

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

To: Lance Gregory, Division Director, Onsite Sewage and Water, Environmental Engineering, and Marina Program

From: Marcia J. Degen, Ph.D., P.E., Technical Services Manager

Date: May 22, 2020

RE: Anua International
Transfer of General Approval for TL-3 of Quanics BioCoir to Anua BioCoir under GMP 2016-03

On June 4, 2009, Quanics Inc., entered into a Memorandum of Understanding and Agreement (Agreement) with VDH to conduct field testing on BioCoir units in accordance with Guidance, Memorandum, and Policy (GMP) 147. Quanics listed the following BioCoir models in the Agreement:

- ATS-SCAT-3-BC-200
- ATS-SCAT-4-BC-400
- ATS-SCAT-6-BC-650
- ATS-SCAT-8-BC-1000
- ATS-SCAT-8-BC-C500
- ATS-SCAT-86-BC-C750
- ATS-SCAT-88-BC-C1000

On May 23, 2012, VDH approved the same list of models as Generally Approved for TL-3 effluent treatment level based on the results of the completed field testing.

Prior to entering into the Agreement for field testing, GMP 147 required that treatment units be tested to demonstrate their ability to meet secondary treatment levels, (TL-2 in 12VAC5-613 (AOSS Regulations)). Specifically the policy said:

- a. The proprietary treatment device or treatment device must receive VDH recognition as being able to provide secondary or better effluent (SE). This measure may be completed by producing a certification from a nationally recognized testing facility (e.g., ETV, NSF), or by submitting sufficient third party performance data.

The Agreement does not identify what test or study was relied upon to document the secondary treatment performance to allow entrance into the field testing. The operation and maintenance manual submitted by Quanics and posted on the VDH website, identifies the BioCoir unit as a Class I/NSF Standard 40 certified system. No other study or reference to a study was found in the VDH files. Based on the O&M manual, it would appear that the NSF 40 certification was intended to serve as evidence of meeting secondary treatment levels. Additionally, the manual provides the following table of design criteria (Table 1) (Another Quanics product is also listed in this table, AeroCell, but that is not a TL3 product in Virginia.) Of interest in this table is that the loading rate to the filter media is fairly consistent, as would be expected, and ranges from 5.43 to 5.88 gpd/ft³. The units in the table are all listed models for NSF 40 and NSF 245.

Table 1. From Quanics O&M Manual for BioCoir from VDH Website

AeroCell & Bio-COIR Specifications

Model #	GPD Rating	Nozzles	Modules	Media (ft ³)	Loading (gpd/ft ³)	Septic Tank (gal)	Pump Tank (gal)	Individual Dose Volume (gal)	Discharge Volume per Individual Dose (gal)	Doses per 24 hrs.
ATS-SCAT-8-AC-C500 ATS-SCAT-8-BC-C500	500*	4	1	85	5.88	1000	500	25.6	5.12	98
ATS-SCAT-86-AC-C750 ATS-SCAT-86-BC-C750	750*	8	2	138	5.43	1500	750	51.2	10.2	73
ATS-SCAT-88-AC-C1000 ATS-SCAT-88-BC-C1000	1000*	8	2	170	5.88	2000	1000	51.2	10.2	98
ATS-SCAT-886-AC-C1250 ATS-SCAT-886-BC-C1250	1250*	12	3	223	5.61	2500	1250	76.8	15.3	81
ATS-SCAT-888-AC-C1500 ATS-SCAT-888-BC-C1500	1500*	12	3	255	5.88	3000	1500	76.8	15.3	98

On June 5, 2019, Anua International announced that it had purchased Quanics assets including the BioCoir product line. On November 1, 2019, Anua requested an update to the BioCoir TL3 approval to reflect the new owner, Anua, and to add 2 new models to the list. The model listing requested by Anua is below in Table 2.

Table 2. Initial model listing request from Anua for BioCoir models

Pod Model	Flow Rating (gpd)	Pod Housing
ATS-SCAT-3-BC-200	200	Quanics FRP
ATS-SCAT-4-BC-400	400	Quanics FRP
ATS-SCAT-6-BC-650	650	Quanics FRP
ATS-SCAT-8-BC-1000	1000	Quanics FRP
ATS-540-BC-1000*	1000	Infiltrator IM-540
ATS-NS500-BC-1000*	1000	Norwesco-Snyder Next Gen D2 500

*Pod housings have been accepted by NSF as equivalent to ATS-8

VDH reviewed the NSF listing as part of the review process. The lists of models for BioCoir (VDH BioCoir approval, NSF listing, and Anua request) do not match. Table 3 attempts to clarify.

Table 3. Comparison of models listed under VDH TL3 approval, NSF listing, and Anua Request for listing.

Listing 2016-03		NSF Listing		Anua Request	
Model	GPD	Model	GPD	Model	GPD
ATS-SCAT-3-BC-200	200			ATS-SCAT-3-BC-200	200
ATS-SCAT-4-BC-400	400			ATS-SCAT-4-BC-400	400
ATS-SCAT-6-BC-650	650			ATS-SCAT-6-BC-650	650
ATS-SCAT-8-BC-1000	1000			ATS-SCAT-8-BC-1000	1000
ATS-SCAT-8-BC-C500	500	ATS-SCAT-8-BC-C500	500		
ATS-SCAT-86-BC-C750	750	ATS-SCAT-86-BC-C750	750		
ATS-SCAT-88-BC-C1000	1000	ATS-SCAT-88-BC-C1000	1000		
		ATS-540-BC-N*	500		
		ATS-1060-BC-N*	800		
		ATS-NS500-BC-N**	500		
		ATS-NS750-BC-N**	660		
		ATS-NS1000-BC-N**	800		
				ATS-540-BC-1000*	1000
				ATS-NS500-BC-1000**	1000

*Housing is an Infiltrator tank (540 or 1060 g volume)

** Housing is a Norwesco-Snyder tank (500, 750 or 1000 g volume)

After reviewing the NSF listing, the original approved models, and the new request for models, it became apparent that some models were being listed with two different loading rates. The NSF listed models were based on the 5.43 to 5.88 gpd/ft³ noted in the O&M manual. Anua provided the following chart that identifies the loadings for the requested models.

Table 4. Design Criteria for BioCoir models requested by Anua for listing

Virginia TL-3 BioCoir Chart						
Pod	Flow Rating (gpd)	BioCoir Media (ft³)	Pod Length (ft)	Pod Width (ft)	Nominal Volumetric Loading (gpd/ft³)	Pod Housing
ATS-3	200	16	3.0	3.0	12.5	Quanics FRP
ATS-4	400	32	4.0	4.0	12.5	Quanics FRP
ATS-6	650	53	6.0	4.0	12.3	Quanics FRP
ATS-8	1,000	85	8.2	4.0	11.8	Quanics FRP
ATS-IM540	1,000	81	5.4	5.2	12.3	Infiltrator IM-540
ATS-NS500	1,000	82	8.0	4.0	12.2	Norwesco-Snyder Next Gen D2 500

Note: Multiple pods can be used for one design to achieve daily flow rate (GPD), as needed

The loading rates in Table 4 are approximately double what NSF used to test the units. Anua stated that there were other third party studies that were conducted at the higher loading rate and that was the basis for the design for the original Quanics BioCoir field study. Anua contacted a former designer with Quanics who confirmed that Quanics routinely designed their systems on the higher media loading rates. VDH reviewed the TL-3 report and confirmed that the sizing of the module for each site appear to be based on the higher volumetric media loading. For example, if the field sites were designed according to the NSF loading rate, then a 3 bedroom home would require an ATS-SCAT-8-BC-C500. The ‘8’ indicates an eight foot module. A ‘6’ indicates a 6 foot module, and a ‘4’ is a four foot module. (The Norwesco Snyder and Infiltrator tanks were not in use in 2009 when the field test was started.)

Table 5 below is from the TL-3 report and shows which models were installed at which homes. With the exception of BZWL which had an 8 foot module on a 3 bedroom home, all other homes had modules selected based on the higher loading rate listed in Anua’s chart above. The Virginia field test was therefore conducted at the higher loading rates to the modules. The higher loaded BioCoir models passed the TL-3 criteria under GMP 147 and were generally approved based on that higher loading rate.

VDH requested a copy of the third party test that justified and verified BioCoir’s performance at the higher loading rate. Anua provided information, but marked the information as ‘Proprietary and Confidential’ and not subject to FOIA. The study was lacking in detail. The study was conducted in 2003 and consisted of a series of test runs with a SCAT-ATS-3-BC (rated at 200 gpd). The loading rate started at 5.5 gpd/ft³ and then was gradually increased in increments to 7, 9, 10.5, 12.5, 14.06, and 15.625 gpd/ft³. Only one or two data points were collected for first 6 loading rates. The most data was available for the loading rate of 15.625 gpd/ft³ which is higher than the loading rate listed by Anua of 11.8 to 12.5 gpd/ft³. Table 6 is a summary of the data provided. The data were collected from July to October 2003.

Table 5. Field sites for TL-3 testing in Virginia with design flow and module size used.

Table 1. Home statistics

Residence Code	Est. flow (gpd)	Act. wm* flow (gpd)	Module size	Start date	End date	County
BCHN	300	113	4'	4/7/2010	8/17/2011	Tazewell
BDSN	300	41	4'	7/20/2009	8/22/2011	Accomack
BLNC	300	n/a	4'	7/1/2010	8/25/2011	Accomack
BRNS	600	123	6'	7/27/2009	8/18/2011	Washington
BSWL	450	159	6'	5/17/2010	8/22/2011	Accomack
BZWL	450	n/a	8'	7/28/2009	8/18/2011	Pittsylvania
DVS	450	154	6'	2/16/2010	8/17/2011	Wise
EBRT	450	n/a	6'	9/30/2009	8/24/2011	Accomack
GLS	450	381	6'	8/23/2010	8/22/2011	Accomack
HLDN	300	n/a	4'	10/1/2009	8/25/2011	Accomack
HMN	450	176	6'	5/17/2010	8/23/2011	Accomack
HRMN	450	n/a	6'	7/21/2009	5/13/2010	Accomack
HRT	600	n/a	6'	9/30/2009	8/25/2011	Accomack
HSTN	300	144	4'	8/24/2010	8/22/2011	Accomack
LDBR	600	143	6'	8/24/2010	8/23/2011	Accomack
LFRT	450	208	6'	5/17/2010	8/22/2011	Accomack
LNRD	450	168	6'	5/19/2010	8/22/2011	Accomack
LVN	600	104	6'	10/5/2009	8/18/2011	Washington
WKNS	450	n/a	6'	7/23/2009	8/24/2011	Accomack
WLT	450	n/a	6'	2/10/2010	8/25/2011	Accomack

* Act. wm = Actual water meter

Table 6. Data from third party test at a media loading rate of 15.625 gpd/ft³

	Influent CBOD mg/l	Effluent CBOD mg/l	Influent TSS, mg/l	Effluent, TSS, mg/l
Average	187.47	8.63	168.66	4.59
min	104	3	94	2
max	379	16	715	23
median	182.5	7.8	142	3.6
count	34	35	35	36

Normally CBOD5 values would be adjusted to reflect BOD 5 values by multiplying the CBOD value by 1.2. Therefore the average effluent BOD5 is estimated at 10.32 mg/l at a media loading rate of 15.625 gpd/ft³.

The third party study does not meet any minimum standard for TL2 used today. There is no detail on the sample type, sample collection point, or analytical methods. There is no identification of where the study was done or by whom. The samples assumed to be influent values are not clearly identified and assumed to be influent only by the values. There is no discussion of the influent source. VDH believes that this study was never submitted in support of the TL3 study and that the VDH reviewer assumed that the NSF listing was the basis for the TL2 justification. Based on conversations with Anua, Quanics had been designing systems with these higher loading rates and did not intend to mislead Virginia. VDH staff reached out to neighboring states and found that Delaware has an approval listed for BioCoir with the same models listed (and flows) as Virginia's TL3 approval. No other neighboring states (MD, West VA, PA, or NC) have an approval on file for BioCoir.

On April 16, 2020, Anua revised its request for listing the models to align with Virginia's bedroom flow rating. The revised request reduces the loading rate to the media, but is still 12 to 60% higher than the NSF rates.



Virginia TL-3 BioCoir Chart

Pod Model	Bedrooms	Flow Rating (gpd)	Media Volume (ft ³)	Media Loading (gpd/ft ³)	Pod Housing
ATS-SCAT-3-BC-200	1	150	16	9.4	Quanics FRP
ATS-SCAT-4-BC-400	2	300	32	9.4	Quanics FRP
ATS-SCAT-6-BC-650	3	450	53	8.5	Quanics FRP
ATS-SCAT-8-BC-1000	4	600	85	7.1	Quanics FRP
ATS-540-BC-N-TL3	4	600	81	7.4	Infiltrator IM-540
ATS-1060-BC-N-TL3	6	900	136	6.6	Infiltrator IM-1060
ATS-1530-BC-N-TL3	12	1800*	246	7.3	Infiltrator IM-1530
ATS-NS500-BC-N-TL3	4	600	82	7.3	Norwesco-Snyder Next Gen D2 500
ATS-NS750-BC-N-TL3	5	750	112	6.7	Norwesco-Snyder Next Gen D2 750
ATS-NS1000-BC-N-TL3	6	900	137	6.6	Norwesco-Snyder Next Gen D2 1000
ATS-NS500-80/20-BC-N	4	600	82	7.3	Norwesco-Snyder Next Gen D2 500
ATS-NS750-80/20-BC-N	5	750	112	6.7	Norwesco-Snyder Next Gen D2 750
ATS-NS1000-80/20-BC-N	6	900	137	6.6	Norwesco-Snyder Next Gen D2 1000

*Flows over 1000 gpd cannot be considered for general approval.

VDH considered the following options.

1. Revoke the TL3 General Approval as the testing used to justify the loading rates was never submitted and the test protocol is deficient to meet criteria for TL2 General Approval.

This issue was only discovered by staff when they checked the Anua requested models against the NSF listing. Had no changes been proposed, VDH would have transferred the TL3 approval to Anua. VDH should have caught the discrepancy prior to allowing Quanics to conduct the TL3 testing. However, because the units have been tested and certified at NSF and the higher loading rate was verified through lab testing (albeit with poor documentation) and TL3 field testing in Virginia, VDH did not pursue this option.

2. Reissue the General Approval only for the models listed in the Quanics approval letter.

This option maintains the status quo. Had VDH not revisited the listing due to the request for the new models, VDH would not have discovered the discrepancy. This allows VDH to honor the original approval, but recognizes that new models have not been 'certified' by a third party as equivalent units at the higher loading rates.

3. Reissue the TL3 product approval to Anua only for NSF listed models and flows.

This option would recognize the NSF tested loading rates as meeting the GMP 147 requirement to have a third party test to support the ability of the unit to produce secondary effluent prior to entering into TL3 testing. This option ignores the fact that the units did pass the TL3 protocol at the higher loading rate.

4. Reissue the TL3 product approval to Anua for the models requested.

The model listing and flow rating requested indicates that all models would receive the loading rate that was tested during the Virginia TL3 field test or less. The new models are new housings for the filter media. NSF has reviewed and approved the Infiltrator IM 540 and 1060 and the Norwesco-Snyder Next Gen D2 500, 750, and 1000 tanks as functionally equivalent to the existing models, albeit at the lower loading rate tested at NSF. The models all passed NSF's other test criteria for materials, design and construction. This option recognizes that the higher loading rate passed the TL3 testing, even though the qualifying test provided to allow the test to be conducted at the higher loading rate was of poor quality.

After review by staff and consultation with VDH legal and management representatives, Option 4 was selected. VDH had already conferred General Approval on the treatment units at the higher loading rate based on a study conducted in Virginia and following Virginia protocols. VDH did not feel that revoking the approval based on an administrative error was warranted. Public Health is protected.

BioCoir is listed in GMP 2013-01 as an N reducing unit based on data collected during the NSF 40 test. As the recommendation is to transfer the TL3 approval to Anua and recognize the higher loading rate, the basis for the N reduction listing is no longer valid. Quanics did conduct N testing during the BioCoirTL3 test. A total of 65 data points were generated of the influent and effluent total nitrogen. The average removal was 69%. At least one other unit (EZ Treat) was allowed to use their VA test data to initially be listed as an N reducing unit. VDH will modify the BioCoir N reduction listing in GMP 2013-01 to reflect the VA data as the basis for the listing.