Slight when exposed to flames
Extinguishing Media: Drychemical, Waterspray, Foam
Special Fire Fighting Procedures: None
Unusual Fire and Explosion Hazards: Avoid CO2 blast. Spontaneous heating possible. Avoid hot, humid storage. Do not disperse in air, as this could lead to dust explosion.

SECTION V--REACTIVITY DATA

Stability: Stable
Incompatibility (Material to Avoid): Strong oxidizing agents
Hazardous Decomposition or By-products: Unknown
Hazardous Polymerization: Will not occur

SECTION VI--HEALTH HAZARD DATA

Permissible Concentrations (AIR): Unknown
Effects of Overexposure: Allergies, dermatitis (skin irritation)
Toxicological Properties: Unknown

EMERGENCY FIRST AID PROCEDURES

Eyes: Flush with large amounts of water, consult an eye physician
Skin Contact: Wipe off excess, wash with soap and water
Inhalation: Remove from area
If Swallowed: Call physician immediately

TEL
(801) 972-4432
Toll Free: (800) 962-7632

FAX
(801) 975-7076

EMAIL
info@pioneersawdust.com

Salt Lake City, UT
Headquarters/Distribution Center
621 Fulton Street
Salt Lake City, UT 84104-4327
PO Box 27861
Salt Lake City, UT 84127-0861

San Leandro, CA
DMS Warehouse
1956 Williams Street
San Leandro, CA 94577

www.pioneersawdust.com



FOR OVER 100 YEARS WE HAVE RECYCLED WOOD WASTE TO PRODUCE QUALITY PRODUCTS

No trees are fallen to supply us with our sawdust. We recycle clean wood waste to produce our sawdust, shavings and sweeping compounds.



SECTION VII--PRECAUTIONS FOR SAFE HANDLING AND USE

Procedures for Clean-up: Handle as normal solid waste. Scoop up and place in waste container, vacuum, or wet clean.

Waste Disposal Method: Waste material can be buried in an approved landfill or handled as inert waste in accordance with Federal, State, and Local Environmental Regulations

SECTION VIII--SPECIAL PROTECTION INFORMATION

Ventilation Type Required (Local, Mechanical, Special): Use adequate ventilation in volume to keep dust concentration below TLV (5mg/m³).

Respiratory Protection: NIOSH approved Dust to Mist Respirator

Eye Protection: Safety glasses or goggles

Other Protective Equipment: N/A

SECTION IX--SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing: Store dry at ambient temperature. Avoid moisture.

Other Precautions: None

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We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

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Preparer: Duncan H. Brockbank

Original Date: 12/04/85 (by Norman L. Brockbank)

Revision Date:

Supersedes:

GUARANTEED ANALYSIS

Sulfur (S) 99.5%

Plant nutrients derived from elemental sulfur.

PRODUCT DESCRIPTION

GreenSun® ES99 is a pastille-shaped form of elemental sulfur which is formulated using new and improved methods as compared to other conventional granulation methods. This material is formed from pure molten sulfur, is very easy to handle, and has a low dust content (<0.5%) allowing for maximum safety during industrial handling processes. Because of its superior quality, **GreenSun® ES99** is uniquely adapted for a wide array of industrial applications, including but not limited to steel making, mining, fruit processing, pulp and paper, and other industries that require sulfur.

PHYSICAL PROPERTIES

Density	76 lbs/ft ³
Granule Size	SGN 260
Color	Bright yellow
Fines content at manuf.	<0.5%
Impurities (carbon, ash)	<0.05%
Angle of repose	29 degrees

GENERAL APPLICATION AND USE RECOMMENDATIONS

GreenSun® ES99 is an excellent choice for industrial processes that require burning sulfur. Recommendations vary as to each individual industrial use and application.

HANDLING AND STORAGE

GreenSun® ES99 should be stored and blended (if applicable) in a well-ventilated location to minimize accumulation of dust. Always use stringent dust control procedures to prevent a concentration of flammable dust from reaching a spark or flame source. **GreenSun® ES99** should not be blended or stored with strong oxidizing agents. Avoid the use of augers due to fracturing of the material. Avoid inhalation of dust if possible. Avoid contact with skin and eyes. Wear proper protective equipment when handling. Dispose of used bags in accordance with local, state, and federal regulations.

KEEP OUT OF REACH OF CHILDREN.



WARNING: This product contains substances known to the State of California to cause cancer, birth defects, or other reproductive harm.

CONDITIONS OF SALE: CoreAgri, LLC (Company) warrants that this product conforms to the chemical description of the label and is reasonably fit for the purposes stated on the label when used in accordance with the directions under normal use. This warranty does not extend to the use of this product contrary to label instruction, or under abnormal use conditions, or under conditions not reasonably foreseen by the Company.

THE COMPANY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF FITNESS OR MERCHANTABILITY. THE COMPANY SHALL NOT BE LIABLE FOR CONSEQUENTIAL, SPECIAL, OR INDIRECT DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, AND THE COMPANY'S SOLE LIABILITY AND BUYER'S AND USER'S EXCLUSIVE REMEDY SHALL BE LIMITED TO THE REFUND OF THE PURCHASE PRICE. BUYER AND SELLER ACKNOWLEDGE AND ASSUME ALL RISKS AND LIABILITY RESULTING FROM HANDLING, STORAGE AND USE OF THIS PRODUCT. THE COMPANY DOES NOT AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE ANY OTHER WARRANTY, GUARANTEE OR REPRESENTATION CONCERNING THIS PRODUCT.

NOTICE: Information about the components of this fertilizer material may be obtained by writing to CoreAgri, LLC, PO Box 1027, Arroyo Grande, CA 93421 and giving the lot number which is found on the container.

F1741



Manufactured by:
COREAGRI, LLC
PO Box 1027
Arroyo Grande, CA 93421
800•385•4715
www.coreagri.com

NET WEIGHT: 50 POUNDS (22.68 KG)

Copyright© CoreAgri, LLC

MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY INFORMATION

Trade Name (as labeled): CoreSulphur ES99

Common Name: Elemental Sulfur 99.5%

Manufactured By: CoreSulphur, Inc.
PO Box 1027
Arroyo Grande, CA 93421

Business Phone: (805) 202-4371

Emergency Phone: INFOTRAC – (800) 535-5053

Date of Preparation: December, 2009
Updated September, 2011

SECTION 2. COMPOSITION AND INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Exposure Limits In Air	
		ACGIH TVL (ppm)	OSHA PEL (ppm)
Sulfur	7704-34-9	NA	NA
NE = Not Established		NA = Not Available	

SECTION 3. EMERGENCY/HAZARDS OVERVIEW

Emergency Overview: Bright yellow colored, free flowing pastille with a possible slight sulfur odor. Dust may cause mild irritation. Sulfur trioxide fumes at temperatures above 1067 °F. Not D.O.T. regulated.

Symptoms Of Over Exposure:

Eyes: Sulfur dust may cause severe irritation with prolonged exposure.
Skin: Prolonged or repeated exposure to sulfur dust may cause skin irritation.
Inhalation: Sulfur dust may cause breathing difficulties and irritation of mucous membranes.
Ingestion: Solid sulfur can be digested in fairly large amounts without injury.
Injection: Not possible.

SECTION 4. FIRST-AID MEASURES

<u>If Inhaled:</u>	Remove to fresh air. If breathing becomes difficult, contact a medical physician. Give artificial respiration if victim is not breathing and obtain immediate medical attention.
<u>If Ingested:</u>	Seek Medical Attention. Do not induce vomiting unless directed to do so by a medical professional. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. If vomiting occurs, keep head lower than hips to prevent introduction of fluid into the lungs.

<u>In Case Of Skin Contact:</u>	Wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Seek medical attention if skin becomes irritated.
<u>In Case Of Eye Contact:</u>	Flush immediately with water for at least 15 minutes, lifting the upper and lower eyelids occasionally. Call a physician if eye irritation persists.
Victims of chemical exposure and all rescuers must be taken for medical attention. Take a copy of label and MSDS to physician or health professional with victim.	

SECTION 5. FIRE-FIGHTING MEASURES

Flash Point:	Pure liquid sulfur, 370 °F. Impure liquid sulfur, 428 °F.
LEL Flammable Limits:	35 gm/m ³ .
UEL Flammable Limits:	1400 gm/m ³ .
Auto Ignition Temperature:	Dust Clouds, 374 °F.
Extinguishing Media:	Use any standard agent suitable for surrounding structural fire or for other chemicals that may be involved. Fine water sprays and/or dry chemical agent. CO ₂ , dry chemicals, or sand.
Fire Extinguishing Media to Avoid:	Hoses and extinguishers with pressure streams should be avoided where solid sulfur is dusty or where it may create a further hazard by raising more dust clouds.
Unusual Fire And Explosion Hazards:	Sulfur trioxide fumes at temperatures above 1067 °F. Dust suspended in air is readily ignited by flame, static electricity, or friction spark. Every reasonable step must be taken to minimize dust formation. Dust tight casings should be equipped with explosion relief vents. Sparkless electrical equipment is recommended. Handling equipment must be grounded or bonded to avoid static electricity. Keep away from sources of flame or sparks. Detailed recommendations in Manufacturing Chemists Association SD-74 and National Safety Council 612 Bulletins covering "Sulfur" should be followed when handling GreenSun ES 99.5%.
Special Firefighting Procedures:	Wear positive pressure, self-contained breathing apparatus (SCBA) and goggles. Avoid exposure to smoke or fumes.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Spill And Leak Response: Pick up dry spills by scooping, shoveling, or vacuuming and place into containers for reuse or disposal. The minimum personal protective equipment should include rubber gloves, rubber apron, and chemical goggles. Gas masks or SCBA gear may be required. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Keep material out of sewers, storm drains, and surface waters. Comply with all applicable government regulations on spill reporting, handling, and waste disposal. For landfill disposal, mix with limestone 3 times the weight of sulfur.

SECTION 7. STORAGE AND HANDLING

Storage Practices: Store in a cool (above 40 °F), dry, well-ventilated area away from incompatible materials. Solid becomes corrosive to metals when stored wet. Product will physically break down when exposed to moisture.

Handling Practices: Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Wash with soap and water after handling.

Work/Hygiene Practices: Avoid getting chemicals ON YOU or IN YOU. Wash hands with soap and water after handling chemicals. Do not eat or drink around or while handling chemicals. Keep out of reach of children.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ventilation/Engineering Controls: Use of local exhaust is recommended at product transfer points and where dusty conditions exist.

Respiratory Protection: For normal product handling, use any NIOSH approved air-purifying dust respirator. For extremely dusty conditions, a full facepiece purifying particulate respirator is recommended.

Eye Protection: Chemical dust/splash goggles or full-face shield to prevent eye contact. As a general rule, contact lenses should not be worn when working with chemicals because they contribute to the severity of an eye injury.

Hand Protection: Wear cotton or canvas protective glove to prevent contact. Rubber gloves may be used if product may become wet or moist.

Body Protection: Use body protection appropriate for task. Chemical-resistant coveralls and rubber aprons are generally acceptable.

Other Protective Measures: An eyewash and safety shower should be nearby and ready for use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<u>Appearance:</u>	Bright yellow colored pastille.	<u>Boiling Point:</u>	832 °F.
<u>Odor:</u>	May have slight sulfur odor.	<u>Crystallization Point:</u>	NA.
<u>pH:</u>	Neutral when dry.	<u>Freezing Point:</u>	246 °F.
<u>Water Solubility:</u>	Insoluble	<u>Vapor Pressure:</u>	Solid, less than 0.0001 mm. hg at 68 °F
<u>Density:</u>	76 lbs/ft ³ .	<u>Vapor Density (air = 1):</u>	>1.
<u>Specific Gravity (H₂O = 1):</u>	Solid, 2.07 gm/ml	NA = Not Available.	

SECTION 10. STABILITY AND REACTIVITY

Stability: Stable.

Conditions To Avoid: Fire and dust explosions.

Incompatibility: Alkaline materials, or mixtures with chlorates, nitrates, or other oxidizing agents.

Hazardous Polymerization: Will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicity Data: NA.

Acute Effects:

Eyes: Mild irritant. May cause redness, tearing and/or burning.
Skin: Mild irritant, especially with prolonged exposure or when in contact with moisture.
Ingestion: Nausea and upset stomach
Inhalation: Moderate irritation of nose and throat from dust. May cause dry coughing, wheezing, chest tightness, and burning of mucous membranes.

Chronic Effects: None known.

SECTION 12. ECOLOGICAL INFORMATION

Environmental Stability: Sulfur, is stable in the environment. Its transport in the environment depends upon the exact compound, the pH, the soil type, and the salinity. All work practices should be aimed at eliminating environmental contamination.

SECTION 13. DISPOSAL CONSIDERATIONS

Do not contaminate lakes, streams, ponds, estuaries, oceans, or other waters by discharge of waste effluents or equipment rinsate. Dispose of waste effluents according to federal, state, and local regulations. For landfill disposal, mix with limestone 3 times the weight of sulfur.

SECTION 14. TRANSPORTATION INFORMATION

This product is not regulated per CFR 49 (Special Provisions 172.102 pt 30

SECTION 15. REGULATORY INFORMATION

SARA Reporting Requirements: This material does not contain toxic chemicals subject to reporting requirements of Section 313, Title III of the Superfund Amendments and Reauthorization Act of 1986.

California Proposition 65: WARNING. This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

SECTION 16. OTHER INFORMATION

The information and recommendations herein are taken from data contained in independent, industry recognized references including NIOSH, OSHA, ANSI, and NFPA. This information is, as of date listed above, true and accurate to the best of CoreSulphur, Inc. knowledge. It is intended for use by persons possessing technical knowledge and at their own discretion and risk. Since actual use is beyond our control, no guarantee, express or implied, and no liability is assumed by CoreSulphur, Inc. in conjunction with the use of this information. Actual conditions of use and handling may require consideration of information other than, or in addition to, that which is provided herein.