



## Department of Health

Mike DeWine, Governor  
Jon Husted, Lt. Governor

Amy Acton, M.D., MPH, Director

November 8, 2019

Dear Manufacturer,

This memo serves as a notification that Ohio approval(s) for sewage treatment systems or products manufactured by your company will expire according to the schedule outlined in Ohio Administrative Code Chapter 3701-29-13(D) below:

Sewage treatment systems products, including pretreatment components reviewed in accordance with section 3718.04 of the Revised Code by the sewage treatment systems technical advisory committee and/or approved by the director of health after January 1, 2007 and before January 1, 2015 shall continue to be approved as follows:

- (1) Products approved prior to January 1, 2009 shall be approved through December 31, 2020;
- (2) Products approved between January 1 and December 31, 2009 shall be approved through December 31, 2021;
- (3) Products approved between January 1, 2010 and December 31, 2012 shall be approved through December 31, 2022;
- (4) Products approved between January 1, 2013 and December 31, 2014 shall be approved through December 31, 2023;

If director approves the renewal application, the five-year approval period for these pretreatment components shall begin upon the date of renewal.

If your company wishes to make application for renewal of product approval(s), the approval must be obtained by the December 31<sup>st</sup> of the applicable year, found above, in order to avoid being removed from the approved products list that is maintained by the Ohio Department of Health.

The Application Form for Review of a Sewage Treatment System or Component under Ohio Revised Code Chapter 3718.04, in addition to the current Ohio Department of Health and Sewage Treatment Systems Technical Advisory Committee Standards, Guidelines, and Protocols for Ohio Revised Code 3718.04 Review of Sewage Treatment System Products or Components can be found at: <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/sewage-treatment-systems/media/odh-tacapplicationform7-14>

If you have questions, please contact ODH Residential Sewage Program staff at (614) 644-7551 or [BEH@odh.ohio.gov](mailto:BEH@odh.ohio.gov).

**TAC 5 Year Product Review Sheet for the STS**

<b>Manufacturer</b>	<b>Product Name</b>	<b>Date of original Approval</b>	<b>Standard approved for</b>	<b>5 year Review Date</b>
<b>Anua (formerly Bord Na Mona)</b>	Puraflo Peat Biofilter	2/20/2007	BOD/TSS and <10,000 fecal(1 ft soil depth credit)	<b>Approved through 2020</b>
<b>Consolidated Treatment Systems</b>	Enviro-Guard ENV or ENV-M (modualr)	2/26/2007	BOD/TSS	<b>Approved through 2020</b>
<b>Consolidated Treatment Systems</b>	Enviro-Guard ENV/ENV-M+ Salcor 3G UV Disinfection	2/26/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2020</b>
<b>Consolidated Treatment Systems</b>	Multi-Flo FTB Models (.05, .06, .75, 1.0 1.5)	2/26/2007	BOD/TSS	<b>Approved through 2020</b>
<b>Orenco</b>	AdvanTex AX20	2/27/2007	BOD/TSS	<b>Approved through 2020</b>
<b>Orenco</b>	AdvanTex AX20 + Salcor 3G or Univirex 36 UV Disinfection with Gravity or pump discharge	2/27/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<b>Approved through 2020</b>
<b>Orenco</b>	AdvanTex AX20 + Salcor 3G UV + Pump Discharge or system fail pump lock-out	2/27/2007	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<b>Approved through 2020</b>
<b>Jet Inc.</b>	1500 Series BAT Media Plants (J-500, J-750, J-1000, J-1250 & J-1500)	3/6/2007	BOD/TSS	<b>Approved through 2020</b>
<b>Ecological Tanks Inc.</b>	Aqua Aire Models (AA500, AA600, AA750, AA1000, AA1500)	3/7/2007	BOD/TSS	<b>Approved through 2020</b>
<b>Norweco</b>	Singulair Model 960	3/7/2007	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	<b>Approved through 2020</b>
<b>Norweco</b>	Singulair Models 960 or TNT + AT 1500 UV Disinfection	3/7/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2020</b>
<b>Norweco</b>	Singulair Model TNT	3/7/2007	BOD/TSS and <10,000 fecal (1 ft Soil depth credit) + Nutrient	<b>Approved through 2020</b>
<b>Consolidated Treatment Systems</b>	Enviro-Guard ENV or ENV-M + Salcor 3G UV Disinfection + Re-Aeration Device + pump lockout or telemetry	3/23/2007	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2020</b>

**TAC 5 Year Product Review Sheet for the STS**

<b>Manufacturer</b>	<b>Product Name</b>	<b>Date of original Approval</b>	<b>Standard approved for</b>	<b>5 year Review Date</b>
<b>Consolidated Treatment Systems</b>	Nayadic M Models	3/23/2007	BOD/TSS	<b>Approved through 2020</b>
<b>SeptiTech, Inc.</b>	SeptiTech (in specified plastic or concrete septic tank)	4/3/2007	BOD/TSS + Nutrient	<b>Approved through 2020</b>
<b>Delta</b>	DF Series Aerobic Treatment Unit (ATU)	4/9/2007	BOD/TSS	<b>Approved through 2020</b>
<b>Delta</b>	DF Series ATU + Salcor 3G UV Disinfection	4/9/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2020</b>
<b>Quanics, Inc.</b>	SCAT Biofilters (Bio-COIR models are included in this approval and are designated by a BC in place of the AC in all models)	4/10/2007	BOD/TSS + Nutrient	<b>Approved through 2020</b>
<b>Ecological Tanks Inc.</b>	Aqua Safe Models (AS500, AS600, AS750, AS1000, AS1500)	5/11/2007	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	<b>Approved through 2020</b>
<b>Norweco</b>	Singular Model TNT + AT 1500 UV Disinfection + Re-aeration (in separate pump basin or within Biokinetic System chamber)+ Service Pro Telemetry or Pump lock	5/17/2007	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restrict\ed spray) + Nutrient	<b>Approved through 2020</b>
<b>Ecological Tanks Inc.</b>	Aqua Aire Models (AA500, AA600, AA750, AA1000, AA1500)	6/20/2007	BOD/TSS + <10,000 fecal (1 ft soil depth credit)	<b>Approved through 2020</b>
<b>Bio-Microbics</b>	MicroFAST Models (.5, .625, .75, .90 and 1.5	6/25/2007	BOD/TSS and Nutrient	<b>Approved through 2020</b>
<b>Bio-Microbics</b>	MicroFAST Models + Salcor 3G UV Disinfection	6/25/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) and Nutrient	<b>Approved through 2020</b>
<b>Eco-Pure Inc</b>	300 Series Peat Moss Filter	6/25/2007	BOD/TSS	<b>Approved through 2020</b>
<b>SeptiTech, Inc.</b>	SeptiTech (in specified plastic or concrete septic tank)	6/25/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit)	<b>Approved through 2020</b>
<b>Bio-Microbics</b>	RetroFAST Models	6/27/2007	Nutrient	<b>Approved through 2020</b>
<b>Jet Inc.</b>	1500 Series BAT Media Plants (J-500, J-750, J-1000, J-1250 & J-1500) + Salcor 3G UV Disinfection or	10/26/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2020</b>

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
<b>Jet Inc.</b>	1500 Series BAT Media Plants (J-500, J-750, J-1000, J-1250 & J-1500) + Salcor 3G UV Disinfection + Re-aeration + Telemetry or Pump lock or	10/26/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2020
<b>Hoot</b>	Hoot H- Series (500, 600, 750 and 1000)	10/27/2007	BOD/TSS	Approved through 2020
<b>Ecological Tanks Inc.</b>	Aqua Safe AS Models(AS500, AS600, AS750, AS1000, AS1500) + Disinfector UV + Re-aeration + Telemetry or Pump lock	10/29/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricive spray)	Approved through 2020
<b>Zoeller Pump Company</b>	Fusion Series Treatment System ZF Models (450, 600, 800)	11/14/2007	BOD/TSS	Approved through 2020
<b>Delta</b>	DF Series ATU + Salcor 3G UV Disinfection + Re-aeration + Telemetry or Pump lock	12/1/2007	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2020
<b>Hoot</b>	Hoot H- Series (500, 600, 750 and 1000)	1/8/2008	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	Approved through 2020
<b>Hoot</b>	Hoot H- Series (500, 600, 750 and 1000)	1/18/2008		Approved through 2020
<b>Hoot</b>	Hoot H-NPDES Series (500, 750 and 1000) + telemetry or pump failsafe	2/28/2008	NPDES (X)3 + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit)	Approved through 2020
<b>Anua (formerly Bord Na Mona)</b>	Puraflo Peat Biofilter + Salcor 3G Re-aeration and fail safe mechinism	3/24/2008	<1,000 fecal (2 ft soil depth credit) & <200 for restricted Spray	Approved through 2020
<b>Anua (formerly Bord Na Mona)</b>	Puraflo Peat Biofilter + Salcor 3G Re-aeration and fail safe mechinism	5/1/2008	all + NPDES	Approved through 2020
<b>Jet Inc.</b>	1500 Series BAT Media Plants (J-500, J-750, J-1000, J-1250 & J-1500)	5/1/2008	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	Approved through 2020
<b>Jet Inc.</b>	1500 Series BAT Media Plants (J-500, J-750, J-1000, J-1250 & J-1500) + Salcor 3G UV Disinfection + Re-aeration + Telemetry or Pump lock or	5/1/2008	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restric\ted spray)	Approved through 2020

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
Hoot	Hoot H-NPDES Series (500, 750 and 1000) + Salcor 3G UV disinfection+ Re-aeration + telemetry or pump failsafe	5/23/2008	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restric\ted spray)	Approved through 2020
Hoot	Hoot H-Series (500, 600, 750 and 1000) + Salcor 3G UV disinfection	5/23/2008	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2020
Consolidated Treatment Systems	Multi-Flo FTB Models (.05, .06, .75, 1.0 1.5)	10/29/2008	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	Approved through 2020
Consolidated Treatment Systems	Multi-Flo FTB Models (.5, .6, .75, 1.0,& 1.5) + Salcor 3G UV Disinfection	10/29/2008	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2020
Consolidated Treatment Systems	Multi-Flo FTB Models (0.5, 0.6, 0.75, 1.0 & 1.5)+ Salcor 3G UV Disinfection + Re-Aeration Device + pump lockout or telemetry	10/29/2008	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricive spray)	Approved through 2020
Quanics, Inc.	SCAT Biofilters(AeroCell only)	1/6/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2021
Quanics, Inc.	SCAT Biofilters(AeroCell only) + Salcor 3G UV disinfection	1/6/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	Approved through 2021
Ecological Tanks Inc.	AA500-35NR + Disinfector UV	2/20/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricive spray)	Approved through 2021
Ecological Tanks Inc.	AA500-35NR	2/20/2009	Nutrient Reduction	Approved through 2021

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
<b>Ecological Tanks Inc.</b>	AS600+4NR+ Disinfector UV	2/20/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2021</b>
<b>Ecological Tanks Inc.</b>	AS600+4NR	2/20/2009	Nutrient Reduction	<b>Approved through 2021</b>
<b>Hydro-Action Industries</b>	AP Series (AP500, AP600, AP750, AP1000, AP1500)	2/20/2009	BOD/TSS	<b>Approved through 2021</b>
<b>Hydro-Action Industries</b>	CLP Series (CLP 500, CLP 600)	2/20/2009	BOD/TSS	<b>Approved through 2021</b>
<b>Hydro-Action Industries</b>	AP Series-0-5-5 SNG-UV, 0-6-5 SNG-UV, 0-7-5 SNG-UV, 0-10-5 SNG-UV, 0-15-5 SNG-UV)	2/20/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2021</b>
<b>Hydro-Action Industries</b>	AP Series+ Salcor 3G UV Disinfection + Re Aeration Device + Telemetry or Pump Lockout (0-5-5 SNG-UV, 0-6-5 SNG-UV, 0-7-5 SNG-UV, 0-10-5 SNG-UV, 0-15-5 SNG-UV)	2/20/2009	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restric\ted spray)	<b>Approved through 2021</b>
<b>Quanics, Inc.</b>	ATS-SCAT-16-AC 2500	2/20/2009	BOD/TSS + Nutrient	<b>Approved through 2021</b>
<b>Consolidated Treatment Systems</b>	Enviro-Guard ENV or ENV-M (modualr)	3/2/2009	<10,000 fecal (1 foot soil depth credit)	<b>Approved through 2021</b>
<b>Ecological Tanks Inc.</b>	Approval includes Concrete models AS500-C, AS600-C, AS750C, AS1000-C	3/19/2009	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	<b>Approved through 2021</b>
<b>Ecological Tanks Inc.</b>	Approval includes Concrete models AS500-C, AS600-C, AS750C, AS1000-C, AS1500-C	3/19/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2021</b>
<b>Anua (formerly Bord Na Mona)</b>	Puraflo Peat Biofilter	4/28/2009	<1,000 fecal (2 ft soil depth credit)	<b>Approved through 2021</b>
<b>Clearstream Wastewater</b>	500N, 500NC, 500NC2, 500NC3,500NU, 600N, 600NC, 600NC2, 600NC3, 600NU, 750N, 750NC, 750NC2, 800N, 800NC, 1000N, 1000NC, 1500N, 1500NC	4/28/2009	BOD/TSS	<b>Approved through 2021</b>
<b>Norweco</b>	Singulair Model TNT + Chemcheck chlorination/de-chlorination	4/29/2009	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray) + Nutrient	<b>Approved through 2021</b>

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
<b>Norweco</b>	Singular Model TNT + Chemcheck chlorination/de-chlorination + Re-aeration (in separate pump basin or within Biokinetic System chamber) + Service Pro Telemetry or Pump lock *All of the above models may be substituted with the Singular Green tank, maintaining the rest of the treatment train	4/29/2009	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray) + Nutrient	<b>Approved through 2021</b>
<b>Aero-Tech</b>	AT Series Models 500, 600, 750, 1000, and 1500	7/14/2009	BOD/TSS	<b>Approved through 2021</b>
<b>SludgeHammer™ Group Ltd. (Remediation Product)</b>	SludgeHammer Aerobic Bacterial Generator Models (S-400 and S-600)	8/27/2009	BOD/TSS	<b>Approved through 2021</b>
<b>Jet Inc.</b>	1500 Series BAT Media Plants (J-500, J-750, J-1000, J-1250 & J-1500) + Salcor 3G UV Disinfection + internal re-aeration pump/no basin + Telemetry or Pump lock (two configurations - see diagram)	11/24/2009	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<b>Approved through 2021</b>
<b>Consolidated Treatment Systems</b>	Nayadic M Models (M-6A, M-8A, M-1050A & M-2000A) + Salcor 3G UV Disinfection	1/13/2010	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit)	<b>Approved through 2022</b>
<b>Clearstream Wastewater</b>	500N, 500NC, 500NC2, 500NC3, 500NCS, 500NU, 600N, 600NC, 600NC2, 600NC3, 600NU, 750N, 750NC, 750NC2, 800N, 800NC, 800 NC2, 1000N, 1000-B, 1000NC, 1000 NC-B, 1500N, 1500 N-B, 1500NC, 1500 NC-B with pretreatment tank and Salcor 3G UV	3/22/2010	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<b>Approved through 2022</b>
<b>Clearstream Wastewater</b>	500N, 500NC, 500NC2, 500NC3, 500NCS, 500NU, 600N, 600NC, 600NC2, 600NC3, 600NU, 750N, 750NC, 750NC2, 800N, 800NC, 800 NC2, 1000N, 1000-B, 1000NC, 1000 NC-B, 1500N, 1500 N-B, 1500NC, 1500 NC-B with pretreatment tank and Salcor 3G UV, re-aeration and failsafe	3/22/2010	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<b>Approved through 2022</b>

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
<b>Winelco Inc.</b>	Univirex 36 Ultraviolet Disinfectant – as substitute to the Salcor 3G Ultraviolet Disinfection Unit or the Disinfectant UV Disinfection Unit in new or existing approved systems that meet the flow requirements of less than 5 GPM with a concurring request by the system manufacturer. The following manufacturers are approved for use with the Univirex 36 having provided a concurring request: -Orenco Systems, Inc.	5/10/2010	Univirex 36 Ultraviolet Disinfectant – as substitute to the Salcor 3G Ultraviolet Disinfection Unit or the Disinfectant UV Disinfection Unit in new or existing approved systems that meet the flow requirements of less than 5 GPM with a concurring request by the system manufacturer. The following manufacturers are approved for use with the Univirex 36 having provided a concurring request: -Orenco Systems, Inc.	<a href="#">Approved through 2022</a>
<b>Orenco</b>	AdvanTex AX20-RT + Salcor 3G or Univirex 36 UV Disinfection	5/26/2010	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Orenco</b>	AdvanTex AX20-RT + Salcor 3G or Univirex 36 UV Disinfection + Re-aeration + pump lock-out	5/26/2010	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Presby Environmental</b>	AES-Presby	6/23/2010	BOD/TSS and <10,000 fecal(1 ft soil depth credit)	<a href="#">Approved through 2022</a>
<b>Bio-Microbics</b>	MicroFAST Models + Salcor 3G UV Disinfection +Re-aeration + Pump lockout or telemetry	7/16/2010	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) and Nutrient	<a href="#">Approved through 2022</a>
<b>Anua (formerly Bord Na Mona)</b>	Puraflo Bottomless Type A Pad Dispersal in subsurface applications	7/26/2010	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit)	<a href="#">Approved through 2022</a>
<b>Anua (formerly Bord Na Mona)</b>	Puraflo Type B Mounded Pad Dispersal	11/5/2010	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit)	<a href="#">Approved through 2022</a>



**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
<b>Jet Inc.</b>	J-500-P500-OH Media Plant + Salcor 3G UV Disinfection + Re-aeration + Telemetry or Pump lock. The pump tank is integrated with main tank resulting in one mold cast for this model.	11/5/2010	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restric\ted spray)	<a href="#">Approved through 2022</a>
<b>Bionest Technologies</b>	Bionest System	12/1/2010	BOD/TSS, < 10,000 fecal (1 ft soil depth Credit) + Nitrogren Reduction	<a href="#">Approved through 2022</a>
<b>Bionest Technologies</b>	Bionest System +Sterilite SC-320 UV Disinfection	12/1/2010	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Bionest Technologies</b>	Bionest System +Sterilite SC-320 UV Disinfection + Re-aeration + pump lockout failsafe	12/1/2010	all + NPDES	<a href="#">Approved through 2022</a>
<b>Hydro-Action Industries</b>	AP Series (AP500, AP600, AP750, AP1000, AP1500)	3/24/2011	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	<a href="#">Approved through 2022</a>
<b>Hydro-Action Industries</b>	CLP Series (CLP 500, CLP 600)	3/24/2011	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	<a href="#">Approved through 2022</a>
<b>Hydro-Action Industries</b>	CLP Series+ Salcor 3G UV Disinfection + Re-Aeration Device + Telemetry or Pump Lockout	3/24/2011	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restric\ted spray)	<a href="#">Approved through 2022</a>
<b>Norweco</b>	Singular Model N 11 (Model A-20 Air pump, AT 1500 UV Disinfection and Re-aeration)	7/7/2011	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray) + Nutrient	<a href="#">Approved through 2022</a>
<b>Ecological Tanks Inc.</b>	Low Profile Models AS500L, AS600L, AS500L-C and AS600L-C	7/11/2011	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<a href="#">Approved through 2022</a>
<b>Jet Inc.</b>	(J-500, J-750, J-1000, J-1250 & J-1500) + Jet 952 UV Disinfection	10/19/2011	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
<b>Jet Inc.</b>	(J-500, J-750, J-1000, J-1250 & J-1500) + Jet 952 UV Disinfection + Re-aeration + Telemetry or Pump lock	10/19/2011	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Jet Inc.</b>	J-500, J-750, J-1000, J-1250 & J-1500) + Jet 952 UV Disinfection + internal re-aeration pump/no basin + Telemetry or Pump lock (two configurations - see diagram)	10/19/2011	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Jet Inc.</b>	J-500-P500-OH Media Plant + Jet 952 UV Disinfection + Re-aeration + Telemetry or Pump lock. The pump tank is integrated with main tank resulting in one mold cast for this model.	10/19/2011	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Delta</b>	DF Series ATU + Salcor 3G UV Disinfection + Re-aeration + Telemetry or Pump lock	1/10/2012	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	<a href="#">Approved through 2022</a>
<b>Orengo</b>	AdvanTex AX20-RT with gravity or pump discharge	1/10/2012	BOD/TSS	<a href="#">Approved through 2022</a>
<b>Orengo</b>	AdvanTex AX20-RT + UV with pump discharge	1/10/2012	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Orengo</b>	AdvanTex AX20-RT + Salcor + 3G or Univirex 36 UV Disinfection + Re-aeration + pump lock-out	1/10/2012	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>
<b>Orengo</b>	AdvanTex AX25-RT	1/10/2012	BOD/TSS	<a href="#">Approved through 2022</a>
<b>Orengo</b>	AdvanTex AX25-RT+UV	1/10/2012	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	<a href="#">Approved through 2022</a>

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
Orengo	AdvanTex AX25-RT+UV+Re-aeration pump discharge	1/10/2012	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	Approved through 2022
Orengo	JE to allow Substitute Salcor for AXUV	1/10/2012		Approved through 2022
Ecological Tanks Inc.	Aqua Safe AS Models(AS500, AS600, AS750, AS1000, AS1500) + Disinfectant UV + Re-aeration + Telemetry or Pump lock	1/31/2012	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2022
Jet Inc.	J-500, J-750 and J-800 Plastic tanks can be used in lieu of concrete	6/27/2012	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	Approved through 2022
Jet Inc.	Journal Entry for UV options for the Jet 1500 Series Treatment Trains	12/12/2012		Approved through 2022
Bio-Microbics	MicroFAST Models (.5, .625, .75, .90 and 1.5	5/7/2013	<10,000 fecal (1 Ft Soil Depth Credit)	Approved through 2023
Norweco	Hydro-Kinetic 600 FEU 2 and 3 tank Series	8/19/2013	BOD/TSS and <10,000 fecal (1 ft Soil depth credit) + Nutrient	Approved through 2023
Norweco	Hydro-Kinetic 600 FEU 2 and 3 tank Series w/Model AT 1500 UV Disinfection	8/19/2013	BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 and < 20 fecal for restricted and unrestricted spray	Approved through 2023
Eljen Corporation	Gravity, Demand or Time Dosing Module A42 and B43	8/20/2013	BOD/TSS	Approved through 2023
Eljen Corporation	Demand or Time Dosing Module A42 or B43	8/20/2013	BOD/TSS and <10,000 fecal (1 ft Soil depth credit)	Approved through 2023
Ecological Tanks Inc.	Pretreatment tanks needed for the following Aqua Aire Models AA500, AA500T,AA600,AA750, AA750T,AA800, AA1000, AA1200,AA1500,+Disinfectant UV, Hi Blow HP40 Re-aeration +pump lockout or Telemetry	7/8/2014	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2023

**TAC 5 Year Product Review Sheet for the STS**

Manufacturer	Product Name	Date of original Approval	Standard approved for	5 year Review Date
Ecological Tanks Inc.	Approval also includes the following models w/o separate pretreatment tanks AA500-35,AA500T-32, AA600-50, AA800-65 + Disinfector UV, + Hi Blow HP40 Reaeration +pump lockout or Telemetry	7/8/2014	NPDES + BOD/TSS,<10,000 and <1,000 fecal (1 & 2 foot soil depth credit) < 200 for restricted spray)	Approved through 2023

# Ohio Department of Health and Sewage Treatment Systems Technical Advisory Committee

## Application Form for Review of a Sewage Treatment System or Component under Ohio Revised Code Chapter 3718.04

*In accordance with ORC 3718.04(A), an application shall be submitted to the Ohio Department of Health (ODH) and the Sewage Treatment System Technical Advisory Committee for the use of a sewage treatment system (STS) or a component of an STS in Ohio that differs in design or function from systems or components the use of which is authorized in OAC Chapter 3701-29. To request an ORC 3718.04 review, complete this form and submit it with all applicable information in accordance with the **Application Instructions for Ohio Revised Code Chapter 3718.04 Sewage Treatment System or Component Review.***

### Select the product application category:

- ☐ New Product      ☐ Product Renewal      ☐ Modification to existing approved product  
Date(s) of approval(s) being modified \_\_\_\_\_

### Name of System or Component

List all model numbers

### Approval Requested

Identify which standards are to be considered and list specific system configuration (treatment train)

- ☐ CBOD<sub>5</sub>(<25 mg/L) and TSS Reduction (<30mg/L)
- ☐ 1,000 Fecal Coliform Reduction (1 ft. soil depth credit)
- ☐ 10,000 Fecal Coliform Reduction (2 ft soil depth credit)
- ☐ <200 Fecal Coliform Reduction
- ☐ < 20 Fecal Coliform Reduction
- ☐ NPDES Discharging System
- ☐ Nutrient Reduction
- ☐ Other (please describe): \_\_\_\_\_

**Refer to the *Application Instructions and Checklist for Ohio Revised Code Chapter 3718.04 Sewage Treatment System or Component Review* before completing the following:**

YES ____	NO ____	Submitting first application for this STS component or system
YES ____	NO ____	Requesting presentation before the Technical Advisory Committee
YES ____	NO ____	Requesting confidential treatment

**Company Name:**

**Mailing Address:**

**Name of Contact person:**

**Mailing Address:**

**Phone number:**

**Alternative phone number:**

**FAX:**

**E-mail:**

*By submitting this application, you declare that the information contained herein and within any attached materials is true, accurate and complete to the best of your knowledge. You also understand that any misrepresentation or significant omission of information may result in the return of your application for supplementation or the denial of your application.*

**Signature:**

**Title:**

**Date:**

***Mail the complete application to:***

*Ohio Department of Health  
Administrator, Residential Water and Sewage Program  
BEH – 7<sup>th</sup> Floor  
246 North High Street  
Columbus, OH 43215*

***ODH Bureau of Environmental Health Contact Information for Questions:***

Residential Water and Sewage Program [BEH@odh.ohio.gov](mailto:BEH@odh.ohio.gov) (614)644-7551

HEA 3718.04 Form  
7/2009, 6/2019

# Ohio Department of Health And Sewage Treatment System Technical Advisory Committee

## Application Instructions for CBOD<sub>5</sub>/TSS or Ohio Revised Code 3718.04 Sewage Treatment System or Component Review

Each applicant requesting CBOD<sub>5</sub>/TSS Review or ORC 3718.04 Review shall compose a submittal that satisfies each detail outlined in these instructions. Satisfaction of these instructions is determined by the Ohio Department of Health. Each submittal shall open with a summary of the product and requested approval following the letter and number designations outlined in these instructions. The summary may refer to supplemental material (company produced product manuals, performance reports, etc.), provided it is tabbed and included in the submittal. Each submittal shall include:

- the *Application Form for CBOD<sub>5</sub>/TSS or ORC 3718.04 Review* in Tab A,
- a written request or decline for a presentation before TAC in Tab B,
- a written request or decline for confidentiality of any information included in the submittal in Tab C,
- and an Operation and Maintenance Manual designed to provide guidance to service providers and homeowners in Tab D.

Additional references must be tabbed and added to the end of the submittal. The application information shall be clear and concise to expedite review.

TAC, in cooperation with ODH, has drafted a *Standards and Guidelines for ORC 3718.04 Review*, which defines applicable standards for approval and an explanation of the review process. For more information, contact Residential Water and Sewage Program Staff at: [BEH@odh.ohio.gov](mailto:BEH@odh.ohio.gov) or (614)466-1390.

### A) **Application Form for ORC 3718.04 Review**

The application form must be signed, with the title of the person signing provided, and dated. The application form shall be provided under Tab A of the submittal.

### B) **Presentation to the STS Technical Advisory Committee (TAC)**

A written request or decline for a brief presentation (15 to 20 minutes) preceding TAC review and discussion of the request for approval must be included in TAB B. A request for a presentation shall identify if Audio and Visual equipment is needed for the presentation. Presentations should be compatible with Microsoft 2007 and saved on a CD or portable memory stick (flash drive).

### C) **Trade secrets and request for confidentiality**

A written request or decline for confidentiality must be included under Tab C of the submittal. Any application, record, report, or other information submitted to ODH for the purposes of this review shall be available to the public, except upon a showing satisfactory to the director of health that all or part of such record, report, or other information, other than effluent data, would divulge methods or processes entitled to protection as trade secrets, as defined in section 1333.61 of the Revised Code, in which instance, ODH shall consider such record, report, or other information or part thereof as confidential and administer such record, report, or other information pursuant to the following:

1. A request for confidential treatment shall be submitted to ODH simultaneously with submission of the specific application, record, report, or other information with documentation sufficient to support that all or part of the application, record, report, or other information is confidential. Failure to make such timely request shall constitute a waiver of the right to prevent public disclosure. A request at a later time will be entertained by ODH, but neither the department nor members of the TAC will be liable for any information released prior to receiving the request.

2. A decision as to whether to treat all or part of the application, record, report, or other information as confidential shall be made by the director within forty-five calendar days of receipt of the request and accompanying documentation. Until such decision is made, the application, record, report, or other information or part thereof, shall be treated as confidential. The person requesting confidentiality shall be notified in writing of the director's decision. The ODH preliminary review of an *Application for an ORC 3718.04 Review* shall begin subsequent to the director's decision.
3. Any application, record, report or other information determined to be confidential may be disclosed, without such person's consent:
  - a. To officers, employees, or authorized representatives of the state or a federal agency;
  - b. In any judicial proceeding; and
  - c. In any hearing conducted by ODH.

**D) System/Component Information**

Submit written information using the order and numbered designations provided below and indicate why any requested information is not applicable.

1. Include the model numbers, design capacity, and hydraulic capacity of each component included in the application with a general description of the component.
2. Specify the purpose of the request for approval. Identify the targeted performance standard(s) and credits or reductions from Appendices A and B to the **Standards and Guidelines for ORC 3718.04 Review**. Identify, in detail, the complete treatment train used to achieve each standard.
3. Explain the process of operation and performance (i.e. the processes or methods by which performance is achieved, and as applicable, include details on any specific claims and processes for enhanced treatment or improved performance).
4. Provide technical information for each component and/or treatment train. Refer to tabbed information in the submittal as necessary. At a minimum, include design capacity, scaled detail drawings, materials specifications, structural capacity and documentation on watertight integrity as applicable for products with subsurface containment components.
  - a. documentation of watertight integrity and structural soundness  
This documentation may include testing data, appropriate certification(s), or a signed statement from an engineer.
  - b. material specifications
  - c. detailed drawings of each model
  - d. detailed drawings of each complete system or treatment train used to achieve the standards
  - e. pump, diffuser, compressor and any other mechanical device specifications and information
  - f. alarm and control specifications and information. (Alarms and controls shall be on a commonly used household circuit. All other electrical components shall be on a different dedicated circuit)
  - g. failsafe mechanisms specifications and information (if applicable)
  - h. post-aeration basin specifications and information including the hydraulic capacity and material specifications
  - i. pretreatment tank specifications and information including detailed drawings, hydraulic capacity, and material specifications
  - j. inspection port specifications and information including its location within the treatment train
  - k. disinfection unit specifications and information including installation and maintenance information
  - l. other component, system, or treatment train technical information
5. Identify any limitations on use, operation, or reliability related to capacity and flow fluctuations, influent restrictions or limits, siting or operating conditions, etc.



6. Summarize performance information to support the requested approval. See the *Standards and Guidelines for ORC 3718.04 Review* for an explanation of what performance information is acceptable. The complete data set and a summary table identifying the average and standard deviation of all normally distributed data, and the geometric mean and geometric standard deviation (the first moment of the transformation) of all data that is not normally distributed, and the confidence intervals of all data. Appendix C of the *Standards and Guidelines for ORC 3718.04 Review* explains the derivation and interpretation of confidence intervals. Unless provided by a third-party certifier, the applicant shall provide the data set in an excel spreadsheet or longhand form (the step by step process used in the statistical analysis) to allow TAC to check/ confirm the analysis. The data set must be accompanied with a detailed explanation of:
  - a. a description of the treatment train and each sampling location
  - b. testing type and regimen
  - c. the testing protocol(s)
  - d. identification of the individuals participating in the chain of custody, collection, transportation, and evaluation of the sample, and who produced any report(s)
  - e. the dates of samples and range of environmental conditions including temperature
  - f. influent concentration and flows
  - g. operation and maintenance conducted during the testing period.
  - h. identification of the applicability of the results to other scaled models
7. Provide siting and installation related information:
  - a. any site restrictions or siting criteria (i.e. minimum footprint, access for service)
  - b. any soil characteristics that may affect performance
  - c. detailed written installation instructions including any siting, soil, or depth of cover specifications or restrictions
  - d. tank or component buoyancy calculations and associated anti-buoyancy measures
  - e. written watertight field test procedure
  - f. an abbreviated installation checklist for installer documentation (see criteria below\*)
  - g. identification of any explicitly required installer certification or training
8. Provide service related information, as applicable:
  - a. O&M manual with detailed instructions including maintenance schedule for routine service and residuals management
  - b. O&M service checklist for service provider documentation (see criteria below\*)
  - c. Description of availability of service providers and/or distributors. How will the accessibility to more than once service provider be ensured?
  - d. Sources for replacement parts and any restrictions on replacement parts
  - e. Identification of any explicitly required service provider certification or training
    - i. If applicable, training/certification details: How are they trained? What are the terms for renewal training/certification? How does the manufacturer keep track of those trained? Actions for non-compliance? Etc.
  - f. How can certification be verified?
  - g. Information on service contract availability and any warranty conditions
  - h. Estimates of operational costs and expected service life
  - i. A PDF file, suitable for web posting, shall be submitted to ODH upon approval. The file shall include a copy of the Operation and Maintenance Manual, checklists identified in D 7 (d) and D 8 (b), and a detailed drawing of each treatment train obtaining approval by ODH. The treatment train drawings shall be labeled with each reduction or credit awarded by ODH.

*\*Criteria for developing an installation or O&M service checklist – Items 7.d) and 8.b) include a checklist for the installer and inspector and a checklist for the service provider. The purpose of the installation checklist is to summarize all of the critical installation steps which, if not done as specified, may result in sub-standard system performance, less than optimum component or system life span and higher maintenance expense over the life of the system, or place a time-consuming burden on a service provider. The checklist also provides a guide for an inspector to verify that the installation and documentation are consistent and accurate.*

*This is the applicant's opportunity to improve quality assurance for the proper installation and inspection of their product and provide the means to document that the installation has been done according to their installation standards. This checklist is not intended to substitute for installer training or reading the installation manuals but is to serve as a method of documenting that the critical installation steps have been completed as required. Service providers reviewing the checklist should be assured that no installation errors were made to result time-consuming problems for their business.*

*The purpose of the O&M checklist is to specify the service operations, to provide a means of documenting performance of the service operations, to create a service record and to provide a service report for the customers.*

*\*Such checklists provided by the applicant should be developed as follows:*

- 1. Use clear, direct language (simple sentences written in active voice), so that the reader (i.e. installer, service provider, inspector, home owner) can easily understand what is required.*
- 2. Critical materials are specified. (Example: type and size of aggregates for bases and back fills)*
- 3. Requirements for critical vertical and horizontal control over the installation are described as an acceptable range of values.*
- 4. Steps are described in such a way that an inspector can easily make a "pass or fail" determination.*
- 5. The checklists reinforce the training provided by the product manufacturer or their agent and summarize the installation instruction provided with the product.*
- 6. Acceptable alternative methods or materials are to be limited, listed and are to meet all of the above criteria.*

# **Ohio Department of Health And Sewage Treatment System Technical Advisory Committee**

## **Standards, Guidelines, and Protocols for Ohio Revised Code Section 3718.04 Review of Sewage Treatment System Products or Components**

### Use of these Standards, Guidelines, and Protocols

The Ohio Revised Code (ORC) section 3718.04 authorizes the Ohio Department of Health (ODH) to approve Sewage Treatment Systems (STS) and components that are not defined in the Ohio Administrative Code (OAC) 3701-29. ORC Section 3718.03 (A) creates the Sewage Treatment System Technical Advisory Committee (TAC) to advise the director of health on the approval or disapproval of these STS or components. ORC 3718.04 requires the director of health to consider TAC recommendations when approving or disapproving a STS or component.

Section 3718.03 (F) of the Revised Code requires TAC and ODH to cooperatively develop standards, guidelines, and protocols for the approval or disapproval of STS or components. This document is created to satisfy the requirement and must be considered by TAC when making recommendations for approval or disapproval and by the director of health when approving or disapproving an application for a new product, modification to an existing product, or product renewal.

### Standards, Guidelines, and Protocols for Review of Sewage Treatment Systems (STS) and Components

In conducting the review of an application in accordance with ORC Section 3718.04, the TAC and the ODH shall:

1. Process the application and approval request documentation to assure review of the specified component or system performance claims.
2. Evaluate the application to assure the applicant has demonstrated at least equivalent performance to protect public health and the environment and meet the regulatory intent of ORC 3718.02 and OAC 3701-29 and standards and / or criteria including any applicable standards listed in Appendices A, B and E of this document.
3. Consider recommendations for approval or disapproval of a new, modification, or renewal product application subject to the regulatory intent of ORC 3718 and OAC 3701-29 and / or any related regulatory changes to law or rule. TAC may also consider any implications for future requests for review.
4. Review application information in the context of the following criteria, as applicable, including but not limited to:
  - (a) Identify applicable performance standards, treatment processes, scientific and/or engineering principles and other relevant criteria pertinent to the review.
  - (b) Assess if there is sufficient theory, applied research, and technical information to explain the function and performance of the component or system and to substantiate specific claims.
  - (c) Consider any requirements, limitations on, or conditions of use, operation, or reliability in view of the information provided and the knowledge and experience of the reviewer.
  - (d) Determine if the submitted performance information adequately supports the requested approval (see item 5 following) and meets the standards and criteria established by the TAC or in law or administrative rule.
  - (e) Review the siting, installation, service, operation and maintenance (O&M) information for the purpose of determining its clarity, accuracy, and completeness.

- i. Documentation relating to the requirements outlined in OAC 3701-29-12(H)(2)-(9) for all trash tanks, pretreatment tanks, pump tanks, and any additional vessels and components as applicable.
  - ii. Documentation relating to the requirements outlined in OAC 3701-29-12(M), as applicable.
- 5. Evaluate the sufficiency, credibility and applicability of submitted data or research findings. The TAC and/or the director may reject data or findings that are determined to be insufficient, unreliable, or not applicable for the purposes of the requested approval. The evaluation of data and findings shall include, but is not limited to, the following considerations, as applicable:
  - (a) Credibility and Quality of supporting research, testing, sampling and data analysis –
    - i. Replicated studies, peer-reviewed research, high quality field testing, and test center data collected in environmental conditions comparable to Ohio shall be valued more heavily than other types of research reports or publications, regulatory reviews or evaluations, or vendor-developed reports.
    - ii. The data shall demonstrate consistent performance within the range of temperature and conditions to which the system would be exposed to while operating in Ohio and expected flow volumes and waste strengths.
    - iii. Optimum data include, as applicable, information regarding strength of influent and effluent wastewater, average influent flow rate, peak influent flow rate, replication of events, controls in place during data collection, effluent quality, range of environmental conditions during data collection, and operation and maintenance performed during data collection. Strength of influent and effluent wastewater shall be demonstrated using at least the standards for which the applicant is requesting approval.
    - iv. TAC and the director shall consider the system or component's ability to consistently meet the standards for which the applicant seeks approval through review of provided raw data and statistical analysis of that data. Review of statistical analysis shall include but is in no way limited to the mean and standard deviation of normally distributed data, the geometric mean and geometric standard deviation (first moment of the transformation) for data that is not normally distributed, and the confidence intervals of all data. Appendix C is provided to explain the derivation and interpretation of confidence intervals, and an Appendix C Spreadsheet is provided to aid in data analysis. The Appendix C Spreadsheet should be requested from the ODH Residential Sewage program by contacting BEH@odh.ohio.gov.
    - v. A minimum of 48 data points (demonstrating consistent performance within the range of temperature and conditions the system would be exposed to while operating in Ohio), each obtained from a separate day of testing shall be submitted, along with the confidence interval analysis included in the statistical analysis as described in Appendix C. A minimum of 96 data points (demonstrating consistent performance within the range of temperature and conditions the system would be exposed to while operating in Ohio), each obtained from a separate day of testing shall be submitted, along with the statistical analysis as described in Appendix C, if the confidence interval analysis is not included in the statistical analysis. Data should be calculated and submitted electronically using the Appendix C Spreadsheet.
  - (b) Methods used in gathering data or conducting research - Commonly accepted protocols shall be valued more heavily than that from a protocol or testing process that is not widely accepted. Optimum data and analysis employ *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association or other methods using accepted scientific and statistical methods as appropriate. While reviewing submitted data, TAC and the director shall consider what individual, company, or agency was involved in designation of site(s), equipment,

and event(s) evaluated among the total population, who participated in the chain of custody, collection, transportation, and evaluation of the sample, and who produced any report(s).

- (c) Qualifications of party or parties conducting the testing or research - Research, sampling, evaluation or other data collection and analysis conducted by an independent third party shall be valued more than that conducted by a first party with a stake in the outcome. Third party testing or research is conducted by persons who have no conflict of interest in the outcome of the subject of the evaluation.

6. Evaluate the need for conditions to be placed on the approval. Any such conditions may relate to requirements for similar systems or components authorized and/or approved in accordance with procedures established under OAC Chapter 3701-29, special circumstances specific to the system or component under review, or other considerations as applicable.

## Appendix A to Standards, Guidelines, and Protocols for ORC 3718.04 Review

### A. Standards for effluent applied to a soil absorption component:

1. **CBOD<sub>5</sub>/TSS Standard** – Compliance with this standard, for the purpose of permitting a soil absorption area sizing reduction in accordance with the Ohio Table, shall be demonstrated through:
  - (a) submission of sufficient performance information to demonstrate that effluent quality consistently meets the treatment standard shall be shown by the arithmetic mean (hereinafter referred to as mean) plus one standard deviation of the data being less than the standard of 25 milligrams per liter (mg/L) for five-day carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>) and less than the standard of 30 mg/L total suspended solids (TSS), along with confidence intervals acceptable to the TAC., or
  - (b) submission of an application demonstrating current third party certification and ODH application requirements. Submissions demonstrating current third party certification may be administratively reviewed for approval as authorized by the Director of Health's October 26, 2007 Journal Entry. Demonstration of certification with one of the following third party testing protocols shall constitute sufficient proof of compliance with the CBOD<sub>5</sub>/TSS standard:
    - (1) ANSI/NSF Standard 40 certification or compliance with current ANSI/NSF Standard 40 by an ANSI/CSA accredited third party certifier
    - (2) BNQ Standard NQ 3680-910CE
    - (3) CEN Standard EN 12566-3
2. **Fecal Coliform Standards** – Compliance with the pathogen reduction standards listed below requires that effluent quality consistently meet the standard. Because fecal coliform data tend to be log-normal distributed, proof of "consistently meeting the standard" shall be shown by the geometric mean plus two standard deviations of the data being less than the standard, along with confidence intervals acceptable to the TAC (*c.f. Appendix C herein*). STS that are compliant with the fecal coliform standards listed in a) and b) below and the CBOD<sub>5</sub>/TSS standard listed in 1 above, may utilize soil depth credits, as provided, in accordance with soil absorption provisions in rule or as conditions of approval by the director of health. STS that are compliant with the fecal coliform standards listed in c) and d) below and demonstrate the ability to produce an effluent quality with less than 15 mg/L CBOD<sub>5</sub> (arithmetic mean of data plus two standard deviations) and less than 18 mg/L TSS (arithmetic mean of data plus two standard deviations), may be used for restricted or unrestricted spray application in accordance with the Spray Irrigation Special Device Approval. Alternate E. coli standards may also be used to determine compliance if approved by the director of health.
  - a) less than or equal to ten thousand colonies/one hundred mL allows for a one-foot soil depth credit;
  - b) less than or equal to one thousand colonies/one hundred mL allows for a two-foot soil depth credit;

## Natural Grade

Trench	Trench	Trench
Effluent meeting the fecal coliform standard of <1,000 cfu/100mL - Two Foot Soil Depth Credit	Effluent meeting the fecal coliform standard of <10,000 cfu/100mL - One Foot Soil Depth Credit	Septic Tank effluent-FULL vertical separation distance
Depth to Limiting Condition	Depth to Limiting Condition	Depth to Limiting Condition

- c) less than or equal to two hundred colonies/one hundred mL for restricted spray dispersal;
- d) less than or equal to twenty colonies/one hundred mL for unrestricted spray dispersal.

3. **Nitrogen Reduction** - Nutrient reduction standards for pretreatment components may be established by the Director or board of health when there is a significant risk of nutrient contamination to surface or ground water due to risk factors identified in the site evaluation or other types of water quality assessments, or risk due to proximity to local, state, or federally recognized nutrient sensitive environments.
  - a) When total nitrogen reduction is required, pretreatment components that meet a fifty percent reduction in the total nitrogen concentration (average influent and effluent total nitrogen concentrations and the actual percentage of removal are provided) as demonstrated by ANSI/NSF Standard 245, BNQ Standard NQ 3680-910, CEN Standard EN 12566-3 data or equivalent shall be used.
  - b) Other nutrients standards may be established by the Director or board of health as needed for an area including higher nitrogen reduction or other nutrients.

## B. Standards for effluent discharged to the waters of the state of Ohio

**NPDES Effluent Limitations** are established by the Director of the Ohio Environmental Protection Agency (OEPA) and included in the general permits.

- a) Compliance with the discharge standards requires that effluent quality consistently meet the standard by the mean plus two standard deviations of the data being less than:
  - CBOD<sub>5</sub> 15 mg/L
  - TSS 18 mg/L
  - NH<sub>3</sub>-N summer 2.0 mg/L
  - NH<sub>3</sub>-N winter 4.5 mg/L
- b) Compliance with the discharge standards requires that effluent quality consistently meet the standard by the geometric mean plus two standard deviations of the data being less than 410 cfu/100ml E. coli
- c) Compliance with the discharge standards requires that the effluent shall not be less than 6.0 mg/L D.O. at any time.
- d) Compliance with the discharge standards requires that the effluent shall not exceed 0.038 mg/L Chlorine residual at any time

General NPDES Permits can be found on the OEPA HSTS web page at:

[http://www.epa.ohio.gov/dsw/permits/GP\\_HouseholdSewageTreatmentPlants.aspx](http://www.epa.ohio.gov/dsw/permits/GP_HouseholdSewageTreatmentPlants.aspx)

## Appendix B to Standards, Guidelines, and Protocols for ORC 3718.04 Review

(note: this chart is provided as a convenience, any update to the law and/or rule granting authority which updates the treatment standard or credit should be followed)

Treatment Standard	Law and/or Rules granting authority	Credit
<b>CBOD<sub>5</sub>/TSS less than 25/30 mg/L***</b>	Ohio Revised Code (ORC) 3718.04 Ohio Administrative Code (OAC) 3701-29	Sizing reduction of required soil absorption area based on OAC 3701-29-15 Table 3
<b>Fecal coliform less than 10,000 cfu/100ml****</b> <i>and the CBOD<sub>5</sub>/TSS 25/30 mg/L Standard as described above</i>	Ohio Revised Code (ORC) 3718.04 Ohio Administrative Code (OAC) 3701-29	One-foot depth credit* for soil based system**
<b>Fecal coliform less than 1,000 cfu/100ml****</b> <i>and the CBOD<sub>5</sub>/TSS 25/30 mg/L Standard as described above</i>	Ohio Revised Code (ORC) 3718.04 Ohio Administrative Code (OAC) 3701-29	Two-foot depth credit* for soil based system**
<b>Fecal coliform less than 200 cfu/100ml, CBOD<sub>5</sub> less than 15 mg/L, and TSS less than 18 mg/L****</b>	Special Device Approval for Spray Irrigation	Restricted surface application
<b>Fecal coliform less than 20 cfu/100ml, CBOD<sub>5</sub> less than 15 mg/L, and TSS less than 18 mg/L****</b>	Special Device Approval for Spray Irrigation	Unrestricted surface application
<b>Timed micro-dosing:</b> Distribution to the soil absorption area providing timed micro-dosing controlled at each point of application not to exceed one quarter gallon per dose and one gallon per four square feet of infiltrative area for each point of application per day.	Ohio Revised Code (ORC) 3718.04 Ohio Administrative Code (OAC) 3701-29	One-foot depth credit* for soil based system**
<b>CBOD<sub>5</sub>/TSS for continuous flush drip distribution***:</b> Effluent meeting an average plus one standard deviation of less than 15 mg/L for five-day CBOD <sub>5</sub> and 18 mg/L TSS.	Ohio Revised Code (ORC) 3718.04 Ohio Administrative Code (OAC) 3701-29	Approved for use within an assured continuous flush drip distribution system.
<b>Household Sewage Treatment System (HSTS) National Pollution Discharge Elimination System (NPDES) Permit effluent limitations:</b>  <ul style="list-style-type: none"> <li>▪ CBOD<sub>5</sub> &lt;15 mg/L****</li> <li>▪ TSS &lt;18 mg/L****</li> <li>▪ NH<sub>3</sub>-N summer &lt;2.0 mg/L****</li> <li>▪ NH<sub>3</sub>-N winter &lt; 4.5 mg/L****</li> <li>▪ E. coli &lt; 410 cfu/100ml****</li> <li>▪ D.O. not less than 6.0 mg/L at any time</li> <li>▪ Chlorine residual not to exceed 0.038 mg/L at any time</li> </ul>	Federal Water Pollution Control Act 33 U.S.C. 1251 et. seq.  ORC Chapter 6111  OAC 3745-1-05  NPDES Permit No. OHK000003	When a soil based HSTS is not feasible:  Permits treated effluent meeting NPDES effluent standards to discharge to waters of the state.
<b>Nitrogen Reduction</b>	Ohio Revised Code (ORC) 3718.04 Ohio Administrative Code (OAC) 3701-29	May be required by local health districts when there is a significant risk of surface or ground water contamination

\* Soil depth credit - the use of the design mechanisms of elevation, pretreatment, and/or distribution as substitutes for in situ soil treatment to compensate for inadequate vertical separation distance between the infiltrative surface and the limiting condition.

\*\* Soil based system – final treatment of effluent occurring by distribution within in situ soil.

\*\*\*Compliance with this standard requires that effluent consistently meet a mean or geometric mean plus one standard deviation

\*\*\*\* Compliance with this standard requires that effluent consistently meet a mean or geometric mean plus two standard deviations



## Appendix C to Standards, Guidelines, and Protocols for ORC 3718.04 Review Statistical Analysis & Use of Confidence Interval in Analyzing Data

### Statistical Analysis

Compliance with the treatment standards requires that the effluent quality from the product or component consistently meet a mean plus one or two standard deviations, depending on the application or design credit. The “mean plus one standard deviation” criteria statistically approximates the effluent quality will not exceed the treatment standard 84% of the time. The “mean plus two standard deviations” criteria statistically approximates the effluent quality will not exceed the treatment standard 98% of the time. The statistical analysis using the mean and standard deviation is used for non-bacterial parameters such as CBOD<sub>5</sub> & TSS. This is based on the assumption that the sample data of these parameters are **normally** distributed about the mean. The statistical analysis using the log transformed sample data (i.e., the geometric mean and geometric standard deviation) is used for bacterial parameters such as fecal coliform and E. coli. This is based on the assumption that such data are **log-normally** distributed, and therefore the log transformation of the sample data produces a normal distribution about the mean of the transformed sample data. See additional explanation below.

### Confidence Intervals

In analyzing data, it is first essential to recognize that the data collected represent only a “sample” of the actual range of effluent quality produced by a system over time. Therefore, the information obtained, (for example the sample mean of CBOD<sub>5</sub> or TSS value) is not the “true mean.” Instead, it represents an **estimate** of the “true mean” that one would find if the system were monitored continuously. Of course, the more samples you take, the closer you are to finding the “true mean” that the system produces over the range of actual operating conditions experienced in the field. The *confidence interval* indicates how sure one can be that the **estimated mean** (calculated from the sample data collected) is near the “**true mean**.”

A confidence interval is a basic statistical concept that provides information about the **range in which the “true mean” actually lies**. These are expressed in terms of percentages. In general, the more confident you want to be that the “true mean” lies within the range you select, the wider the range becomes. This concept may best be explained by a simple example.

**Example:** Consider attempting to predict the average score on an exam being taken by 100 people. We can say with 100% certainty (a confidence level of 100%) that the mean will fall between 0 and 100. *However, if we want to narrow that range, we give up confidence.* For example, one can be relatively sure that not all students will score 100 or 0. We also know that some will do well, and some will not. Hence, we can postulate that the average is probably somewhere between 20% and 90%, but we are less than 100% confident in this answer (because in some cases everyone may have scored either very high or very low). This is a qualitative explanation of why increased confidence levels result in larger ranges.

In examining a system’s operation, we collect samples to provide us guidance on where the “true mean” is. In the example above, this would imply collecting some number of tests and recording the score, then calculating the mean. The result will be a mean test score that provides some guidance on where the “true mean” lies, **but there will always be some margin of uncertainty unless the entire population is measured.**

The above concept is translated into statistics by calculating a confidence interval at a desired level of certainty by assuming the population being sampled is normally distributed around the mean. In the case of a mean CBOD<sub>5</sub>, or TSS value, and many of the other parameters analyzed for on-site sewage treatment systems, this is a good assumption. For some however, most notably bacterial information (e.g. total and fecal Coliform & E-coli), the data tend NOT to be normally distributed. To allow us to use the statistics we are used to (mean, standard deviation, etc.) we must TRANSFORM the data into a form that is normally distributed. For bacterial data, the transformation that has proven most effective is the LOG transformation. Once transformed, we can use the transformed data to calculate the confidence interval, and then transform the confidence interval BACK to its original form.

### **Calculating Mean, Standard Deviation, & Confidence Intervals for Non-bacterial Data (e.g. CBOD<sub>5</sub> & TSS)**

The mean is calculated as:  $x_{ave} = \frac{\sum(x)}{n}$

where:  $x$  = sample data point  
 $x_{ave}$  = mean of sample data  
 $n$  = number of sample data points

The standard deviation of sample data is calculated as:

$$s = \sqrt{\sum \frac{(x - x_{ave})^2}{n - 1}}$$

The confidence interval is calculated as:

$$C.I. = x_{ave} \pm (t_{\alpha, n-1}) \left( \frac{s}{\sqrt{n}} \right) \quad (\text{Eq. 1})$$

where: C.I. = confidence interval (range in which “true mean” lies with specified certainty);

$x_{ave}$  = mean of sample data

$(t_{\alpha, n-1})$  = t-value at desired confidence interval. A value based on number of samples and degree of certainty desired and obtained from any statistical reference text;

$n$  = number of sample data points

$v$  = degrees of freedom =  $n - 1$

$s$  = standard deviation of sample calculated as:  $s = \sqrt{\sum \frac{(x - x_{ave})^2}{n - 1}}$ .

### **Using Confidence Intervals to Evaluate the Number of Data Points for Non-bacterial Data (e.g. CBOD<sub>5</sub> & TSS)**

The most common question asked is how many data points (samples) are required to achieve a desired degree of certainty. Unfortunately, it is IMPOSSIBLE to answer that before we start collecting data. As can be seen from equation 1 above, the confidence interval is a function of the standard deviation of the data. To provide an example of the application of this concept, consider the data set below

Date	CBOD <sub>5</sub>	TSS	Date	CBOD <sub>5</sub>	TSS	Date	CBOD <sub>5</sub>	TSS
21-Jun	20.6	16	11-Jul	12.7	9	11-Jan	13.8	12.6
22-Jun	20.6	30	18-Jul	7.81	6.8	12-Jan	11.4	11.1
23-Jun	46.3	27.4	27-Jul	7.82	NS	13-Jan	15.2	14
24-Jun	27.2	26.7	28-Jul	13.6	NS	14-Jan	12.2	9.39
25-Jun	76.1	35	29-Jul	11.5	NS	15-Jan	13.3	13
26-Jun	63.3	33	30-Jul	14.4	NS	16-Jan	8.54	7.8
27-Jun	70.1	32	1-Aug	12.1	NS	17-Jan	17.7	6.72
5-Jul	17.5	2.4	21-Dec	13.5	4.52	24-Jan	10.3	5.82

For the parameter CBOD<sub>5</sub>, the Mean + one Std Dev is greater than the standard of 25 mg/L (22.4 + 20.0 = 42.4 mg/L), and therefore does not meet the standard. And, for TSS, the Mean + one Std Dev is less than the standard of 30 mg/L (16.0 + 10.9 = 26.9 mg/L). (But that does not tell us how sure we are that this sample average is giving us the TRUE average values over the range of the systems operation. To accomplish this, we need to calculate the confidence interval. For this example, we will use the 90% confidence interval (namely, we are sure that the system will produce a value within the specified range 90% of the time). To calculate this we need to calculate the standard deviation of the sample data, as well as know the number of sample points. Because we are only interested in the case when the value is above the range (value above the top confidence interval) we will use a ONE-SIDED T-test statistic. The tail area probability chart can be found in any standard statistical text. An example is found at the end of this document (Table B1).

A 90% confidence for one-tail means we are looking for the 10% (0.1) tail area probability (i.e. the probability that the value of the normal distribution is in the 10% tail area). For the CBOD<sub>5</sub> data above we have 24 samples and a standard deviation of 20.02, and for TSS, we have 19 samples and a standard deviation of 10.92. Because we use one “degree of freedom” in calculating the standard deviation, we have 23 degrees of freedom for CBOD<sub>5</sub> and 18 for TSS. From Table B1 (attached) we find the tail area probability for 0.1 and 23 degrees of freedom and 18 degrees of freedom to be 1.319 and 1.328 respectively.

Therefore, from Eq. 1

$$90\% \text{ Top confidence interval for CBOD}_5 = \bar{x}_{ave} + (t_{\alpha, n-1}) \left( \frac{s}{\sqrt{n}} \right) = 22.4 + (1.319) \left( \frac{20.02}{\sqrt{24}} \right) = 27.8 \text{ mg/L}$$

$$90\% \text{ Top confidence interval for TSS} = 16.0 + (1.328) \left( \frac{10.92}{\sqrt{19}} \right) = 19.3 \text{ mg/L, and}$$

$$90\% \text{ Top confidence interval} + \text{one std dev} = 19.3 + 10.9 = 30.2, \text{ which is } > 30.$$

From this calculation, we cannot be sure (at the 90% level) that the system tested is meeting the TSS standard of 30 mg/L (average + one std deviation less than 30). In fact, we can determine HOW

confident we are by using the data and Eq. 1 to calculate the resulting “t-value” when the top of the confidence interval plus one std dev is 30 mg/L (the standard).

That is: Top C.I. + s = 30, and therefore Top C.I. = 30 – s.

Rearranging Eq. 1 yields

$$(t_{\alpha,n-1}) = (\{\text{Top C.I. for TSS}\} - x_{ave}) * \left(\frac{\sqrt{n}}{s}\right)$$

Substituting {30 - s} for Top C.I. results in:

$$(t_{\alpha,n-1}) = (\{30 - s\} - x_{ave}) * \left(\frac{\sqrt{n}}{s}\right) = (\{30 - 10.92\} - 16.0) * \left(\frac{\sqrt{19}}{10.92}\right) = 1.229$$

Given a t-value of 1.229 and using Table B1, with 18 degrees of freedom, corresponds to just below the 90% confidence level. **So from the data, we can only be about 88% or so confident that the system will meet the required performance standard** (exact percentage would require a more detailed table than the one provided).

#### NOTE:

CBOD<sub>5</sub> 90% Top C.I. + one std dev = 27.8 + 20.0 = 47.8 which is > 25

TSS 90% Top C.I. + one std dev = 19.3 + 10.9 = 30.2 which is > 30

TSS “88%” Top C.I. = 16.0 + (1.229) \* (10.92 /  $\sqrt{19}$ ) = 19.1

TSS “88%” Top C.I. + one std dev = 19.1 + 10.9 = 30.0

## **Calculating Geometric Mean, Geometric Standard Deviation, & Geometric Confidence Intervals for Bacterial Data (e.g. Fecal Coliform & E. coli)**

1. Transform the sample test data numbers (x) to the LOG of the numbers (y)

The log transformation of x is calculated as:  $y = \log_{10}(x)$

2. Use the LOG transformed numbers (y) to perform the statistical calculations (i.e. mean, standard deviation, mean plus two standard deviations, and confidence intervals.)

The mean is calculated as:  $y_{ave} = \frac{\sum(y)}{n}$

where: y = log of sample data point  
y<sub>ave</sub> = mean of log numbers  
n = number of sample data points

The standard deviation of log transformed numbers is calculated as:

$$s = \sqrt{\sum \left( \frac{(y - y_{ave})^2}{n-1} \right)}$$

The confidence interval is calculated as:

$$C.I. = y_{ave} \pm (t_{\alpha, n-1}) \left( \frac{s}{\sqrt{n}} \right) \quad (\text{Eq. 2})$$

where: C.I. = confidence interval (range in which “true mean” lies with specified certainty);

y<sub>ave</sub> = mean of log transformed numbers

(t<sub>α,n-1</sub>) = t-value at desired confidence interval. A value based on number of samples and degree of certainty desired and obtained from any statistical reference text;

n = number of sample data points

v = degrees of freedom = n-1

s = std dev of log transformed numbers is calculated as:  $s = \sqrt{\sum \left( \frac{(y - y_{ave})^2}{n-1} \right)}$

3. Transform each of the statistical calculation results back to its original form (z),  
calculated as  $z = 10^y$ .

## Using Confidence Intervals to Evaluate the Number of Data Points for Bacterial Data (e.g. Fecal Coliform & E. coli)

The most common question asked is how many data points (samples) are required to achieve a desired degree of certainty. Unfortunately, it is IMPOSSIBLE to answer that before we start collecting data. As can be seen from Eq. 1 above, the confidence interval is a function of the standard deviation of the data. To provide an example of the application of this concept, consider the data set below:

Sample No.	Date	Fecal Coliform Sample Test Data (x)	Log <sub>10</sub> of Sample Test Data $y = \text{LOG}_{10}(x)$	
1	21-June	2,400	3.380	
2	22-June	2,400	3.380	
3	23-June	3,500	3.544	
4	24-June	2,400	3.380	
5	25-June	2,200	3.342	
6	26-June	2,400	3.380	
7	27-June	650	2.813	
8	28-June	1,100	3.041	
9	29-June	2,100	3.322	
10	30-June	2,700	3.431	
11	1-July	2,100	3.322	
12	2-July	180	2.255	
13	3-July	2,300	3.362	
14	5-July	660	2.820	
15	6-July	360	2.556	
16	7-July	5,200	3.716	
17	8-July	1,800	3.255	
18	9-July	2,500	3.398	
19	10-July	2,550	3.407	
20	11-July	4,100	3.613	Transformed back to Original Form (10 <sup>y</sup> )
Mean of Log Transformed Data = 3.236				
Standard Deviation of Log Transformed Data = 0.363				
Mean + 2 Standard Deviations of Log Transformed Data = 3.961				9,151 = Geometric Mean + 2 Std Dev

For the parameter Fecal Coliform, the Mean + two Std Dev is greater than the standard of 1,000 cfu/100ml for two-foot soil depth credit, therefore does not meet the standard. However, it is less than the standard of 10,000 cfu/100ml for one-foot soil depth credit. However, that does not tell us how sure we are that this sample average is giving us the TRUE average values over the range of the systems operation. To accomplish this, we need to calculate the confidence interval. For this example, we will use the 90% confidence interval (namely, we are sure that the system will produce a value within the specified range 90% of the time). To calculate this we need to calculate the standard deviation of the log transformed sample data, as well as know the number of sample points. Because we are only interested in the case when the value is above the range (value above the top confidence interval) we will use a ONE-SIDED T-test statistic. The tail area probability chart can be found in any standard statistical text. An example is found at the end of this document (Table B1).

A 90% confidence for one-tail means we are looking for the 10% (0.1) tail area probability (i.e. the probability that the value of the normal distribution is in the 10% tail area). For the Fecal data above, we have 20 samples and a standard deviation of the log transformed data of 0.363. Because we use one “degree of freedom” in calculating the standard deviation, we have 19 degrees of freedom. From Table B1 (attached) we find the tail area probability for 0.1 and 19 degrees of freedom to be 1.328.

Therefore, from Eq. 2:

$$\begin{aligned} 90\% \text{ Top confidence interval for log transformed data} &= y_{ave} + (t_{\alpha, n-1}) \left( \frac{s}{\sqrt{n}} \right) \\ &= 3.236 + (1.328) \left( \frac{0.363}{\sqrt{20}} \right) = 3.344 \end{aligned}$$

Transformed back to original form, 90% Top confidence interval =  $10^{3.344} = 2,207$

90% Top confidence interval + two standard deviations of log transformed data  
 $= 3.344 + 2 (0.363) = 4.07$

Transformed back to original form, 90% top confidence interval + two standard deviation  
 $= 10^{4.07} = 11,749$

From this calculation, we cannot be sure (at the 90% level) that the system tested is meeting the fecal standard of 10,000 cfu/100ml for one-foot soil depth credit (geometric mean + two std deviations less than 10,000). In fact, we can determine HOW confident we are by using the data and Eq. 2 to calculate the resulting “t-value” when the top of the confidence interval plus two std dev of log transformed data equals the log of 10,000 (the standard).

That is: Top C.I. + 2(s) =  $\log_{10} (10,000)$ , and therefore Top C.I. =  $4.0 - 2(s)$ .

Rearranging Eq.2 yields:

$$(t_{\alpha, n-1}) = (\{\text{Top C.I.}\} - y_{ave}) * \left( \frac{\sqrt{n}}{s} \right)$$

Substituting {4.0 - 2(s)} for Top C.I. results in:



$$(t_{\alpha, n-1}) = (\{4.0 - 2(s)\} - y_{ave}) * \left( \frac{\sqrt{n}}{s} \right) = (\{4.0 - 2(0.363)\} - 3.236) * \left( \frac{\sqrt{20}}{0.363} \right) = 0.475$$

Given a t-value of 0.475, and using Table B1, with 19 degrees of freedom, corresponds to between 60% and 75% confidence levels. **So from the data, we can only be about 68% or so confident that the system will meet the required performance standard** (*exact percentage would require a more detailed table than the one provided*).

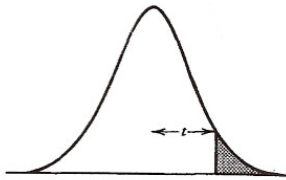
**NOTE:**

90% Top C.I. + two std dev =  $3.344 + 2(0.363) = 4.070$ , transformed back  $10^{4.070} = 11,749$  which is  $> 10,000$

"68%" Top C.I. =  $3.236 + (0.475) * (0.363 / \sqrt{20}) = 3.274$

"68%" Top C.I. + two std dev =  $3.274 + 2(0.363) = 4.000$ , transformed back  $10^{4.000} = 10,000$

TABLE B1. Probability points of the  $t$  distribution with  $\nu$  degrees of freedom



$\nu$	tail area probability									
	0.4	0.25	0.1	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005
1	0.325	1.000	3.078	6.314	12.706	31.821	63.657	127.32	318.31	636.62
2	0.289	0.816	1.886	2.920	4.303	6.965	9.925	14.089	22.326	31.598
3	0.277	0.765	1.638	2.353	3.182	4.541	5.841	7.453	10.213	12.924
4	0.271	0.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	0.267	0.727	1.476	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	0.265	0.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	0.263	0.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	0.262	0.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	0.261	0.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	0.260	0.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	0.260	0.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	0.259	0.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	0.259	0.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	0.258	0.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	0.258	0.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	0.258	0.690	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	0.257	0.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	0.257	0.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	0.257	0.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	0.257	0.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	0.257	0.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	0.256	0.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	0.256	0.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.767
24	0.256	0.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	0.256	0.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	0.256	0.684	1.315	1.706	2.056	2.479	2.779	3.067	3.435	3.707
27	0.256	0.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	0.256	0.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	0.256	0.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	0.256	0.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	0.255	0.681	1.303	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	0.254	0.679	1.296	1.671	2.000	2.390	2.660	2.915	3.232	3.460
120	0.254	0.677	1.289	1.658	1.980	2.358	2.617	2.860	3.160	3.373
$\infty$	0.253	0.674	1.282	1.645	1.960	2.326	2.576	2.807	3.090	3.291

Source: Taken with permission from E. S. Pearson and H. O. Hartley (Eds.) (1958), *Biometrika Tables for Statisticians*, Vol. 1, Cambridge University Press.

Parts of the table are also taken from Table III of Fisher and Yates: *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver and Boyd, Edinburgh), by permission of the authors and publishers.

## **Appendix D to Standards, Guidelines, and Protocols for ORC 3718.04 Review Explanation of the Review Process**

### **Step I. ODH Residential Sewage Program Review for Completeness**

A request for ORC 3718.04 Review shall be submitted as a hard copy document to ODH at the address on the application form. A copy of product data shall be submitted electronically in the Appendix C Spreadsheet. ODH will conduct a preliminary review of the application to determine whether the application is complete. Each item specified in the application and application checklist instructions must be addressed for an application to be considered complete. When a manufacturer submits an application to modify an existing approval, the manufacturer may submit only the information from the application checklist instructions that are applicable to the requested modification. Although all documentation from the original approval is not required for the modification to be considered complete, TAC members may, at any time, request this information to complete the review of the request.

- In the event that an application is determined to be incomplete, the applicant shall be notified by ODH not later than sixty days following the submission the application. The applicant shall be provided with a written description of the information that is missing.
- In the event that an application is determined to be complete, the applicant will be notified not later than sixty days following the submission of the application. The applicant will be asked to submit 15 hard copies of the complete application for distribution to TAC members. The applications shall be sent to the address on the application form.

### **Step II. TAC Review and Recommendations**

- The Ohio Department of Health shall send each TAC member a copy of the application by direct mail or hand delivery within 30 days of receipt of the 15 hard copies. Distribution of the 15 hard copies to committee members shall mark the beginning of the statutory 90-day TAC review period. Please be advised that when an application has been forwarded to the TAC for review, committee members may request additional information from the applicant. In such case, ODH will contact the applicant regarding the requested information.
- In order to provide sufficient time for TAC members to complete comprehensive reviews of submittals, the committee has requested that requests for applications not be added to future agendas until 30 days after copies have been made.
- TAC meetings are scheduled at a frequency to accommodate review of complete applications within the statutory 90-day TAC review period. Requests will be added to future committee meeting agendas, providing sufficient time for each member to review the completed application. Posting of the TAC meeting agendas including the dates, times, and locations of the meetings on the ODH web site shall serve as public notification.
- Applicants may request that additional time be added to the agenda for a short presentation before TAC. Regardless of whether the applicant requests a presentation before the committee, it is recommended that the applicant be present to address questions during discussion of the STS or component. TAC shall review the request for approval considering these standards, guidelines, and protocols. TAC shall vote to recommend approval or disapproval to the director in accordance with TAC bylaws.
  - In the event that TAC votes to recommend approval of the STS or component, the recommendation shall be forwarded to the director for final approval or disapproval. In making recommendations for approval, the TAC may include recommendations for any conditions on the approval. The TAC recommendations for approval may include a minority recommendation for disapproval as applicable.
  - In the event TAC votes to recommend disapproval of the application, the reason for disapproval shall be included in the recommendation. The recommendation for disapproval of the system shall be forwarded to the director for final approval or disapproval.

### **Step III. ODH Final Approval or Disapproval**

The director of health shall review the request for approval with consideration of the TAC recommendation and make the final determination of system approval or disapproval within sixty days of receiving the TAC recommendation. However, if the TAC fails to provide recommendation, or fails to provide recommendation within the statutory 90-day TAC review period, the director may approve or disapprove the application without considering the TAC recommendation. The director shall notify the applicant in writing indicating whether the application has been approved or disapproved.

- In the event of an application's disapproval, the notification shall provide a brief explanation of the reason(s) for the disapproval.
- In the event of an application's approval, the approval will be listed on the ODH web site after receipt of the STS or components Homeowner's Manual, installation checklist, and detailed drawings of the STS and/ or component and complete treatment train (where applicable) suitable for web posting. Such posting shall serve as the notification of director's approval to boards of health and other interested parties. An approval may specify conditions for use of the STS or component.

### **ODH Compliance Review of an Approved System or Component**

An approved and listed system or component is subject to ODH review for compliance with the conditions of approval and compliance with law and rules. Whenever there has been a change in design of the system or component, an applicant shall notify ODH and shall resubmit an application for review. An ODH review may be conducted when specified as a condition of an approval, when there is evidence of noncompliance with approval conditions, or for other reasons deemed necessary to assure compliance. Upon review, if there is a determination of noncompliance, a system or component may be disapproved and removed from the approved list in accordance with Chapter 119 of the Revised Code.

## Appendix E to Standards, Guidelines, and Protocols for ORC 3718.04 Review 2020-2025 Product Renewal Standards

### A. General product renewal standards:

In order to be considered for product renewal, all applicants must submit the information required for new product approval found in the application instructions and in the TAC Standards, Guidelines, and Protocols for Ohio Revised Code Section 3718.04 Review of Sewage Treatment System Products or Components, as well as the following:

- 1) The testing data and report (NSF, BNQ, etc.) for the most current product/ treatment train in the event that the product or treatment train has obtained approved modifications since its original approval. This data should demonstrate that the product meets, at a minimum, the current treatment standards for which approval is being sought. The current treatment standards can be located in Appendix B of this document.
- 2) The following information should be submitted for each product or treatment train for which renewal of product approval is being sought:
  - a) Detailed drawings/schematics of the current product/treatment train. If the product for which renewal is being requested has previously been approved for modification(s), the drawings or schematics submitted for renewal should represent the most recently approved configuration of the product.
  - b) Current installation manuals, operation and maintenance manuals, installation checklists, homeowner's manual, and operation and maintenance checklists for the most recently approved product configuration.
  - c) An updated list with current contact information for all product distributors.
  - d) An updated list of authorized service providers who have received manufacturer certification to service the product/treatment train. Additionally, the manufacturer should provide:
    - i. An example/template service contract that identifies the minimum required services that authorized service providers can adapt for their business model.
  - e) An example of the certification (certificate, letter, or similar) that will be issued by the manufacturer to an authorized service provider upon completion of manufacturer training. **The certification must only be valid for a single registration/calendar year and must be reissued annually by the manufacturer.** The certificate issued to the authorized service provider must clearly indicate the expiration date of the certification.
  - f) In addition to product specific technical training, a manufacturer authorized service provider shall be required, as a condition of the manufacturer's certification, to include the following in every service contract:
    - i. If the product requires effluent sampling as a condition of director's approval (i.e. NPDES), effluent samples shall be collected by a registered service provider if the board of health where the product is installed has chosen not to provide sample collection services in accordance with OAC 3701-19-E(1). Service providers may contract or partner with a laboratory to provide the sampling services when necessary. Laboratories that offer

sample collection services must register as a service provider with the local health district(s) where samples are collected.

**B. Standards for products that are applying for renewal of Household Sewage treatment System (HSTS) National Pollution Discharge Elimination System (NPDES) approval:**

In addition to the items in section A of this appendix, products that were previously approved for and are seeking renewal for NPDES discharge standards must submit additional field data demonstrating that those products meet the current standards in household applications.

- 1) Manufacturers may choose to submit existing NPDES sampling data from the most recent two full calendar (January 1 to December 31) years, which was gathered as part of the compliance with the Ohio EPA General Household National Pollutant Discharge Elimination System (NPDES) Permit compliance by the system owner; or
- 2) A minimum of four samples per location from the existing approved treatment train of a pretreatment component at twelve Ohio (or similar climate) households taken at evenly spaced intervals over a minimum period of nine months and a maximum period of fifteen months, with a twelve month period being ideal. These samples should meet the following criteria:
  - a) Ohio data is preferred. If data from similar climate households is submitted it must include an explanation of why Ohio data was not obtained and demonstrate that the treatment train configuration sampled is the same treatment train configuration approved for use in Ohio.
  - b) Manufacturers should demonstrate that, to the extent possible, the sampled household systems are a random selection of the installed products.
  - c) Samples should be collected and analyzed for the parameters outlined in the current general HSTS NPDES permit, found in Appendix B. Additionally:
    - i. Sampling methodologies shall follow the Procedure for the Collection and Testing of Grab Samples as Required by NPDES General Permit for Discharging Household Sewage Treatment Systems (available at: <https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/sewage-treatment-systems/resources-and-education/npdes-fs-samprotocol>)
    - ii. Research, sampling, evaluation or other data collection and analysis conducted by an independent third party shall be valued more than that conducted by a first party with a stake in the outcome. Third party testing or research is conducted by persons who have no conflict of interest in the outcome of the subject of the evaluation.
  - d) The samples should be collected in a range of conditions in order to demonstrate that the product or treatment train performs adequately in real-world scenarios. The samples should:
    - i. Represent operation during summer and winter conditions. Summer conditions are considered from May 1- Oct 31, and winter conditions are from Nov 1- Apr 30. Samples should be collected at a range of temperatures that reflect performance under winter or summer conditions in Ohio.

- ii. Be collected at varying times of day to demonstrate performance during variable periods and amounts of household water usage.
- e) Manufacturers should submit information about the households and systems from which the samples are collected, including:
  - i. The number of occupants in the household.
  - ii. The hydraulic/design capacity of the system.
  - iii. A general geographic location of the system. This should include the county and township, as well as the state or province if data is collected outside of Ohio.
  - iv. The history of system service and maintenance. Records should include:
    - o Last service date prior to the start of testing.
    - o Service reports for any service that is provided during the testing period.
- f) Field data shall be submitted in the spreadsheet provided electronically by the ODH Residential Sewage program upon receipt of your application or upon request.
- g) Information about the collection of field data shall be submitted in accordance with the criteria established in section 5 (b) of the Standards, Guidelines, and Protocols for Ohio Revised Code Section 3718.04 Review of Sewage Treatment System Products or Components.