



COMMONWEALTH of VIRGINIA

Department of Health
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State Health Commissioner

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June 21, 2019

Nicholas Noble, Government Relations Manager

nnoble@orenco.com

Orenco Systems Inc.
814 Airway Ave.
Sutherlin OR 97479

VIA ELECTRONIC AND REGULAR MAIL

RE: Treatment Level 3 General Approval of Orenco's AdvanTex AX20, AX20-RT, and AX25-RT Treatment Units

Dear Mr. Noble:

We have completed our review of your request for listing of Orenco's AdvanTex AX20, AdvanTex AX20-RT, and AdvanTex AX25-RT 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. An application for TL-3 listing.
2. Letter report from Channing Blackwell, P.E. dated November 30, 2018, with an addendum dated February 15, 2019.
3. An electronic version of the final report from the study entitled "Virginia AdvanTex Testing Program – Final Report – November 10, 2005" prepared by Mark Gross, Ph.D., P.E. This is the original report submitted by Orenco that documents the details of the field testing program for the original approval.
4. Hard copies of all chain of custody and laboratory reports associated with the Virginia study.
5. An excel spreadsheet with the site specific data regarding the Virginia sites.
6. An electronic version of the 2009 NSF International report "Final Evaluation Report – Pennsylvania Onlot Technology Verification Program".
7. Electronic copies of the chain of custody and laboratory reports for the Pennsylvania study.
8. A letter from NSF documenting the operation and maintenance for the Pennsylvania study.
9. An excel spreadsheet with the site specific information for the Pennsylvania study sites.
10. All data from Virginia and Pennsylvania studies entered into the VDH statistical spreadsheet.
11. Updated technical drawings for the AX25-RT.

Mr. Nicholas Noble
June 21, 2019
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Based on our review, VDH approves the referenced AdvanTex 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 indicate a 99% confidence interval for BOD₅ of 6.0 mg/l and TSS of 6.7 mg/l using the protocol established in GMP 2016-03. See the attached review memo for discussion of the review.

The specific units included in this approval are below. The minimum septic tank volume preceding the treatment units is also listed.

Model	Minimum Septic Tank Capacity, gallons	Rated Treatment Capacity, gpd
AX20	1000	600
AX20-RT	1000	600
AX25-RT	1500	750

The AdvanTex units are already included in GMP 2013-01 as 50% nitrogen reducing units on the basis of their NSF 245 certification.

Please feel free to call me at (804) 387-1883 or contact me by email at Marcia.Degen@vdh.virginia.gov if you have any questions.

Sincerely,



Marcia J. Degen, Ph.D., P.E.
Technical Services Administrator
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: June 7, 2019

RE: Orenco Systems, Inc.
Approval of AdvanTex AX20, AX20-RT, AX25-RT Treatment Units for TL-3 General Approval

Cc: Lance Gregory – OEHS

Orenco System Inc.'s (Orenco) Advantex treatment units have been generally approved for TL-3 in Virginia beginning in 2006. Orenco followed a field testing protocol that was agreed upon by VDH that included testing of 18 treatment units that were each sampled at least quarterly. Because the TL-3 approval for Advantex predates the *Regulations for Alternative Onsite Sewage Systems (AOSS Regulations)*, the current approval is to be reevaluated in accordance with 12VAC5-613-30L. The *AOSS Regulations* state that the units shall be evaluated pursuant to the requirements of the *AOSS Regulations*.

Orenco requested and received a variance signed August 5, 2016, to allow the use of data from units installed outside of Virginia and to allow CBOD5 data to substitute for BOD5 data when a 1.2 factor is applied to the CBOD5 data. Orenco submitted a report with data on December 3, 2018, to comply with GMP 2016-03. TL-3 General Approval is requested for AdvanTex Models AX20, AX20-RT, and AX25-RT.

The following information was submitted in support of the request:

1. An Application for TL-3 listing.
2. Letter report from Channing Blackwell, P.E. dated November 30, 2018, regarding the Pennsylvania report and addendum dated February 15, 2019.
3. An electronic version of the final report from the study entitled "Virginia AdvanTex Testing Program – Final Report – November 10, 2005" prepared by Mark Gross, Ph.D., P.E. This is the original report submitted by Orenco that documents the details of the field testing program for the original approval.
4. Hard copies of all chain of custody and laboratory reports associated with the Virginia study.
5. An excel spreadsheet with the site specific data regarding the Virginia sites.
6. An electronic version of the 2009 NSF International report "Final Evaluation Report – Pennsylvania Onlot Technology Verification Program".
7. Electronic copies of the chain of custody and laboratory reports for the Pennsylvania study.
8. A letter from NSF documenting the operation and maintenance for the Pennsylvania study.
9. An excel spreadsheet with the site specific information for the Pennsylvania study sites.
10. All data from Virginia and Pennsylvania studies entered into the VDH statistical spreadsheet.
11. Technical drawings for the AX25-RT.

Orenco noted that the drawings for the AX20 and AX20-RT approved previously are still valid as well as the operation and maintenance manuals.

Virginia Study: This study, dated November 10, 2005, was the basis for Orenco's current TL3 approval. A total of 18 units were included in the testing, but 4 units were tested in Mode 1. Mode 1 is not used in Virginia as it does not promote denitrification. The Mode 3 unit is NSF 245 approved for TN reduction. For the reevaluation, VDH only accepted data from the Mode 3 units for a total of 14 units. The units identified as Mode 1 in Table 8 of the Gross report were deleted from the analysis. CBOD5 and TSS data were collected of the effluent. Testing was also done of the processing tank which is a mix of the raw sewage and the recirculated effluent. True influent testing was not conducted because of the inability to obtain a true influent sample in mode 3. All CBOD5 effluent data were multiplied by 1.2 to estimate the BOD5 value.

Pennsylvania Study: This study, dated 2009, was conducted by the National Sanitation Foundation (NSF) for the Pennsylvania Onlot Technology Verification Program in the Pennsylvania Department of Environmental Protection. Data from 10 of the 11 systems were used in the analysis. The system eliminated from consideration had unusually concentrated raw wastewater documented to be outside the norm for residential strength. Influent BOD5 data was collected from the septic tank at the start and end of the study when the system was operated in Mode 1. Mode 1 returns all of the wastewater to the recirculation basin so samples from the septic tank could

be collected. During the testing of effluent, the units were all in Mode 3 (see engineer’s statement in the referenced addendum). The units were sampled monthly for at least one year, minimum, with most of the sites sampled for 2 to 3 years.

The combined data set was reviewed to determine if the test data supported the request to list the AdvanTex treatment units as TL-3 compliant under GMP 2016-03 and 12VAC5-613-70. The results of the statistical analyses are provided in the table below.

	BOD ₅	TSS
Count (N) =	24	24
Degrees of Freedom (N-1) =	23	23
Mean =	1.55	1.65
Std Dev =	0.47	0.50
Std Err =	0.10	0.10
Upper 99% T (1-tailed) =	2.50	2.50
Upper 99% T Conf Int =	1.79	1.90
Upper 99% T Conf Int =	6.0	6.7
	Native Values	
	Log-Transformed Values	

VDH ran an additional analysis removing data points that appeared to be collected before 90 days since startup. Elimination of the results collected during initial system acclimation had minimal impacts on the results. The 99% confidence interval was 5.8 mg/l for BOD₅ and 6.8 for TSS.

Orenco has completed the testing in accordance with GMP 2016-03 and 12VAC5-613-70. A statistical analysis of the data indicate compliance with the TL-3 standard. The Orenco AdvanTex AX20, AX20-RT, and the AX25-RT are recommended for TL-3 General Approval.