



# COMMONWEALTH of VIRGINIA

Department of Health  
P O BOX 2448  
Richmond, VA 23218

M. Norman Oliver, MD, MA  
State Health Commissioner

TTY 7-1-1 OR  
1-800-828-1120

April 15, 2019

Marie-Christine Belanger, Product Director

[Belm2@premiertech.com](mailto:Belm2@premiertech.com)

Premier Tech Aqua

1 Avenue Premier

Riviere-du-Loup, Qc G5R 6C1

VIA ELECTRONIC AND REGULAR MAIL

RE: Treatment Level 3 General Approval of Premier Tech's Ecoflo Biofilter ST/STB Model Series

Dear Ms. Belanger:

We have completed our review of your request for listing of Premier Tech Aqua's Ecoflo Biofilter ST/STB wastewater treatment units as "Generally Approved" under the Virginia Department of Health's (VDH's) Guidance, Memorandum, and Policy (GMP) 2016-03 and in accordance with the Treatment Level 3 (TL-3) general approval requirements in the *Regulations for Alternative Onsite Sewage Systems* (12 VAC5-613, *AOSS Regulations*).

The complete submittal for review consists of the following:

1. TL3 Application Form received December 6, 2018.
2. Composite report dated November 28, 2018, and received December 6, 2018, which includes the original study report by Dr. Albert Rubin and an analysis of the study's compliance with the current protocol. The report was updated to address VDH comments of January 11, 2019. The following information was included in the composite report as required by GMP 2016-03:
  - a. PE certification by Michael Craun, P.E., regarding TL3 capability and Operation and Maintenance (O&M) manual appropriateness for treatment units;
  - b. List of personnel in responsible charge of the critical elements of the study;
  - c. Description of individual testing sites;
  - d. Field data;
  - e. Statistical analysis of data;
  - f. O&M reports;
  - g. O&M Manual; and
  - h. Technical data sheets.
3. Separate electronic submittal (via FTP site) of all analytical data sheets with chain of custody documentation.
4. Letter from Dr. Albert Rubin dated April 29, 2019 (apparently erroneously dated as it was received by VDH on April 1, 2019), which states that all of the CBOD<sub>5</sub> data reported in the original study report was BOD<sub>5</sub> data and incorrectly reported as CBOD<sub>5</sub>. Dr. Rubin was the third party overseer of the field study.

Ms. Marie-Christine Belanger  
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Based on our review, VDH approves the referenced Premier Tech Ecoflo wastewater treatment units for listing as “Generally Approved” under GMP 2016-03 and as “Generally Approved” for TL-3 effluent treatment under the *AOSS Regulations*. The effluent testing results using four quarters of data per site indicate a predicted BOD<sub>5</sub> of 6.7 mg/l and TSS of 4.8 mg/l using the protocol established in GMP 2016-03. When all data collected is used in the analysis (18 data points per site), the predicted BOD<sub>5</sub> is 8.1 mg/l and TSS is 5.2 mg/l. See the attached review memo for discussion of the review. The specific Ecoflo units included in this approval are listed below.

Ecoflo Model	Capacity, gpd	Open/Closed Bottom	Integral Pump
<b>Fiberglass</b>			
ST-500	420	Open	No
ST-650	600	Open	No
ST-750	695	Open	No
<b>Concrete</b>			
STB-650B-H1	600	Closed	No
STB-650BR-H1	600	Closed	Yes
STB-650B-H2	600	Closed	No
STB-650BR-H2	600	Closed	Yes
STB-650B-H2+3	600	Closed	No
STB-650BR-H2+3	600	Closed	Yes
STB-650B-H3	600	Closed	No
STB-650BR-H3	600	Closed	Yes
<b>Polyethylene</b>			
ST-570P	530	Open	No
STB-570P	530	Closed	No
STB-570PR	530	Closed	Yes
ST-650P	600	Open	No
STB-650P	600	Closed	No
STB-650-PR	600	Closed	Yes
ST-730P	675	Open	No
STB-730P	675	Closed	No
STB-730PR	675	Closed	Yes

Please contact me by phone at (804) 387-1883 or by email at [Marcia.Degen@vdh.virginia.gov](mailto:Marcia.Degen@vdh.virginia.gov) if you have any questions.

Sincerely,



Marcia J. Degen, Ph.D., P.E.  
 Technical Services Manager  
 Division of Onsite Sewage, Water Services,  
 Environmental Engineering & Marina Programs

Attachment: Review Memo  
 Cc: Lance Gregory, Division Director

**Virginia Department of Health**  
**Office of Environmental Health Services**  
*Technical Services – Wastewater Engineering*

To: File  
From: Marcia Degen, Ph.D., P.E. – Technical Services Manager, OEHS  
Date: April 15, 2019  
RE: Ecoflo Systems, Inc.  
***Approval of Ecoflo Biofilter ST/STB Model Series Treatment Units for TL-3 General Approval***  
Cc: Lance Gregory – OEHS

Premier Tech’s Ecoflo Biofilter treatment units have been generally approved for TL-3 in Virginia since 2008 as documented in now rescinded GMP #118. Premier Tech followed a field testing protocol that was agreed upon by VDH that included testing of 20 treatment units that were each sampled at least quarterly. Because the TL-3 approval for Premier Tech predates the *Regulations for Alternative Onsite Sewage Systems (AOSS Regulations)*, reevaluation of the treatment units in accordance with 12VAC5-613-30L is required for renewal of the general approval designation by VDH.

Premier Tech submitted a report with data on December 6, 2018, to comply with the evaluation protocols stipulated by GMP 2016-03. TL-3 General Approval is requested for Models ST/STB with the following models and capacities.

**Table 1**

ST/STB units	500	570	650	730	750
Rated capacity (gpd)	420	530	600	675	695
Filtering media surface (sq.ft.)	49	61	70	77	81
Hydraulic loading rate (gpd/sq.ft.)	8.6				
Filtering media height (in.)	31.5				
<b>Containment</b>					
Fiberglass	X		X		X
Polyethylene		X	X	X	
Concrete	X		X		
<b>Type of effluent discharge</b>					
Open (O)/Perforated bottom (P)*	O	P	O/P	P	O
Close bottom Gravity		X	X	X	
Close bottom Pump		X	X	X	

\* Fiberglass unit are Open bottom only, Polyethylene are perforated bottom

The following information was submitted in support of the request:

1. TL3 Application Form received December 6, 2018.
2. Composite report dated November 28, 2018, and received December 6, 2018, which includes the original study report by Dr. Albert Rubin and an analysis of the study’s compliance with the

current protocol. The report was updated to address VDH comments of January 11, 2019. The following information was included in the composite report as required by GMP 2016-03:

- a. PE certification by Michael Craun, P.E., regarding TL3 capability and O&M manual appropriateness for treatment units;
  - b. List of personnel in responsible charge of the critical elements of the study;
  - c. Description of individual testing sites;
  - d. Field data;
  - e. Statistical analysis of data;
  - f. O&M reports;
  - g. O&M Manual; and
  - h. Technical data sheets.
3. Separate electronic submittal (via FTP site) of all analytical data sheets with chain of custody documentation.
  4. Letter from Dr. Albert Rubin dated April 29, 2019, (apparently erroneously dated as it was received by VDH on April 1, 2019), which states that all of the CBOD<sub>5</sub> data reported in the original study report was BOD<sub>5</sub> data and incorrectly reported as CBOD<sub>5</sub>. Dr. Rubin was the third party overseer of the field study.


The Virginia study was the basis for Premier Tech’s current TL3 approval. The study is titled “Field Performance Assessment of Premier Tech Ecoflo® Wastewater Treatment Systems in Virginia” and dated October 2007. A total of 21 units were included in the testing, but one unit had little to no flow and was subsequently dropped from the test. Each unit was sampled for 18 months with monthly effluent samples collected for BOD<sub>5</sub> and TSS. Influent testing (septic tank effluent) was conducted monthly for BOD<sub>5</sub> and quarterly for TSS. Both the Rubin report and the data spreadsheet refer to CBOD<sub>5</sub> samples for the effluent.

VDH initially judged the CBOD<sub>5</sub> effluent results as not compliant with the regulatory requirement (12VAC5-613-70) which calls for BOD<sub>5</sub> effluent monitoring. Premier Tech referred to the laboratory data sheets to show that all data was reported as BOD<sub>5</sub> by the laboratory and should have been reported as BOD<sub>5</sub> in the Rubin report but was erroneously referred to as CBOD<sub>5</sub>. Premier Tech contacted Dr. Rubin for confirmation. Dr. Rubin submitted a letter to VDH on April 1, 2019, in which he confirmed that all of the laboratory monitoring reports for the study and all of the results were reported to Premier Tech as BOD, not as CBOD<sub>5</sub>, as indicated in his report.

To confirm the validity of this change, VDH spot checked the laboratory monitoring reports and chain of custody documentation and confirmed the BOD<sub>5</sub> reporting by the laboratory. VDH also contacted a Virginia lab to discuss normal procedures. The laboratory confirmed that the analytical method, 5210B, is used for both BOD<sub>5</sub> and CBOD<sub>5</sub>. The selection of BOD<sub>5</sub> vs CBOD<sub>5</sub> is normally made on the chain of custody form and the result is reported accordingly by the lab as either CBOD<sub>5</sub> or BOD<sub>5</sub>. As an example, below is an excerpt from the Hale site sampling form, dated March 8, 2006.

Laboratory and analysis	
Laboratory:	Air Water & Soil / Universal
Influent:	<input checked="" type="checkbox"/> BOD <sub>5</sub> <input type="checkbox"/> TSS <input type="checkbox"/> Fecal coliforms <input type="checkbox"/> Nitrate <input type="checkbox"/> TKN Others: _____
Effluent:	<input checked="" type="checkbox"/> BOD <sub>5</sub> <input checked="" type="checkbox"/> TSS <input checked="" type="checkbox"/> Fecal coliforms <input type="checkbox"/> Chloride <input type="checkbox"/> Nitrate <input type="checkbox"/> TKN Others: _____
Lysimeter 1:	<input checked="" type="checkbox"/> Fecal coliforms <input type="checkbox"/> Chloride <input type="checkbox"/> Nitrate <input type="checkbox"/> TKN Others: _____
Lysimeter 2:	<input checked="" type="checkbox"/> Fecal coliforms <input type="checkbox"/> Chloride <input type="checkbox"/> Nitrate <input type="checkbox"/> TKN Others: _____
Lysimeter 3:	<input type="checkbox"/> Fecal coliforms <input type="checkbox"/> Chloride <input type="checkbox"/> Nitrate <input type="checkbox"/> TKN Others: _____

The laboratory monitoring report for this sample accordingly reports the data as BOD<sub>5</sub> and not CBOD<sub>5</sub>. We note that is consistent for all the reports checked.



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**Certificate of Analysis**  
*Final Report*

**Laboratory Order ID 06030117**

<p>Client Name: Dalmarva Septic Solutions, Inc. 1281 Goodluck Road Kilmarnock, VA 22482</p> <p>Submitted To: Bruce King</p> <p>Client Proj I.D. Hale</p>	<p>Date Sampled: March 08, 2006 Date Received: March 09, 2006 Date Issued: March 16, 2006</p> <p>Project Number: NA</p> <p>Purchase Order: NA</p>
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Sample I.D.:	Influent	Laboratory Sample I.D.:	06030117-001
Parameter	Method	Sample Results	LOQ
BOD	SM5210B	134 mg/L	2.0
		Analysis Date/Time	03/09/06 17:42
		Analyst	TER

Sample I.D.:	Effluent	Laboratory Sample I.D.:	06030117-002
Parameter	Method	Sample Results	LOQ
BOD	SM5210B	2.4 mg/L	2.0
TSS	EPA160.2	1.3 mg/L	1.0
Fecal Coliform	SM9221B	1600 mpn/100ml	2
Fecal Coliform analysis performed by Universal Laboratories.			

Based on this review, VDH concurs with the opinion of Premier Tech, as confirmed by Dr. Rubin, that all analyses were for BOD<sub>5</sub> and not CBOD<sub>5</sub> as erroneously stated in the Rubin report.

Premier Tech submitted a statistical analysis that did not use the whole data set. Premier Tech explained their data selection as “During the 18 months testing period, analysis of complete set of parameters were performed on a quarterly basis, for a total of 6 full sampling event (influent and effluent), for consistency the first one of the series was not use to take into account for the 3 months of usage, then we look at the sampling period to respect as much as possible the schedule imposed per the GMP, finally, we looked at having 4 consecutive complete quarterly dataset (influent and effluent) that did not have any sampling issues. Those are the data that were used.” Based on this data set, the following statistical results were obtained by Premier Tech using the GMP statistical protocol.

	<u>BOD<sub>5</sub></u>	<u>TSS</u>
Count (N) =	20	20
Degrees of Freedom (N-1) =	19	19
Mean =	1.58	1.18
Std Dev =	0.57	0.71
Std Err =	0.13	0.16
Upper 99% T (1-tailed) =	2.54	2.54
Upper 99% T Conf Int =	1.90	1.58
Upper 99% T Conf Int =	6.7	4.8
	Native Values	
	Log-Transformed Values	

VDH conducted a separate statistical analysis using all of the effluent data reported from the 20 sites. Using all of the data, we found the Ecoflo effluent compliant with the TL-3 requirements. A summary of the VDH analysis that uses the complete data set follows.

	<u>BOD<sub>5</sub></u>	<u>TSS</u>
Count (N) =	20	20
Degrees of Freedom (N-1) =	19	19
Mean =	1.83	1.34
Std Dev =	0.45	0.54
Std Err =	0.10	0.12
Upper 99% T (1-tailed) =	2.54	2.54
Upper 99% T Conf Int =	2.09	1.65
Upper 99% T Conf Int =	8.1	5.2
	Native Values	
	Log-Transformed Values	

The Premier Tech ST/STB units are recommended for TL-3 General Approval. The specific units covered by this approval are:

Model	Capacity, gpd	Open/Closed Bottom	Integral Pump
<b>Fiberglass</b>			
ST-500	420	Open	No
ST-650	600	Open	No
ST-750	695	Open	No
<b>Concrete</b>			
STB-650B-H1	600	Closed	No
STB-650BR-H1	600	Closed	Yes
STB-650B-H2	600	Closed	No
STB-650BR-H2	600	Closed	Yes
STB-650B-H2+3	600	Closed	No
STB-650BR-H2+3	600	Closed	Yes
STB-650B-H3	600	Closed	No
STB-650BR-H3	600	Closed	Yes
<b>Polyethylene</b>			
ST-570P	530	Open	No
STB-570P	530	Closed	No
STB-570PR	530	Closed	Yes
ST-650P	600	Open	No
STB-650P	600	Closed	No
STB-650-PR	600	Closed	Yes
ST-730P	675	Open	No
STB-730P	675	Closed	No
STB-730PR	675	Closed	Yes

Additional explanation and detail on the units may be found in the technical data sheets on the VDH website.