APPENDIX B:
GENERAL USE I/A VENDOR INFORMATION

BIOCLERE™

BIOLOGICAL WASTEWATER TREATMENT SYSTEM

OPERATION & MAINTENANCE MANUAL

BIOCLERE MODELS: 16/12-SS, 16/12-LS, 16/15 & 16/19

AQUAPOINT
AN OBEH COMPANY

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www.aquapoint.com

BIOCLERE™

BIOLOGICAL TREATMENT SYSTEM

Congratulations on your purchase of a Bioclere biological treatment system. The Bioclere is a modification of the classic trickling filter. Trickling filters have been used for over one hundred years for the treatment of wastewater due to their reliability and simplicity of operation.

Naturally occurring microorganisms break down waste (organic matter) in the Bioclere and create harmless byproducts, mainly: water, carbon dioxide and additional microorganisms (sludge). The sludge created in the Bioclere is automatically returned and stored in your primary settling or sludge holding tank. Therefore, the Bioclere unit(s) do NOT require pumping.

However, regular pumping of your grease trap(s) (if applicable) and primary tank(s) is required. Failure to maintain a regular pumping schedule will have an adverse impact on the biology in the Bioclere system. If pumping is ignored for an extended period it may become costly to get the system back to efficient operation.

Aquapoint recommends that the grease trap(s) and primary tank(s) are checked every 3 and 6 months respectively by a certified operator or septic hauler and pumped as needed. For seasonal applications, pumping of the tanks should occur during mid-season to protect the microbiology in the filter. Failure to adhere to this pumping schedule will result in compromised treatment and will void the Bioclere warranty.

The Bioclere units are designed to reduce the effects of toxic substances that may enter the system from your facility. However, it is in your best interest to evaluate what is discharged to the system. Be aware of daily/weekly/monthly/annual activities and the quantities of chemicals that are being discharged. While the bacteria are resistant to many forms of toxic chemicals discharged in small quantities, large volumes or certain combinations of chemicals may have detrimental effects. Some items to be aware of include: cleaning agents, floor strippers, harsh chemicals, paints and solvents, as well as abnormal quantities of soaps and milk. If at any time you are unsure about using a particular chemical please call Aquapoint. If necessary, we will arrange a site meeting to evaluate your products.

Aquapoint wants you to have a good experience with your new Bioclere treatment system. If you treat the bugs with respect, they will treat you to decades of clean water and help to preserve the environment.

Please call our office if you have ANY questions concerning your new system.

Sincerely,

AQUAPOINT
(508) 985-9050

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Not included.

This Technical Manual is supplied for the benefit of the user and is not applicable to any other customer. Aquapoint.3 LLC is not responsible for any other equipment used in conjunction with this installation. Please refer to contractor or other suppliers for information and use of their equipment.

1.0 GENERAL DESCRIPTION AND FUNCTION

1.1 The Bioclere is a secondary wastewater treatment system. The first stage of treatment occurs in the primary tank in which the solids are settled and partially digested. Wastewater then flows from the primary tank to the Bioclere where treatment by the natural process of biochemical oxidation takes place followed by final clarification prior to discharge.

1.2 The wastewater enters the baffled zone located in the clarifier beneath the Bioclere filter module. It is then pumped to the distribution assembly, which doses the surface of the filter media.

The oxidation process occurs as the water trickles over the biological film that grows on the media surface. The pump operates on a timed sequence that is specific to the individual facility wastewater characteristics to ensure that the dosing rate optimizes filter performance.

In the filter module the biological film thickens until carbonaceous material and oxygen no longer penetrate to the bacteria nearest the media surface. When this occurs the biological film sloughs from the media and passes through the media bed into the clarifier where it settles to the bottom. A sludge return pump periodically returns this sludge to the primary tank.

Thus, the filter media is self-purging and maintenance free.

1.3 Oxygen is provided by a fan located in the top housing of the Bioclere and is vented either through the effluent line of the system or the influent line to the biofilter. The fan is sized to provide the proper supply of oxygen to the treatment process.

1.4 Wastewater flows by gravity through the Bioclere. The pumps are used only for the treatment process. In the event of a power or pump failure the effluent will continue to pass by gravity through the sump portion of the Bioclere to its point of discharge. However, this situation should not be allowed to continue for an extended period of time because without the pumps operating the secondary treatment of the wastewater is no longer occurring.

2.0 SPECIFICATIONS & SCOPE OF SUPPLY

2.1 BIOCLERE MODELS 16/12-SS – 16/12-LS – 16/15 – 16/19

2.2 BIOCLERE EQUIPMENT SUPPLIED:

Item	Quantity Per Unit
Tank assembly	1 each
Filter media	1-4 cubic meters depending on model
Pipes, fittings & connectors	Misc.
Distribution system	1 each
Nozzles	3 each
Dosing pump	1 each
Recycle pump	1 each
Latches, Moore 702-L-C-SS	4 each
Baffle	1 each
Fan module assembly	1 each
Control panel	1 each
Misc. hardware	1 set
O & M manual	1 each
Padlocks, Abus	2 each
1 ½" key KA8302	2 each

2.3 PUMP TIMER SETTINGS:

Dosing pump **ON**	3 min.
Dosing pump **OFF**	5 min.
Recycle pump **ON**	2 min.
Recycle pump **OFF**	2.5 hrs.

2.4 SPECIFICATIONS (continued):

The following is a list of critical parts with specifications. It is recommended that the user have spare parts on hand at all times. They may be obtained through Aquapoint.

DOSING PUMPS:

Manufacturer:	Goulds
Type: LSP0311F	1/3 horsepower
# Required per unit:	One (1)
Electrical:	115v/1ph/60Hz

RECYCLE PUMPS:

Manufacturer:	Goulds
Type: LSP0311F	1/3 horsepower
# Required per unit:	One (1)
Electrical:	115v/1ph/60Hz

FAN:

Manufacturer:	Papst
Type: 4800X	58 cfm
# Required per unit:	One (1)
Electrical:	115v/1ph/60Hz

FLOAT SWITCH:

Manufacturer:	SJE Rhombus
Type: Vertical Master	1003778
# Required per unit:	One (1)
Electrical:	115v/1ph/60Hz

The above will assist when using the other sections of this manual and when ordering any spare parts.

3.0 INSTALLATION

3.1 INTRODUCTION:

This document establishes the installation procedures for the Bioclere secondary wastewater treatment system. It is recommended that these procedures be reviewed and approved by the engineer of record to ensure compatibility with specific site characteristics.

Aquapoint assigns a project manager for each installation to provide onsite supervision of the installation, the fresh water commissioning system and certification that the system is operational. Aquapoint will also arrange for the transportation of the system. Effective execution of these procedures requires coordination with the site contractor.

We request that the site contractor contact Aquapoint at 508-985-9050 to coordinate delivery, installation schedule and fresh water commissioning of the system.

3.2 PROCEDURE:

A. Locate Bioclere from site engineering plans.

B. Excavate to 16" below clarifier. De-water excavation if required.

C. Add 12" (1.00 ft.) of clean 3/8" pea stone.

D. Install pre-cast mounting pad approximately centered to Bioclere location. (See drawing PMW/AWT3015).

E. Check to ensure mounting pad is level and elevation is correct.

F. Carefully lower Bioclere into position with proper rigging and lifting techniques.

G. Orient and align Bioclere to inlet and outlet directions. Confirm Bioclere is level.

H. Fill Bioclere with clean fresh water to bottom of outlet pipe to stabilize unit.

I. If Bioclere is installed in groundwater refer to anchoring requirements on site plan and/or contact site engineer.

J. If Bioclere is not installed in groundwater backfill excavation with clean 3/8" pea stone and/or sand to within 12" of the inlet pipe. Check level of Bioclere.

NOTE: Use care while backfilling to prevent Bioclere movement and/or damage to Bioclere.

K. Install inlet, outlet and vent/test port piping.

NOTE: If installation specifies venting through house stack, bring vent pipe to grade and cap.

L. Install recycle piping from Bioclere back to the inlet end of primary (septic) tank. The recycle line is 1 ½" Schedule 40 PVC from the Bioclere to the outside of the primary tank and Schedule 80 PVC inside the primary tank. Schedule 80 PVC to be installed against inside wall and at ½ the tank's liquid depth terminating with a 90° elbow. (See drawing PMW/1256-1). Use pressure fittings. If possible, slope recycle line to the primary tank to allow the recycle pipe to drain.

M. Install wiring with watertight conduit from control location to Bioclere.

N. Backfill around Bioclere with sand and/or pea stone to final grade.

O. Install control box in protected location preferably on exterior of home or building to facilitate access by the operator. Connect power feed and Bioclere. (Drawing AWT 3308).

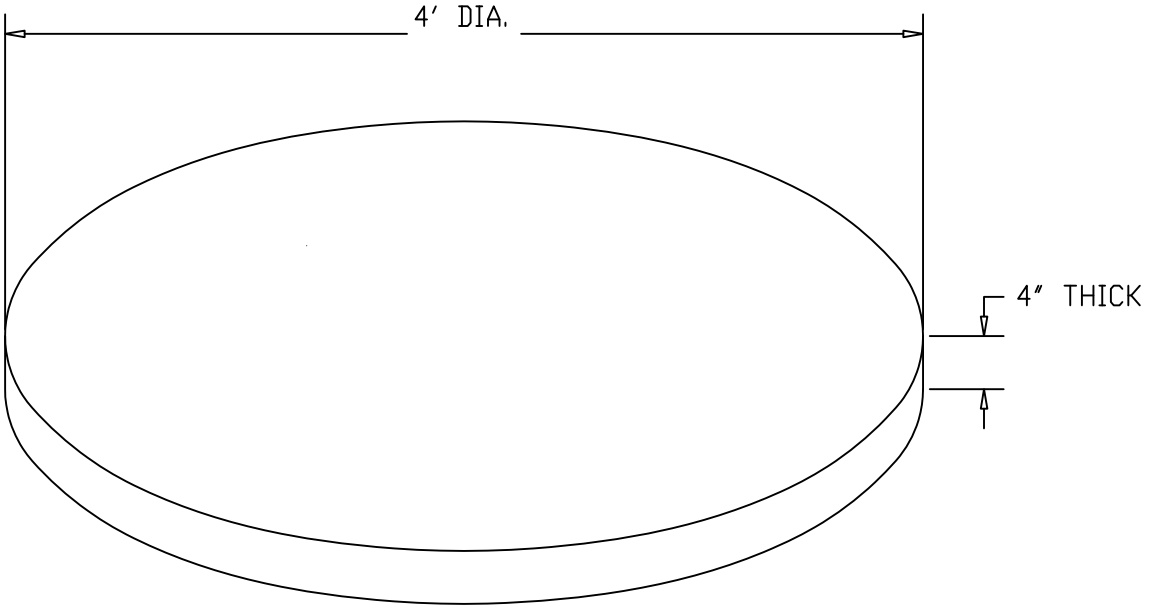
The following items are performed by the Aquapoint Authorized Representative unless otherwise specified:

P. Install dosing and recycle pumps with safety ropes to the appropriate pipes.

Q. Install pump wiring to junction box in fan module. (See drawing AWT 3308)

NOTES:

1) CONCRETE MINIMUM STRENGTH: 4000 PSI @ 28 DAYS
   STEEL REINFORCEMENT: 6 X 6 10 GA. STEEL WIRE MESH
2) 4' SQUARE PAD - OPTIONAL
3) PAD TO BE SUPPLIED AND INSTALLED BY CONTRACTOR



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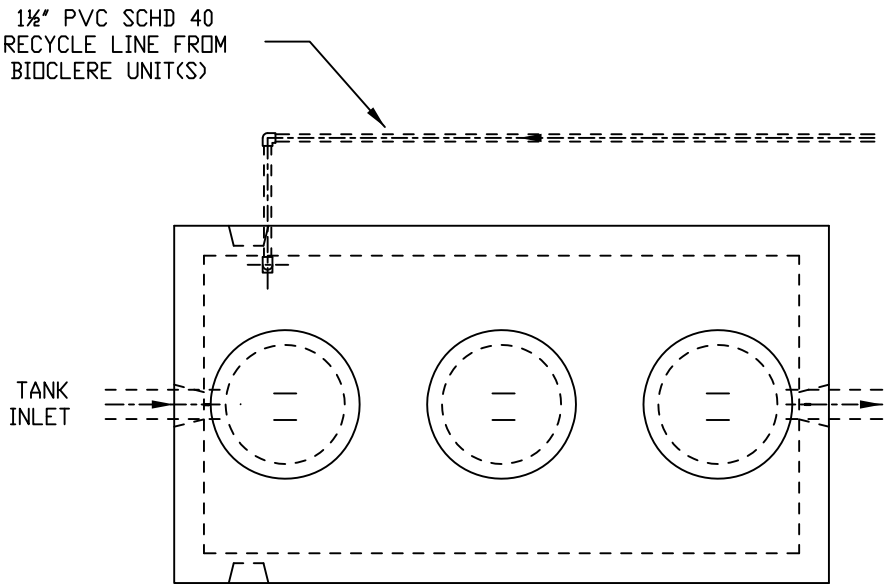
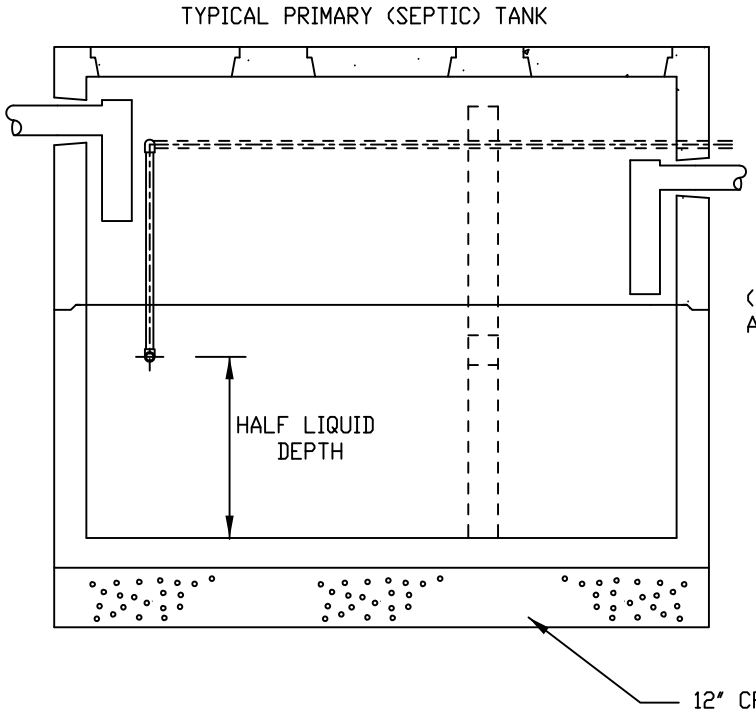
TITLE:	PRECAST MOUNTING PAD (SERIES 16 BIOFILTERS)
DRAWING NO.:	PMW/AWT3015
REVISION:	A
DATE:	9 Feb 09
DWN BY:	P.WILLEY
SCALE:	N.T.S. SIZE: B/A3
SHEET #:	1 of 1

1½" Biofilter Recycle Line Installation at Primary Tank.

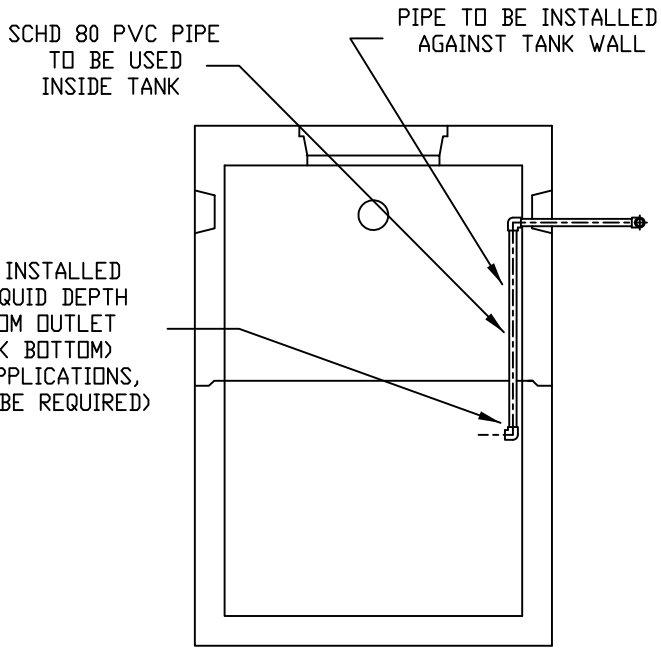


NOTES FOR CONTRACTOR:

1. SLOPE PIPE BACK TO SEPTIC TANK WITH NO LOW POINTS.
2. USE PRESSURE FITTINGS ONLY.



PVC 90° ELBOW INSTALLED AT CENTRE OF LIQUID DEPTH (½ DISTANCE FROM OUTLET INVERT TO TANK BOTTOM) (FOR COMMERCIAL APPLICATIONS, AN EXTENSION MAY BE REQUIRED)



1.5BiofRecyc.dwg

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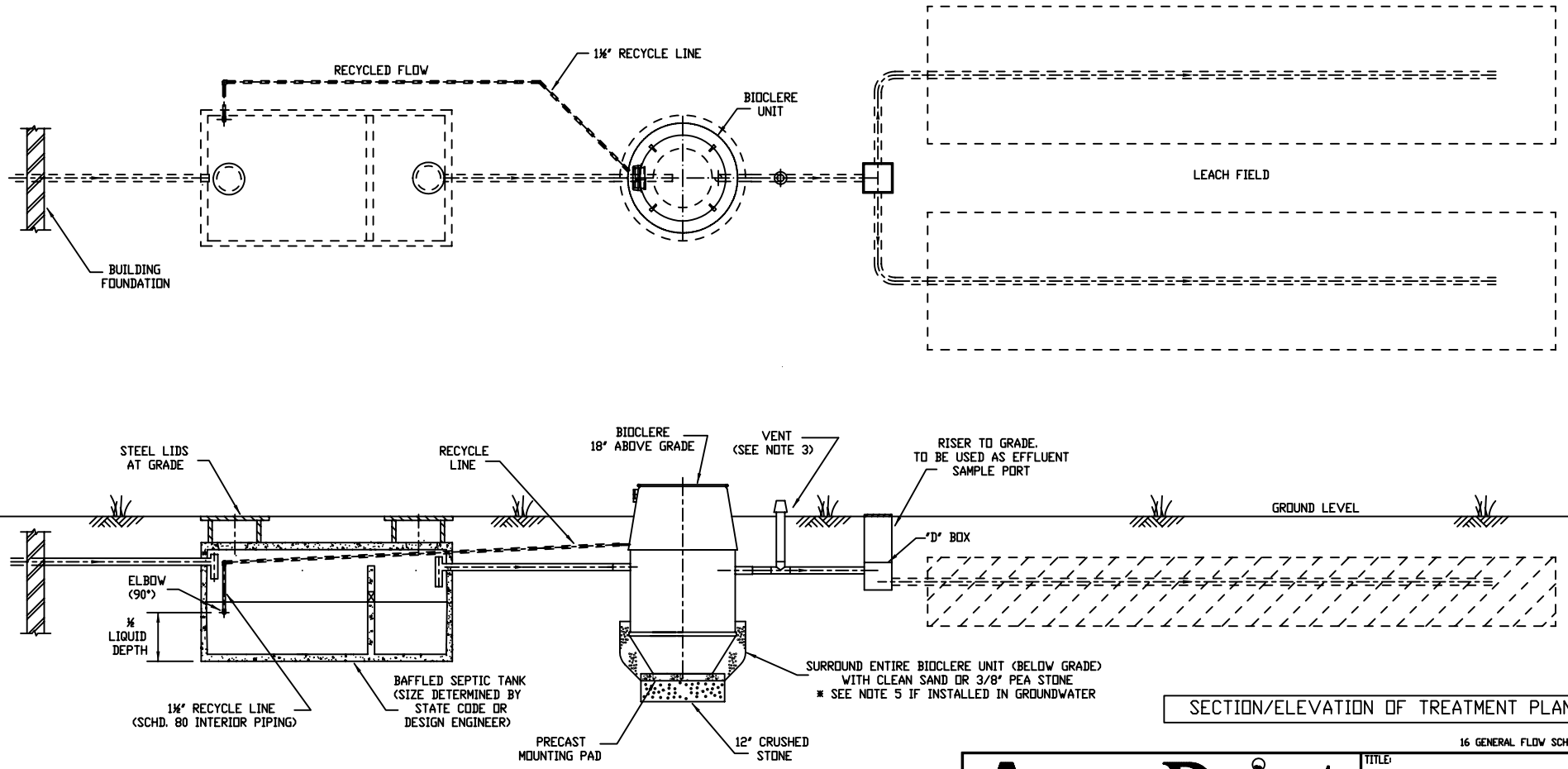
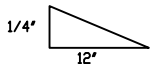
TITLE:	1½" Recycle Line Installation. (Primary Tank)
DRAWING NO:	PMW/1256-1
REVISION:	B
DATE:	9 Feb 09
DWN BY:	P.WILLEY
SCALE:	1 : 40
SIZE:	A / A4
SHEET #:	1 of 1

16 GENERAL FLOW SCHEMATIC

NOTES: UNLESS OTHERWISE SPECIFIED:
1. THIS INSTALLATION REPRESENTS BIOCLERE MODEL 16 SERIES.
2. OTHER MODELS MAY BE SUBSTITUTED.
3. IF VENTING IS ACCOMPLISHED THROUGH BUILDING, VENT IS TO BE BROUGHT TO GRADE AND CAPPED.
4. IF INSTALLED IN GROUND WATER CONTACT SITE ENGINEER FOR ANCHORING REQUIREMENTS.
5. CONTRACTOR IS TO SUPPLY ALL CONCRETE STRUCTURES AND PERFORM INSTALLATION.



PLAN ON TREATMENT PLANT



TYPICAL SLOPE

SECTION/ELEVATION OF TREATMENT PLANT

16 GENERAL FLOW SCHEMATIC.dwg

0 3' 6' 9' 12' 15' 18' 21' 24' 27' 30'

AquaPoint
Performance Based Wastewater Treatment Systems
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	TYPICAL GROUND INSTALLATION
DRAWING NO:	UK.1265-4
REVISION:	D
DATE:	3/22/01
DWN BY:	P.WILLEY
SCALE:	1 : 60
SIZE:	B / A3
SHEET #:	1 of 1

4.0 BIOCLERE START-UP

A. During installation the Bioclere and primary tanks should be filled with potable water. Be certain that all water is clean and clear. Under no circumstances is silt laden or muddy water to be used in the Bioclere.

B. Check that the dosing pump is immersed and that the pipe connected and the distribution assembly is level. Check that the sludge recycle pump is standing on the floor of the sump and that the discharge pipe is connected to the sludge recycle line.

C. The Bioclere system is controlled by a Programmable Logic Relay (PLR) with integral HMI screen (interface). PLR operating instructions are provided in Appendix B of this manual and should be reviewed prior to proceeding with this startup procedure.

D. Turn **ON** the toggle switch in the fan box module on the side of the Bioclere unit. When this is turned **OFF**, the fan and all pumps are disconnected and the alarm will sound if the main circuit breaker in the Bioclere control panel is **ON**.

E. Turn the main power breaker in the control panel to **ON**. The green power light will turn **ON** and the PLR control screen will be illuminated. Note that the screen will go into sleep mode and the screen will go black after about 10 seconds if the PLR control buttons are not being used. To re-illuminate the screen press the (esc) key.

F. Using the **(+/-)** navigation buttons on the PLR access the dosing pump and recycle pump timer setting screens and set the dosing and recycle pump timers to short test cycles for the initial startup process. We recommend the following settings.

	ON	**OFF**
Dosing	1 min.	1 min.
Recycle	1 min.	2 min.

G. Access the recycle pump control screen and set the recycle pump to **AUTO**. The recycle pump should turn **ON** and **OF**F in a continuous cycle according to the above timer settings. The sludge recycle operation can be confirmed by observing flow from the recycle line at the head of the primary tank or at the tell tail hole in the recycle piping inside the Biocloere unit.

H. Access the dosing pump control screen and set the dosing pump to **AUTO**. The dosing pump should turn **ON** and **OFF** in a continuous cycle according to the above timer settings. Dosing pump operation can be confirmed by observing flow from the Bioclere dosing array assembly inside the unit.

I. Manually activate the float switch using by pulling one of the float switch wires out of the terminal strip in the control panel or by lowing the water level in the Bioclere clarifier. The

recycle pump operation should terminate when the float switch is in the extended position (open circuit).

J. Confirm the Bioclere ventilation fan is operational.

K. ALARMS: All alarm conditions are controlled by and logged in the PLR module. The alarm circuit consists of (1) current sensor (shared by the dosing and recycle pumps) and (1) AR power alarm relay. The PLR is set for a 3 second delay before the alarm will energize. This allows the pumps time to attain operating amperage. The visual alarm is a light on the top left side of the enclosure, while a Sonalert type audible alarm is located on the bottom right of the enclosure. Alarm conditions must be silenced by accessing the PLR interface screen and by pressing the **(A)** button. Acknowledging an alarm will reset the alarm function, stop the beacon and silences the horn. If applicable, a USP (United Security Products) autodialer is utilized to provide two functions:

1. Immediate notification of an alarm condition to a maximum of (4) telephone numbers and,
2. Weekly call-in to a telephone number verifying that the unit is on line and operating normally.

The current sensing relay (inside the control panel) senses when the dosing and/or recycle pump is running. If a pump fails, draws less current than normal or the circuit breakers trip, the alarm will be activated. These contacts are connected to an audio/visual alarm.

External alarm indication:

A dry contact between terminals 23 and 24 closes for an alarm condition and is used for connection to an automatic voice/ pager dialer system (120 VAC max).

Alarm conditions are as follows:

1. Fan circuit breaker trips/power loss: AR contact opens to indicate either condition and energizing local alarms.

2. Pump failure: Upon loss of amperage as detected by the current sensor the alarm will be initiated.

3. Power switch off in fan module at unit.

L. Testing of dosing and sludge recycle pumps in **MANUAL** mode:

Turn **ON** system as described above and put dosing and recycle pumps in **MANUAL** position. When the pumps start observe the water flowing from the dosing array and into the inlet of the primary tank or observe flow through the recycle “telltale” inside the Bioclere.

M. If any of the functions described above fail, check with the trouble shooting section of this manual (Section 7).

N. Reset timers as described in section 2.3 “Timer Settings” of this manual.

O. If the unit is ready for treatment it may be left in the operating condition with PLR screens set to **AUTO**.

P. If there is some delay before the plant is needed it is recommended that the shut down procedure in Section 5 is followed.

5.0 BIOCLERE SHUTDOWN

A. No action needs to be taken if there is a temporary cessation of flow to the plant for a period of time which does not exceed up to twelve (12) weeks. Leave the plant in operation with power **ON**.

B. Should the plant not need to be operational for any period in excess of 12 weeks, the following shut down procedure will apply:

   1. Run the sludge recycle pump for 2 minutes to remove any secondary sludge from the Bioclere.

   2. If possible, keep the power **ON** to the Bioclere control panel and turn **OFF** the dosing and recycle pumps and leave the fan running. Otherwise, turn the power **OFF** and remove the fan unit. Reinstall the fan unit when the Bioclere is placed back in service.

   3. If "B" is not possible, turn the main power on the Bioclere control panel to **OFF** position.

C. On resumption of wastewater flow to the plant the Bioclere should be re-started as described in Section 4.

6.0 MAINTENANCE PROCEDURES

6.1 INTRODUCTION:

The treatment system shall be operated by an Aquapoint Certified Wastewater Treatment Plant Operator. The treatment system shall also be operated in accordance with the Manufacturers recommendations contained in the Bioclere System Technical Manual. Reporting of test analyses will be done in conformance with applicable rules and local regulations for the use of the system.

Turn the main power switch to **OFF** before servicing the pump, fan or electrical panel box.

6.2 FREQUENCY OF MAINTENANCE:

A. Initial start-up visit to ensure proper commissioning and system operation

B. Weekly (first two weeks): Check pump and fan operation visually via access hatch. Check the accuracy of the timers through two (2) complete cycles.

C. Standard Quarterly Maintenance:

1. Check general condition/appearance of Bioclere unit.
2. Check vent flow, odor.
3. Check general condition of fan box including internal and external wiring, lock, latch, gaskets, etc.
4. Check for quiet fan operation.
5. Check condition of cover locks, latches, gaskets.
6. Check and characterize biomass growth (thickness, color, uniformity).
7. Check recycle pump operation and timing
8. Check dosing pump operation, timing and spray pattern.
9. Check general condition of dosing assembly and clean spray nozzles as necessary.
10. Check general condition of control box including locks, gaskets, etc.
11. Check control panel switches, alarms, timers, etc.
12. Complete and maintain service report file.

See attached Bioclere field report for complete O&M procedures.

6.3 PROCESS CONTROL FOR CARBONACEOUS BIOCHEMICAL OXYGEN DEMAND ($CBOD_5$) REMOVAL WITH THE BIOCLERE SYSTEM:

Wastewater flows from the primary settling tank into a baffled chamber in the clarifier of the Bioclere. Dosing pumps located in this clarifier intermittently dose the PVC filter media bed with the wastewater.

In the Bioclere trickling filter the organic material in the wastewater is reduced by a population of microorganisms whish attach to the filter media and form a biological slime layer. In the outer portion of the slime layer treatment is accomplished by aerobic microorganisms. As the microorganisms multiply the biological film thickens and diffused oxygen and organic substrate are consumed before penetrating the full depth of the slime layer. Consequently the biological film develops aerobic, anoxic and anaerobic zones.

Absent oxygen and a sufficient organic carbon source ($CBOD_5$) the microorganisms near the media surface lose their ability to cling to the media. The wastewater flowing over the media washes the slime layer off the media and a new slime layer begins to form. This process of losing the slime layer is called "sloughing" and it is primarily a function of organic and hydraulic loading on the filter. This natural process allows a properly designed media bed to be self-purging and maintenance free.

The sloughed biomass settles to the bottom of the clarifier as sludge. This secondary sludge is periodically pumped back to the primary tank to enhance the digestion and denitrification processes which is further discussed in ***Section 6.4.2 below.***

6.3.1 Bioclere Trickling Tilter Dosing Rates:

The Bioclere uses a dosing pump to distribute wastewater over the trickling filter. It is critical to periodically clean the nozzles of excess biomass using a bottle brush to ensure uniform distribution. The Bioclere dosing rates that were set at the time of commissioning are listed in ***Section 2.0*** of this Technical Manual. The dosing rates are set so that the flow of water and pollutants (CBOD5 and ammonium) over the biofilm are maximized. This in turn, will maximize the pollutant removal efficiencies and facilitate biomass sloughing through the filter. Therefore, it is **not necessary** to adjust the dosing timers. In fact, the dosing timers should only be adjusted if the Bioclere receives little or no flow for extended periods.

6.3.2 Bioclere Recirculation Rates:

Recirculation of sludge and treated effluent is accomplished in each unit using a submersible stainless steel pump controlled by a fully adjustable timer. The biological solids generated in the filter are returned to the sludge storage facility at regular intervals, typically every hour or two. Therefore, the sludge will not collect in the secondary settling tank and a sludge blanket will not form.

The benefits or recirculation are numerous and include: 1) removing biological sludge from the Bioclere so that only the primary tank(s) need periodic pumping, 2) diluting the influent pollutant concentrations which results in a thinner and more effective biofilm on the media bed, 3) odors are reduced in the primary tanks and the treatment components, 4) diluting biological inhibitors (cleaning agent, sanitizers, etc.) that may exist in the wastewater, 5) achieving nitrogen removal through denitrification due to the recirculation of nitrate to the primary tank.

The recirculation rates that were set at the time of commissioning are listed in ***Section 2.0*** of the Technical Manual. These rates may need adjusting depending on the 1) actual average daily flow, and 2) actual measured strength of the wastewater (concentrations of influent BOD5, TKN etc.). Please contact AquaPoint prior to adjusting the recirculation rates.

6.4 PROCESS CONTROL FOR NITROGEN REMOVAL WITH THE BIOCLERE SYSTEM:

Below is a brief description of how nitrogen removal is accomplished in the Bioclere unit.

6.4.1 Nitrification:

Nitrification is the sequential biological oxidation of NH_4-N, first to nitrite (NO_2^--N) by *Nitrosomonas* bacteria then to nitrate (NO_3^--N) by *Nitrobacter* bacteria according to the following overall equation:

$$\mathbf{2NH_4^+ + 2O_2 \rightarrow NO_3^- + 2H^+ + H_2O}$$

Oxidation of 1 mg/l of NH_4-N requires approximately 4.6 mg/l of dissolved oxygen and produces acid resulting in the consumption of approximately 7.1 mg alkalinity as $CaCO_3$/mg NH_4-N oxidized. Alkalinity is the inorganic carbon source nitrifying bacteria require to oxidize ammonia. ***Therefore it is critical that alkalinity is monitored on a regular basis to ensure complete nitrification.*** Alkalinity concentrations in the Bioclere effluent must remain above 75 mg/l as CaCO3 to allow nitrification to proceed. If the alkalinity drops below this value then it is likely that nitrification will be inhibited and the effluent may not meet permit requirements. It is best to measure the alkalinity in the Bioclere effluent with a field test kit each time you are onsite to inspect the treatment system. Bioclere effluent can be collected from the final pump chamber Effluent can be collected with a bailer.

If required, alkalinity can added in the form of baking soda (sodium bicarbonate). It can be purchased as a powder in 50 pound bags. Contact Aquapoint if assistance is required to determine the alkalinity dosing rate.

Please note that nitrifying bacteria require a stable and consistent environment because of their sensitivity to numerous inhibitory and toxic substances and an array of environmental factors including temperature, pH, dissolved oxygen, and alkalinity. If nitrification is not being achieved then it will be necessary to verify the influent average daily flow, pH, BOD_5, TSS, TKN. It may also be necessary to conduct an inventory of the type and quantity of cleaning and process solutions that are used that may impact the microorganisms in the Bioclere units (i.e. daily, weekly, monthly, yearly).

6.4.2 Denitrification:

Dissimilating denitrification, the biological reduction of nitrate (NO_3^--N) to nitrite (NO_2^--N) and ultimately nitrogen gas in an anoxic environment (dissolved oxygen <0.5 mg/l), involves the transfer of electrons from a reduced electron donor (organic carbon substrate) to an oxidized electron acceptor (NO_3^--N). It is an important reaction as it restores approximately (3.57 mg alkalinity/mg of NO_3^--N reduced), and partially offsets the effects of nitrification in a combined nitrification/denitrification process. The microorganisms responsible for completing the reaction are facultative heterotrophic aerobes contained in the wastewater that are also responsible for $CBOD_5$ oxidation in the Bioclere.

Denitrification in the Bioclere system is accomplished by periodically recirculating secondary sludge and treated nitrified effluent to the septic tank which provides an anoxic environment. Recirculation typically occurs several minutes every hour via a timer in the control panel. See ***Section 2*** of the Bioclere Technical Manual for Bioclere recycle and dosing rates. For typical residential strength wastewater, recirculation of treated effluent from the Bioclere to the septic tank will achieve >70% removal of total nitrogen. This is because weight ratios of carbon to nitrogen, as measured as **BOD:TKN** in the influent wastewater are usually greater than the generally accepted ratio of **4:1** in which denitrification has been proven to proceed without an external carbon source.

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BIOCLERE™

Submit by Email

FIELD REPORT

Date

Client

Address

City State

Inspector

Bioclere Model #(s)

Reason For Site Visit:

☐ O & M ☐ Commissioning

☐ Testing ☐ Other:

(1) Odor

1) Is there odor around the site? ☐ Yes ☐ No

2) Where is the source of odor?

3) If odor is present, check all that apply: ☐ Mild ☐ Medium ☐ Strong ☐ Musty ☐ Septic

(2) Sludge & Scum Depth Measurements

	Scum	Sludge
Grease Trap		
Primary Tank #1		
Primary Tank #2 (if applicable)		
Bioclere 1A		
Bioclere 1B (if applicable)		

	Scum	Sludge
Bioclere 2A (if applicable)		
Bioclere 2B (if applicable)		
Effluent Tank		
Other: _____		

(3) Bioclere Venting

1) Record the Bioclere fan model #(s):

2) Is air passing through the vent(s)? ☐ Yes ☐ No

(if in doubt, put a small plastic bag around vent and allow to fill)

3) Is the fan operating and in good condition...

for Bioclere 1A? ☐ Yes ☐ No

for Bioclere 2A? (if applicable) ☐ Yes ☐ No

for Bioclere 1B? (if applicable) ☐ Yes ☐ No

for Bioclere 2B? (if applicable) ☐ Yes ☐ No

(Please provide necessary details in the report summary section)

AQUAPOINT
39 TARKILN PLACE
NEW BEDFORD, MA 02745
TEL 508.985.9050
FAX 508.985.9072

BIOCLERE™

FIELD REPORT

(4) General

	Bioclere 1A	Bioclere 1B (IF APPLICABLE)	Bioclere 2A (IF APPLICABLE)	Bioclere 2B (IF APPLICABLE)
Are there any filter flies in the unit?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
If so, how many?	☐ Many ☐ Few	☐ Many ☐ Few	☐ Many ☐ Few	☐ Many ☐ Few
Is the lid gasket in good condition?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Locks/latches/handles in good condition?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Is there any external damage to the units?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Cover, fan box, & control panel securely locked?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Does the fan box contain standing water?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

(Please provide necessary details in the report summary section)

Were influent/effluent samples taken for lab analysis? ☐ Yes ☐ No

If process control test samples were taken, please provide the following information:

Alkalinity (as $CaCO_3$) _____ pH _____ Turbidity (NTU) _____

Sample Locations: _____ Temperature (F) _____ DO (mg/l) _____ NH_3-N (mg/l) _____

NO_3-N (mg/l) _____ Other: _____ _____

(5) Biomass Characterization

	Bioclere 1A	Bioclere 1B (IF APPLICABLE)	Bioclere 2A (IF APPLICABLE)	Bioclere 2B (IF APPLICABLE)
What is the color of the biomass?	☐ White ☐ White/Gray ☐ Gray ☐ Gray/Brown ☐ Brown ☐ Red/Brown ☐ Black	☐ White ☐ White/Gray ☐ Gray ☐ Gray/Brown ☐ Brown ☐ Red/Brown ☐ Black	☐ White ☐ White/Gray ☐ Gray ☐ Gray/Brown ☐ Brown ☐ Red/Brown ☐ Black	☐ White ☐ White/Gray ☐ Gray ☐ Gray/Brown ☐ Brown ☐ Red/Brown ☐ Black
Classify the growth of the biomass 6-12 inches below the media surface. 1=light 2=medium 3=heavy				

(6) Nozzle Spray Pattern

	Bioclere 1A	Bioclere 1B (IF APPLICABLE)	Bioclere 2A (IF APPLICABLE)	Bioclere 2B (IF APPLICABLE)
1) Does spray cover the entire media surface area?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
(If not, clean each nozzle with a bottle brush)				
2) Does the spray now cover entire surface area?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
If not, then: *a. remove nozzles and soak them in a bleach solution.* *b. manually engage both dosing pumps for 2 min.* *c. replace nozzles*				
3) Does the spray now cover entire surface area?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
If not, consult AQUAPOINT				

AQUAPOINT
39 TARKILN PLACE
NEW BEDFORD, MA 02745
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BIOCLERE™

FIELD REPORT

(7) Pumps and Control Panel

	Bioclere 1A	Bioclere 1B (IF APPLICABLE)	Bioclere 2A (IF APPLICABLE)	Bioclere 2B (IF APPLICABLE)
What is the dosing pump timer setting?	min on: ____ min off: ____	min on: ____ min off: ____	min on: ____ min off: ____	min on: ____ min off: ____
What is the recycle pump timer setting?	min on: ____ hrs off: ____	min on: ____ hrs off: ____	min on: ____ hrs off: ____	min on: ____ hrs off: ____

For the following checklist, set dosing and recycle timers to a test cycle.

What is the amperage of dosing pump 1?	____ Amps	____ Amps	____ Amps	____ Amps
What is the amperage of dosing pump 2?	____ Amps	____ Amps	____ Amps	____ Amps
What is the amperage of recycle pump?	____ Amps	____ Amps	____ Amps	____ Amps
Is dosing pump operating according to test cycle?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Is recycle pump operating according to test cycle?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Are the dosing pumps alternating?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

(Please provide necessary details in the report summary section)

(8) Plumbing

Are the unions in the Bioclere leaking? ☐ Yes ☐ No
(If "yes", then tighten with pipe wrench)

Is the recycle siphon break weep hole operating as designed? ☐ Yes ☐ No
(If "no", clean weep hole)

(9) Final Check

- ☐ Main Power set to "On" and toggle for all pumps set to "Normal" (or "Auto")
- ☐ Alarm toggle set to the "On" position
- ☐ Recycle and dosing pump timers are set back to original cycles in control panel
- ☐ Control panel, Bioclere cover, and fan box locked
- ☐ Record daily flow rate or water meter reading (if possible): ____

(10) Report Summary:

Note: Contact Aquapoint for pump, fan and control component replacement parts.

Signature: _____

7.0 TROUBLE SHOOTING

7.1 Before conducting any repair work on the fan or pump, replacing fuses, or doing any work on the panel or fan module:

SWITCH THE MAIN BIOCLERE BREAKER AND POWER PANEL TOGGLE SWITCH TO OFF

FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
Fan not working	Power failure	Check circuit breaker and replace if necessary.
	Fan motor failure	Check wiring and terminal connections. Replace fan if necessary.
Dosing pump not working	Power failure	As for fan above.
	Low-level protection	Check that pump is fully submerged.
	Timer control failure.	Check that power switch is ON Replace timer if necessary.
	Pump failure	Check pump in accordance with manufacturer's instructions supplied.
Excessive build-up of biomass	Plant overload	Check that hydraulic and organic load are within design limits. Contact Aquapoint Inc. if capacity is to be increased.
	High sludge levels	Check sludge levels in each unit and de-sludge as necessary.
No biomass in filter	Excess shedding of biomass.	investigate and eliminate any source of biofilm poisoning such as disinfectant, household bleach, acids, etc. showing up in waste.
Odorous	Inefficient treatment.	Check that dosing assembly sprinkles evenly over media surface. Clean dosing assembly.
	Inadequate air supply	Check fan and air intake. See fan not working above.

8.0 FINAL EFFLUENT QUALITY PROBLEMS

8.1 HIGH SUSPENDED SOLIDS

If effluent levels are exceeded carry out the following checks:

1. Examine primary settlement tank. If excessive sludge or floating matter in the chamber is discharging to the Bioclere arrange for the primary tank to be de-sludged.
2. Inspect sludge recycle pump, clean and test to ensure pump is operating satisfactorily.
3. Consult distributor for assistance.

8.2 HIGH C.B.O.D. (Carbonaceous Biochemical Oxygen Demand)

If effluent levels are exceeded carry out the following checks:

1. Check for signs of excessive sludge in the system and for suspended solids.
2. Check that the fan is operating continuously and that the air inlet to the fan is unobstructed. Clean and replace as necessary.
3. Check that the spray distribution system is clean and that the effluent is being distributed evenly to the filter media.
4. Check whether the loading to the plant has increased beyond the design basis. Consult distributor if loading has increased.
5. Ensure that there are no toxic or concentrated cleansing chemicals being discharged to the plant.

8.3 HIGH NH_3N (ammonia-nitrogen)

Carry out check procedure as for Item 8.2.

8.4 HIGH NO_3 (Nitrate-nitrogen)

If effluent levels are exceeded carry out the following checks:

1. Check the recirculation pump and confirm it is operating properly.
2. Check the dissolved oxygen (DO) concentration in the primary settling tank effluent tee. The conditions should be anoxic (between 0.2 and 0.5 mg/l DO). If the DO concentration is high, reduce the recycle rate. If the DO concentration is low, increase the recycle rate.

For additional assistance contact:

AQUAPOINT.3 LLC
39 Tarkiln Place
New Bedford, MA 02745
Tel. 508-985-9050
Fax 508-985-9072

8.5 TOXIC MATERIALS WARNING

In order to maintain proper Bioclere operation the following must be noted:

This Bioclere system is designed to provide treatment for a specific waste stream. Its fixed film biological process is exceptionally stable and will tolerate shocks of high strengths of organic loading. However, toxic shock loading may adversely impact effluent characteristics.

None of the following should be introduced into the Bioclere plant:

1. Gasoline, kerosene, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid or gas.
2. Any non-latex paints, paint thinners, paint removers, or strippers.
3. Any organic solvent or any liquid containing any organic solvent.
4. Any quaternary ammonium sanitizers.
5 Any photographic fluids including waste developer, fixer and rinse water.
6 Any pesticide including insecticides, fungicides, rodenticide, and herbicides of any sort.
7. Any water or wastes containing toxic poisonous solids, liquids, or gases, in sufficient quantity to interfere with the sewage treatment process, constitute a hazard to humans or animals, create a public nuisance, or create any hazard in the ground water.
8. Any waters or wastes having a pH higher than 9.5 or lower than 5.5.
9. Solid or viscous substances in quantities capable of causing obstruction to the flow in sewers, or other interference with the proper operation of the sewage works such as, but not limited to, ash, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, ungrounded garbage, whole blood, paunch, manure, hair, fleshing, and entrails, and paper dishes, cups, milk containers, etc. either whole or in parts.
10. Any water or waste containing fats, wax, grease, or oils, whether emulsified or not, in excess of 100 mg/l, or containing substances which may solidify or become viscous at temperatures between 32 and 150 degrees Fahrenheit (0-65 degrees Celsius).
11. Any shredded garbage. The installation and operation of any garbage grinders in systems using the Bioclere is prohibited.
12. Any storm water, surface water, roof runoff, or subsurface drainage unless the system is designed to accept such sources of water.
13. Rubber gloves, gauze pads, etc. which are typical from medical facilities.

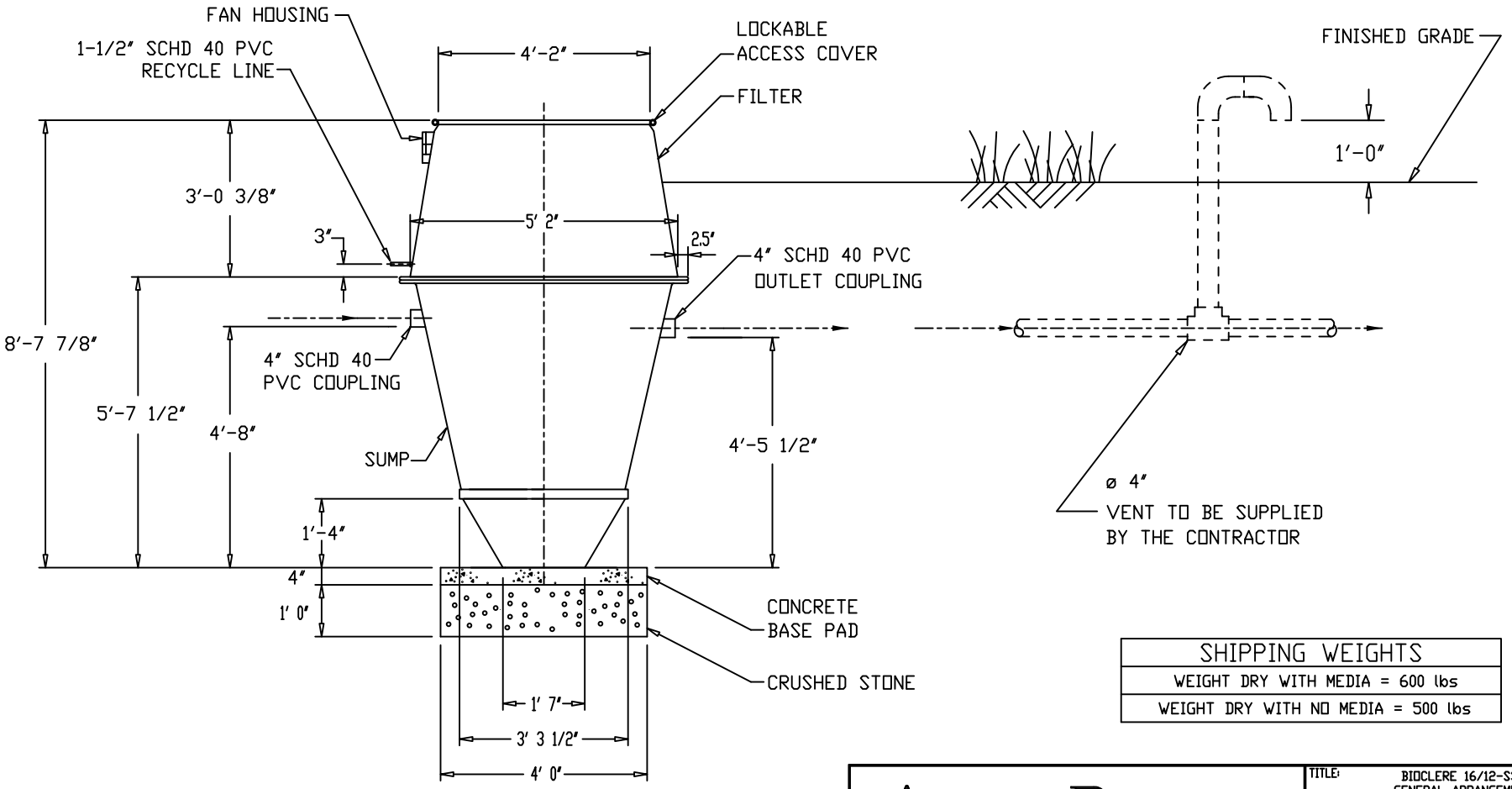
Similarly, substances, which might enhance or inhibit biological activity, should not be discharged into the system.

In the event these or other inhibiting substances inadvertently enter the waste stream contact Aquapoint immediately.

APPENDIX A

BIOCLERE DRAWINGS

NOTES:
1. VENT MAY BE RUN UP THE SIDE OF BUILDING.
2. SEE DRAWING PMW/AWT3015 FOR MOUNTING PAD CONSTRUCTION DETAILS.



SHIPPING WEIGHTS
WEIGHT DRY WITH MEDIA = 600 lbs
WEIGHT DRY WITH NO MEDIA = 500 lbs

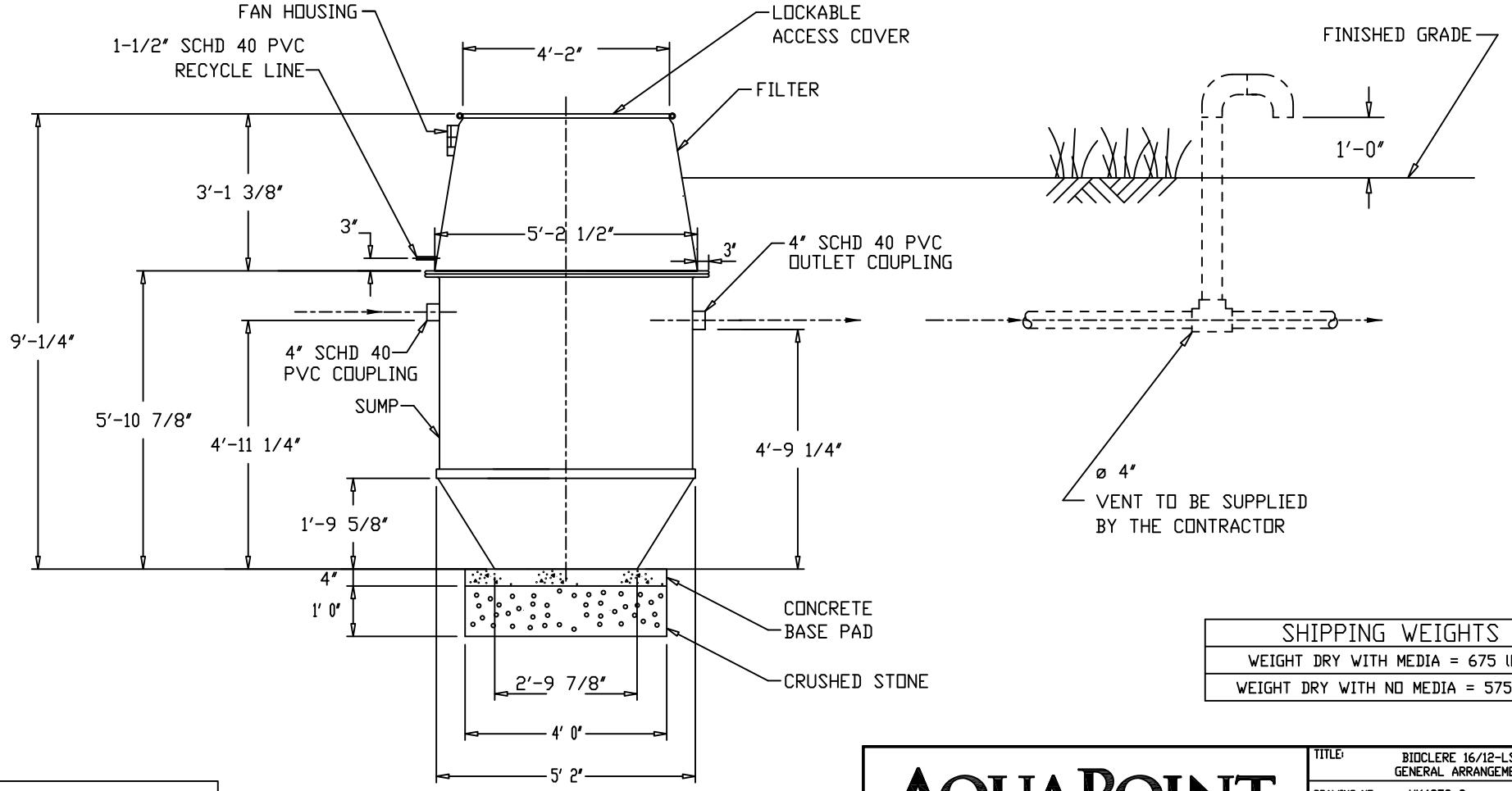
16_12_SS.dwg

BIOCLERE MODEL 16/12-SS

AQUAPOINT
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	BIOCLERE 16/12-SS GENERAL ARRANGEMENT
DRAWING NO:	UK.1259-1
REVISION:	B
DATE:	10/25/00
DWN BY:	P.Willey
SCALE:	1 : 25 SIZE: B
SHEET #:	1 of 1

NOTES:
1. VENT MAY BE RUN UP THE SIDE OF BUILDING.
2. SEE DRAWING PMW/AWT3015 FOR MOUNTING PAD CONSTRUCTION DETAILS.



MODEL 16/12-LS

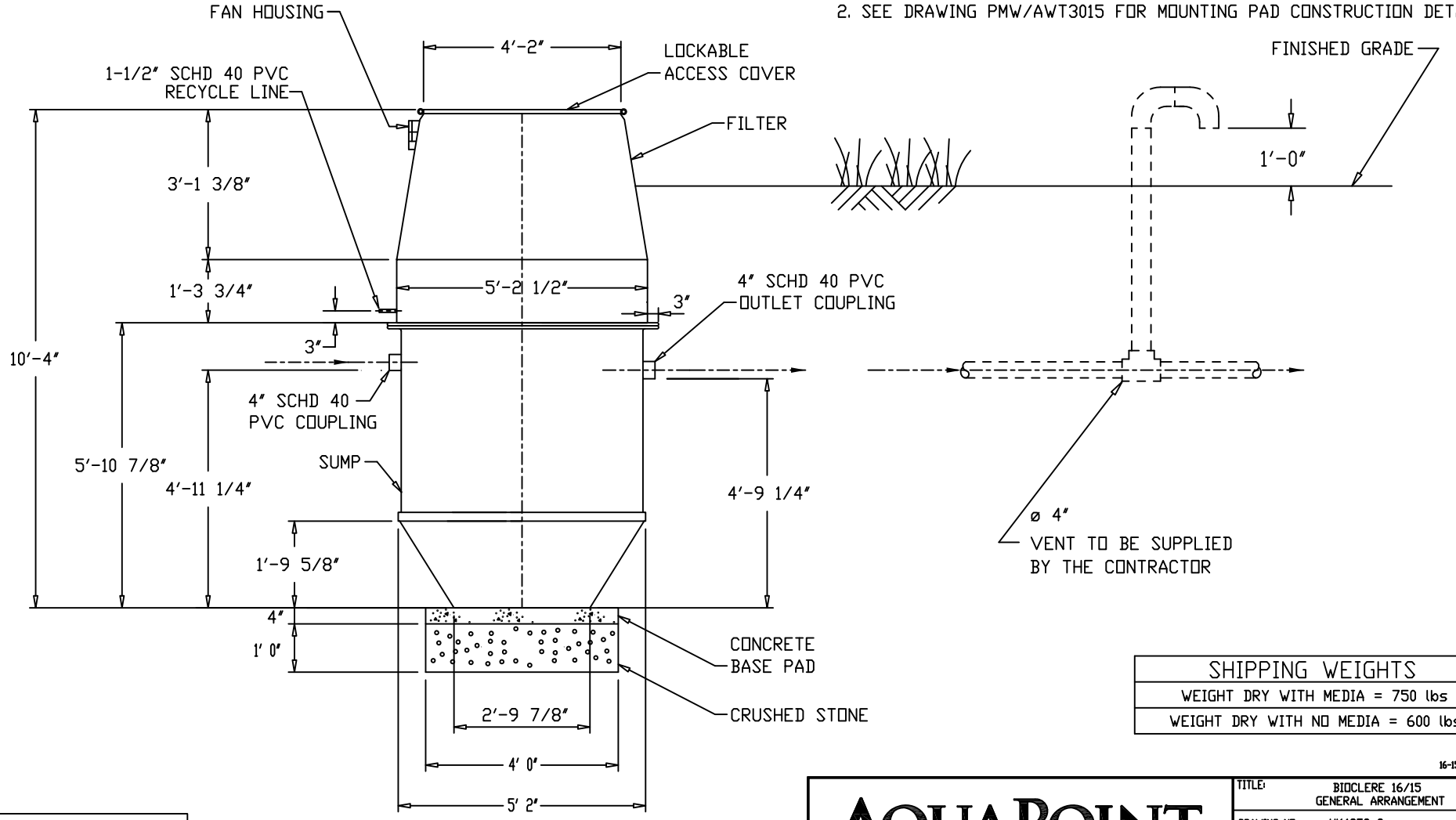
SHIPPING WEIGHTS
WEIGHT DRY WITH MEDIA = 675 lbs
WEIGHT DRY WITH NO MEDIA = 575 lbs

16_12_LS .dwg

AQUAPOINT
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	BIOCLERE 16/12-LS GENERAL ARRANGEMENT
DRAWING NO:	UK.1259-2
REVISION:	B
DATE:	10/25/00
DWN BY:	P.Willey
SCALE:	1 : 25 SIZE: B
SHEET #:	1 of 1

NOTES:
1. VENT MAY BE RUN UP THE SIDE OF BUILDING.
2. SEE DRAWING PMW/AWT3015 FOR MOUNTING PAD CONSTRUCTION DETAILS.



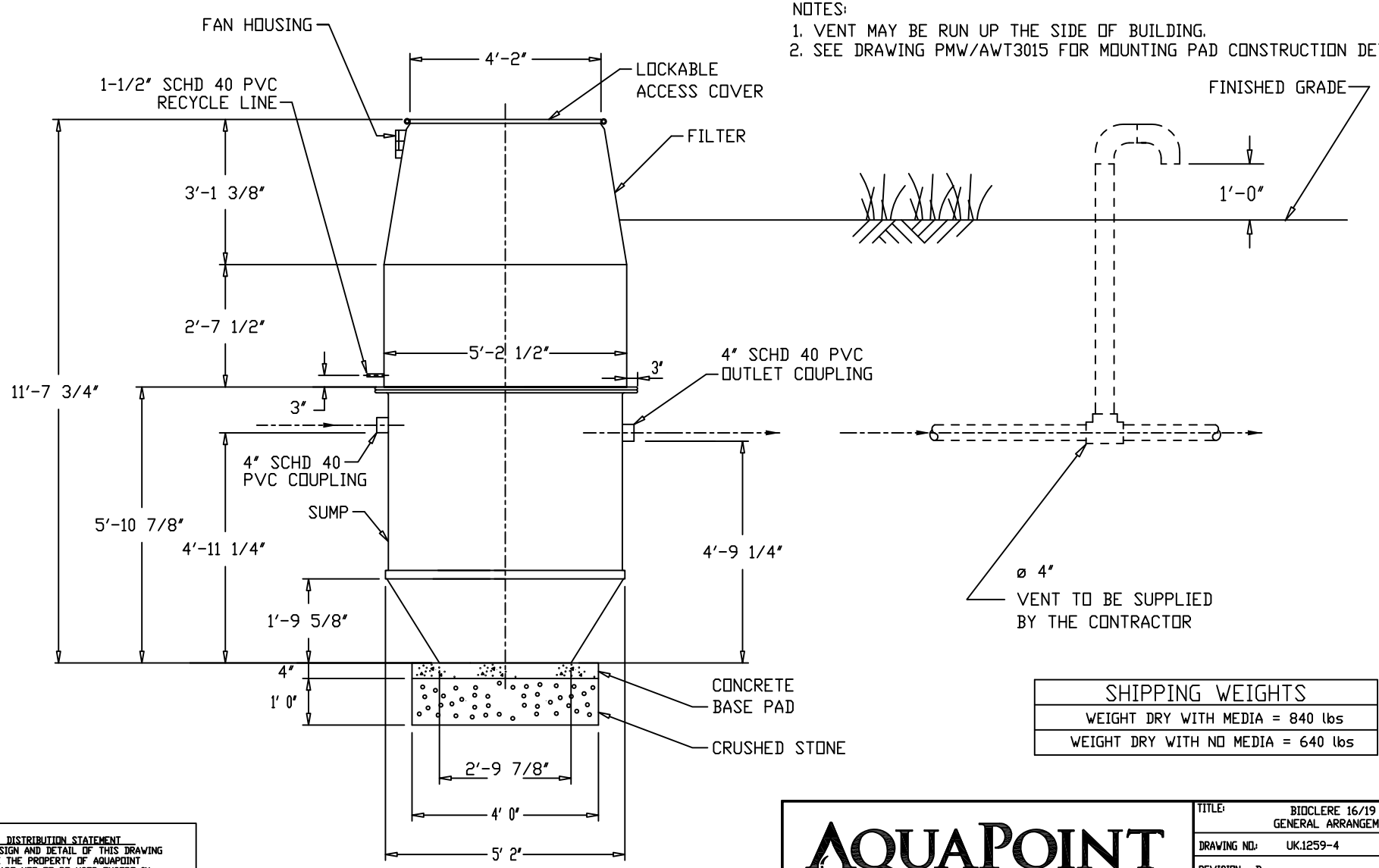
BIOCLERE MODEL 16/15

SHIPPING WEIGHTS
WEIGHT DRY WITH MEDIA = 750 lbs
WEIGHT DRY WITH NO MEDIA = 600 lbs

16-15 std GA.dwg

AQUAPOINT
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	BIOCLERE 16/15 GENERAL ARRANGEMENT
DRAWING NO:	UK.1259-3
REVISION:	A
DATE:	10/25/00
DWN BY:	P.Willey
SCALE:	1 : 25 SIZE: B
SHEET #:	1 of 1



NOTES:
1. VENT MAY BE RUN UP THE SIDE OF BUILDING.
2. SEE DRAWING PMW/AWT3015 FOR MOUNTING PAD CONSTRUCTION DETAILS.

SHIPPING WEIGHTS
WEIGHT DRY WITH MEDIA = 840 lbs
WEIGHT DRY WITH NO MEDIA = 640 lbs

BIOCLERE MODEL 16/19

16-19 std GA.dwg

AQUAPOINT
39 TARKILN PLACE
NEW BEDFORD, MA 02745
(508) 985-9050 FAX (508) 985-9072

TITLE:	BIOCLERE 16/19 GENERAL ARRANGEMENT
DRAWING NO.:	UK.1259-4
REVISION:	B
DATE:	10/25/00
DWN BY:	P.Willey
SCALE:	1 : 25 SIZE: B
SHEET #:	1 of 1

Septi-Tech

Hi Mila,

Below please find the pricing you requested for the SeptiTech STAAR treatment systems. I've listed the model number, with the corresponding gallons per day, below. And attached are system drawings.

STAAR 0.5 Denite (M400N) – 1-4 bedrooms – up to 500 gpd : $9,550.00 plus MA tax

STAAR 0.75 Denite (M550N) – 5-6 bedrooms – up to 750 gpd: $10,865.00 plus MA tax

STAAR 1.0 Denite (M750N) – 7-9 bedrooms – up to 1,000 gpd: $14,150.00 plus MA tax

STAAR 1.2 Denite (M1200N) – 10-11 bedrooms – up to 1,200 gpd: $19,200.00 plus MA tax

STAAR 1.5 Denite (M1500N) – 12-14 bedrooms – up to 1,500 gpd: $22,750.00 plus MA tax

STAAR 3.0 Denite (M2500N) – up to 3,000 gpd: $36,600.00 plus MA tax

STAAR 4.5 Denite (M3000N) – up to 4,500 gpd: $64,750.00 plus MA tax

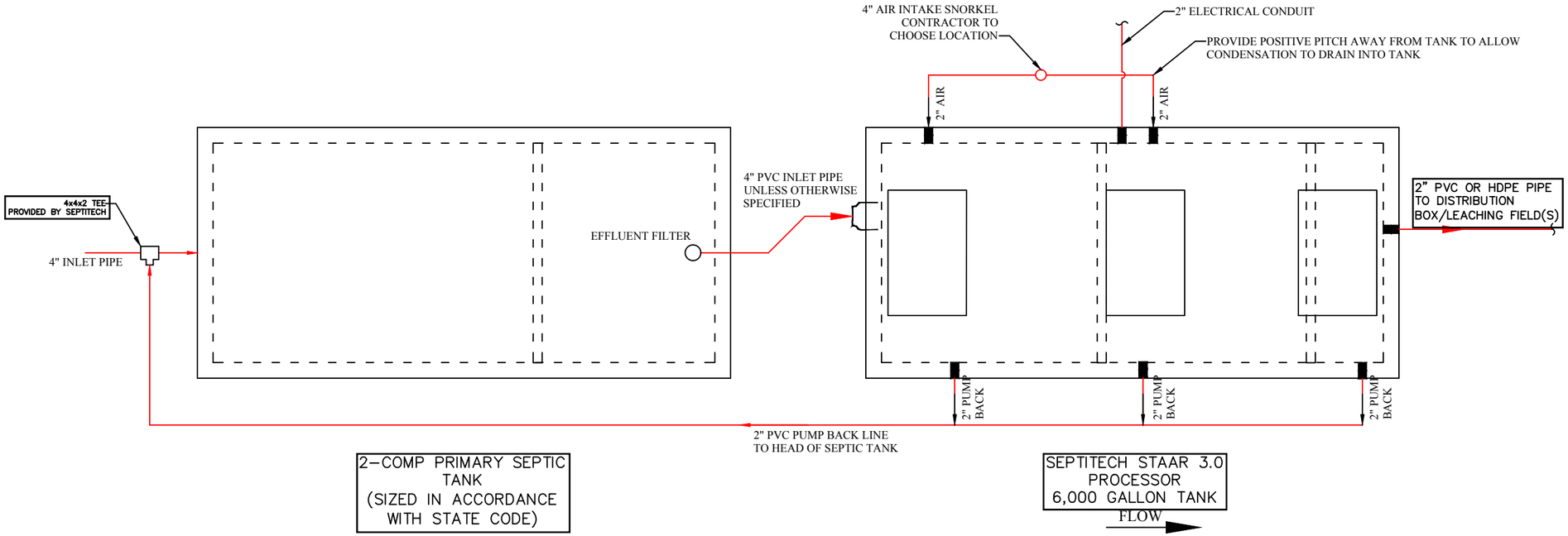
Pricing includes STAAR components, delivery to the site, setup into tanks, connections and PVC within treatment tanks, and system startup.

Pricing does not include tanks, electrical work, external connections or PVC piping, SAS, etc.

BioMicrobics/SeptiTech requests approval of treatment tanks prior to system being ordered.

Please let me know if you have any questions or would like additional information.

Thanks,
Lauren



GENERAL NOTES

- Tank(s) shall not be installed at a depth any greater than 24-inches. Tank installations requiring a depth greather than 24-inches shall do so with prior approval by SeptiTech only. Any risers required to bring the aluminum hatches to grade are the responsibility of the contractor.
- Tank(s) shall be installed with a minimum of 12-inches of compacted crushed stone bedding. Select fill shall be used for backfilling around tanks. Native material may be used if approved by the design engineer.
- Water Testing: Contractor is responsible for water testing the concrete tank(s) once the tank(s) installation has been completed and allowed to set overnight. Water testing shall be conducted in accordance with ASTM C1227.9.2. Installing contractor shall be responsible for providing clean water for the testing, filling the tanks, and pumping the tanks dry once testing is completed.
- Exterior Piping: Contractor is responsible for supplying and installing all exterior piping per SeptiTech installation drawings.
- Air Intake Piping: Air intake snorkel shall be installed within 100 feet of the processor tank. Air intake piping shall be installed such that a positive pitch is provided back towards the processor tank such that any condenstaion build up is free to drain.
- Pipe Insulation: Contractor is responsible for insulating all piping exterior to the SeptiTech processor including the discharge line from the processor to the disposal field.
- Tank Insulation: After concrete tanks have been installed and water testing is completed, contractor shall insulate the top and sides of the processor tank below frost depth (4-feet minimum) down the sides of the tank with 2" rigid foam (blue) board insulation and then complete backfilling. Contractor is also responsible for installing insulation over the top of the forcemain from the SeptiTech system to the disposal field if not buried below frost level in order to prevent freezing.
- Electrical: All electrical work is the responsibility of the contractor's licensed electrician and is not provided by SeptiTech. System Controller should be installed in a heated building where an ambient temperature range of 60 to 90 degrees F is maintained. If the control panel must be located outside, please notify SeptiTech, Inc. so a heater may be installed within the enclosure.

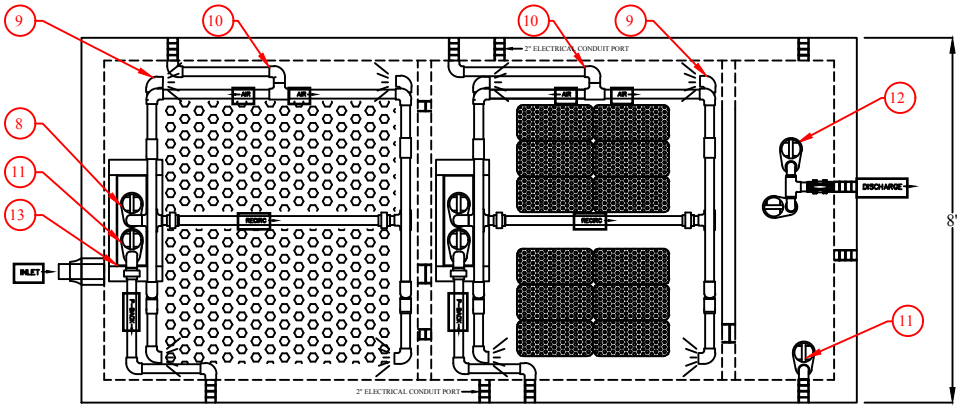
  SeptiTech processors can also be built to 3-phase power requirements. If 3-phase is required, please notify SeptiTech at the time of contract signing.
- Internet: Contractor is responsible for installing a internet line to the processor control panel for the Telemetry. Any work performed on the system without the installation of the internet line shall be at the expense of the owner.

SeptiTech®
a subsidiary of Bio-Microbics, Inc.

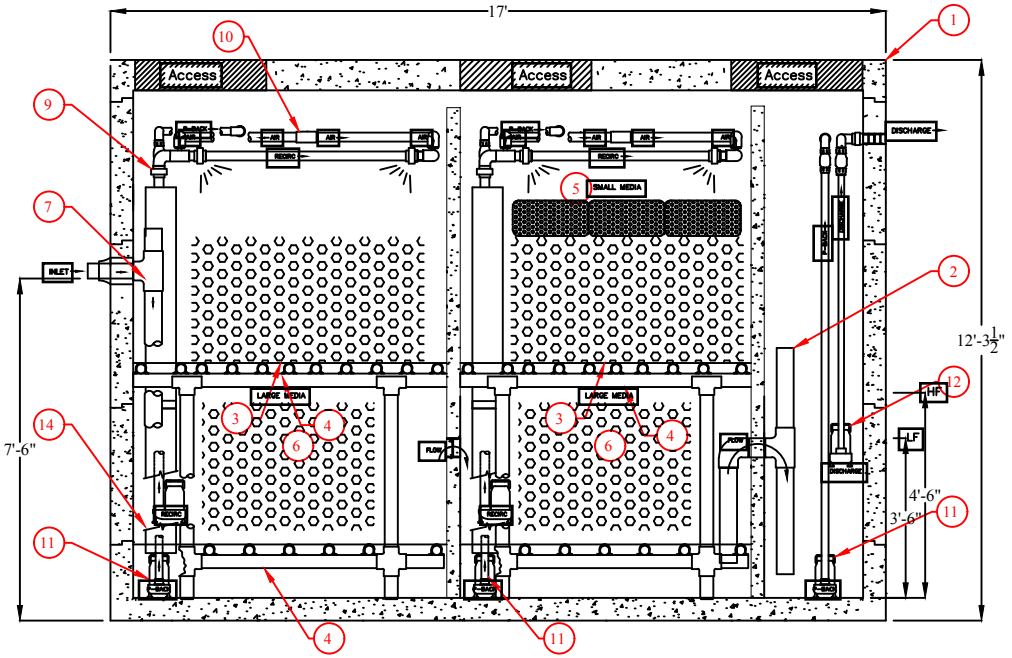
DES.BY:	JSC
DR.BY:	JSC
CK.BY:	DRR
PROJECT NO.:	

STAAR 3.0 PROCESSOR
INSTALLATION PLAN

DATE:	03/16/07	DWG. NO.:	
SCALE:	1/4"=1'-0"	REV.:	1



TOP VIEW



ELEVATION VIEW

FLOW

ITEM	QTY.	PART NO.	DESCRIPTION
14	2	#####	Pump Back Chute Assembly
13	2	#####	Pump Chute Assembly
12	1	#####	Dual Discharge Pump Assembly
11	3	#####	Pump Back Pump
10	2	#####	Blaster Air Header Assembly
9	2	#####	Blaster Assembly
8	2	#####	Recirc Pump
7	1	#####	Inlet Piping Assembly
6	2	#####	Large Media
5	2	#####	Small Media
4	4	#####	Support Structure
3	2	#####	Screening Assembly
2	1	#####	Interior Piping Assembly
1	1	#####	6000 Gal. Concrete Tank

SeptiTech® a subsidiary of Bio-Microbics, Inc.

DES.BY: DRR
DR.BY: JSC
CK.BY: WDR

PROJECT NO.:

STAAR 3.0 TOTAL TANK LAYOUT

DATE: 03/04/02
SCALE: 1/4"=1'-0"
DWG. NO.:
REV.: 1

Orenco

EIA Capital Cost ($) per Home

Sources: MASSTC, Water Industry and Provisional Permit Vendors

BHW - December 19, 2023

EIA costs are currently borne entirely by the homeowner. This analysis works to identify all the costs that would go into an installation**.**

Retrofit - Many installations can take advantage of components already installed at the home. At the Shubael Pond project, 60% of homes could still use the septic tank and/or the leach field, sometimes with modification. This had a material effect on total project costs and is basis for weighted average calculation.

For a 2-4 bedroom home we look at ranges and make a final assumption.

	Full Installation	**Retrofit**
Design (1)	5,000-7,000	5,000-7,000
Permitting (2)	400-600	400-600
N Removing Equipment (3)	20,000-35,000	20,000-35,000
Installation (4)	17,000-20,000	7,000-15,000
RME Mgt Fee (5)	500-700	500-700
Total Capital Cost (6)	**42,900-63,300**	**32,900-58,300**

Weighted Average (7) - Low 36,900, High 60,300. Average $48,600. Assume $50,000.

Notes

(1) Soil evaluation included. Design costs should be subject to learning curve pricing as project goes into production mode.
(2) Permitting costs should be consistent from town to town.
(3) Remote sensors are expected to be limited at this point to indications of whether or not a blower or pump is operating and are assumed to be in the equipment cost.
(4) Installation includes other components like piping, wiring and Title 5 level equipment. Includes pulling and/or decommissioning old tanks/cesspools. Includes water meter to monitor water use.
(5) Assumes purchase and installation will be managed by RME, rather than the owner.
(6) Main variable is balance between Equipment and Installation. When combined, vendor totals were reasonably comparable.
(7) (42.9k-63.3k) @ 40%)+(32.9k-58.3k @ 60%) = Range $36.9k-60.3k. Average $48.6.

Bio-Microbics

BIOMICROBICS

Model: FAST Treatment Systems with Nitrogen Reduction MicroFAST® 0.5, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0 ; HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0; NitriFAST® 0.5, 0.75, 1.0, 1.5, 3.0, 4.5, 9.0

Nitrogen Reducing Aerobic Treatment system. Nitrogen reducing25 mg/l for 550 gpda; 19 mg/l for 660 gpda Residential < 2000 gpd Approval: 12/29/10, revised 3/20/15

Budget Quotes:

$5,710 (tax NOT included)

Additional installation Guidance:

Instead of a 1500-gallon septic tank, this is a 1500-gallon FAST tank. The tank is different due to it's configuration, it configured so that it can accept a fast system to be installed inside of it.

There are two models which are the same price.

H-20: this system goes inside the tank.

H-10: this system requires a rectangular cut out at the top of the tank where the unit can be installed and supported with a flange. Requires venting and air lines. A blower would be hooked up to the air line and would require power.