pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0100129**
Facility Type	**Non-Municipal**	APS ID	**1084594**
Major / Minor	**Minor**	Authorization ID	**1432871**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Seneca Hills Bible Conference**	Facility Name	**Seneca Hills Campground**
Applicant Address	276 Damascus Road	Facility Address	276 Damascus Road
	Polk, PA 16342-4904		Polk, PA 16342-4904
Applicant Contact	Robb Dempsey, Facilities Manager (robb.dempsey@senecahills.org)	Facility Contact	Robb Dempsey, Facilities Manager (robb.dempsey@senecahills.org)
Applicant Phone	(814) 673-1433	Facility Phone	(814) 673-1433
Client ID	37566	Site ID	244065
Ch 94 Load Status	Not Overloaded	Municipality	Victory Township
Connection Status	No Limitations	County	Venango
Date Application Received	February 27, 2023	EPA Waived?	Yes
Date Application Accepted	March 29, 2023	If No, Reason	-

Purpose of Application: Renewal of an NPDES Permit for an existing discharge of treated sanitary wastewater.

Summary of Review

Act 14 - Proof of Notification was submitted and received.

A Part II Water Quality Management permit is not required at this time.

The Permittee should be able to meet the limits of this permit, which will protect the uses of the receiving stream.

I. OTHER REQUIREMENTS:

A. Stormwater into sewers
B. Right of way
C. Solids handling
D. Public Sewerage Availability
E. Effluent Chlorine Optimization and Minimization

SPECIAL CONDITIONS:

II. Solids Management

There are no open violations in efacts for Client ID (37566) as of 1/17/2024.

Approve	Deny	Signatures	Date
X		Stephen A. McCauley Stephen A. McCauley, E.I.T. / Environmental Engineering Specialist	1/17/2024
X		 Vacant / Environmental Engineer Manager	Okay to Draft JCD 1/22/2024

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	001	Design Flow (MGD)	0.017
Latitude	41º 20' 31.00"	Longitude	-79º 53' 0.00"
Quad Name	-	Quad Code	-
Wastewater Description:	Sewage Effluent		
Receiving Waters	Sandy Creek (WWF)	Stream Code	51322
NHD Com ID	100478127	RMI	1.51
Drainage Area	149.63	Yield (cfs/mi^2)	0.049
Q_{7-10} Flow (cfs)	7.34	Q_{7-10} Basis	calculated
Elevation (ft)	992	Slope (ft/ft)	0.00934
Watershed No.	16-G	Chapter 93 Class.	WWF
Existing Use	-	Existing Use Qualifier	-
Exceptions to Use	-	Exceptions to Criteria	-
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment	-		
Source(s) of Impairment	-		
TMDL Status	-	Name	-

Background/Ambient Data		Data Source
pH (SU)	-	-
Temperature (°F)	-	-
Hardness (mg/L)	-	-
Other:	-	-

Nearest Downstream Public Water Supply Intake	Aqua Pennsylvania, Inc. - Emlenton		
PWS Waters	Allegheny River	Flow at Intake (cfs)	1,376
PWS RMI	90.0	Distance from Outfall (mi)	24.0

Sludge use and disposal description and location(s): Sludge is hauled To the Franklin STP, where it is disposed of at an approved landfill.

Public Participation

DEP will publish notice of the receipt of the NPDES permit application and a tentative decision to issue the individual NPDES permit in the *Pennsylvania Bulletin* in accordance with 25 Pa. Code § 92a.82. Upon publication in the *Pennsylvania Bulletin*, DEP will accept written comments from interested persons for a 30-day period (which may be extended for one additional 15-day period at DEP's discretion), which will be considered in making a final decision on the application. Any person may request or petition for a public hearing with respect to the application. A public hearing may be held if DEP determines that there is significant public interest in holding a hearing. If a hearing is held, notice of the hearing will be published in the *Pennsylvania Bulletin* at least 30 days prior to the hearing and in at least one newspaper of general circulation within the geographical area of the discharge.

Narrative: This Fact Sheet details the determination of draft NPDES permit limits for an existing discharge of 0.017 MGD of treated sewage from an existing STP in Victory Township, Venango County.

Treatment permitted under Water Quality Management Permit 6178402 consists of the following: A 470 gallon influent wet well, manual screening, a 17,000 gallon steel aeration tank, a 4,741 gallon steel final settling tank, tablet chlorine disinfection with a 1,381 gallon contact tank, and a 1,160 gallon aerated sludge holding tank.

1. Streamflow:

Sandy Creek at Outfall 001:

Drainage Area:	149.63	sq. mi.		(from previous WQPR)
Yieldrate:	0.049	cfsm		(from previous WQPR)
% of stream allocated:	100%		Basis:	no nearby discharges
Q_{7-10}:	7.33	cfs		(calculated)

2. Wasteflow:

Maximum discharge: 0.017 MGD = 0.026 cfs

Runoff flow period: 24 hours Basis: Runoff flow with flow equalization

The calculated stream flow is more than three times the permitted discharge flow. In accordance with the SOP, since there is more than 3 parts stream flow (Q7-10) to 1 part effluent (design flow), the treatment requirements in document number 391-2000-014, titled, "Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers", dated April 12, 2008, do not need to be implemented in this NPDES Permit.

Flow will be required to be monitored as authorized under Chapter 92a.61, and as recommended in the SOP.

3. Parameters:

The following parameters were evaluated: pH, Total Suspended Solids, Fecal Coliform, Phosphorus, NH_3-N, $CBOD_5$, Dissolved Oxygen, and Disinfection.

a. pH

Between 6.0 and 9.0 at all times

Basis: Application of Chapter 93.7 technology-based limits.

The measurement frequency was increased from 3/week to 1/day as recommended in the SOP, based on Table 6-3 in the "Technical Guidance for the Development and Specification of Effluent Limitations" (362-0400-001), which will be retained.

b. Total Suspended Solids

Limits are 30.0 mg/l as a monthly average and 60.0 as an instantaneous maximum.

Basis: Application of Chapter 92a47 technology-based limits

c. Fecal Coliform

05/01 - 09/30:	200/100ml	(monthly average geometric mean)
	1,000/100ml	(instantaneous maximum)

10/01 - 04/30: 2,000/100ml (monthly average geometric mean)
10,000/100ml (instantaneous maximum)

Basis: Application of Chapter 92a47 technology-based limits.

d. E. Coli

Monitoring was added for E. Coli at a frequency of 1/year under Chapter 92a.61 as recommended by the SOP for flows between 0.002 MGD and 0.05 MGD.

e. Total Phosphorus

Monitoring for Total Phosphorus will be retained with this renewal in accordance with the SOP, based on Chapter 92a.61.

f. Total Nitrogen

Monitoring for Total Nitrogen will be retained with this renewal in accordance with the SOP, based on Chapter 92a.61.

g. Ammonia-Nitrogen (NH_3-N)

Median discharge pH to be used: 7.0 Standard Units (S.U.)

Basis: Average pH value from DMR summary

Discharge temperature: 25°C (default value used in the absence of data)

Median stream pH to be used: 7.0 Standard Units (S.U.)

Basis: Default value used in the absence of data

Stream Temperature: 25˚C (default value used for WWF modeling)

Background NH_3-N concentration: 0.1 mg/l

Basis: Default value used in the absence of data

Calculated summer NH_3-N limits: 25.0 mg/l (monthly average)
50.0 mg/l (instantaneous maximum)

Calculated winter NH_3-N limits: 25.0 mg/l (monthly average)
50.0 mg/l (instantaneous maximum)

Result: WQ modeling resulted in the calculated summer limits above (see Attachment 1), which are the same as the previous NPDES Permit. The winter limits are calculated as three times the summer limits, but since the technology-based limits would govern, they will be used. Similar to the previous permit, NH3-N will remain as monitor only year round.

h. $CBOD_5$

Median discharge pH to be used: 7.0 Standard Units (S.U.)

Basis: Average pH value from DMR summary

Discharge temperature: 25°C (default value used in the absence of data)

Median stream pH to be used: 7.0 Standard Units (S.U.)

Basis: Default value used in the absence of data

Stream Temperature: 25˚C (default value used for WWF modeling)

Background $CBOD_5$ concentration: 2.0 mg/l

Basis: Default value used in the absence of data

Calculated $CBOD_5$ limits: 25.0 mg/l (monthly average)
50.0 mg/l (instantaneous maximum)

Result: WQ modeling resulted in the calculated CBOD5 limits above (see Attachment 1), which are the same as the previous NPDES Permit and will be retained.

i. Dissolved Oxygen (DO)

The technology-based minimum of 4.0 mg/l is recommended by the WQ Model (see Attachment 2) and the SOP based on Chapter 93.7, under the authority of Chapter 92a.61.

The measurement frequency was increased from 3/week to 1/day as recommended in the SOP, based on Table 6-3 in the "Technical Guidance for the Development and Specification of Effluent Limitations" (362-0400-001), which will be retained.

j. Disinfection

☐ Ultraviolet (UV) light monitoring

☒ Total Residual Chlorine (TRC): 0.5 mg/l (monthly average)
1.6 mg/l (instantaneous maximum)

Basis: The TRC limits above were calculated using the Department's TRC Calculation Spreadsheet (see Attachment 2). The limits are less restrictive than in the previous NPDES Permit. Based on the eDMR data, the previous, more restrictive limits are attainable, they will be retained.

The measurement frequency was increased from 3/week to 1/day as recommended in the SOP, based on Table 6-3 in the "Technical Guidance for the Development and Specification of Effluent Limitations" (362-0400-001), which will be retained.

4. Reasonable Potential Analysis for Receiving Stream:

A Reasonable Potential Analysis was not performed in accordance with State practices using the Department's Toxics Management Spreadsheet since no sampling other than sewage-related parameters was performed for this facility with the renewal application.

5. Reasonable Potential for Downstream Public Water Supply (PWS):

The Department's Toxics Management Spreadsheet does not calculate limits for parameters that are based on PWS criteria (TDS, Chloride, Bromide, and Sulfate). However, since no sample data was provided, mass-balance calculations were not performed.

Nearest Downstream potable water supply (PWS): Aqua Pennsylvania, Inc. - Emlenton
Distance downstream from the point of discharge: 24.0 miles (approximate)

Result: No limits are necessary as significant dilution is available

6. Anti-Backsliding:

Since all the permit limits in this renewal are the same or more restrictive than the previous NPDES Permit, anti-backsliding is not applicable.

7. Attachment List:

Attachment 1 - WQ Modeling Printouts
Attachment 2 - TRC_Calc Spreadsheet

(The Attachments above can be found at the end of this document)

Compliance History

DMR Data for Outfall 001 (from December 1, 2022 to November 30, 2023)

Parameter	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22
Flow (MGD) Average Monthly	0.002	0.002	0.002	0.004	0.005	0.005	0.002	0.006	0.002	0.002	0.002	0.002
pH (S.U.) Instantaneous Minimum	6.2	6.9	6.6	6.6	7.1	7.1	6.9	6.9	7.0	7.0	6.3	7.0
pH (S.U.) Instantaneous Maximum	7.6	7.5	7.4	7.3	7.4	7.3	7.8	7.2	8.4	7.5	8.3	8.4
DO (mg/L) Instantaneous Minimum	4.7	5.7	4.6	5.4	5.0	5.0	6.0	5.9	5.2	5.2	5.2	5.2
TRC (mg/L) Average Monthly	0.3	0.1	0.1	0.4	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.1
TRC (mg/L) Instantaneous Maximum	0.9	0.5	0.5	0.9	0.5	0.7	0.7	0.5	0.2	0.2	0.1	0.2
CBOD5 (mg/L) Average Monthly	11.8	3.5	< 4.3	3.4	< 3.0	4.0	< 2.8	< 2.0	< 2.2	< 2.0	4.0	< 2.7
TSS (mg/L) Average Monthly	8.5	< 8.0	< 20.0	< 14.5	10.5	11.5	6.5	< 5.0	< 9.0	10.0	< 6.5	< 8.0
Fecal Coliform (No./100 ml) Geometric Mean	214	< 1	< 6	46	< 1	69	< 110	220	940	46	93	7
Fecal Coliform (No./100 ml) Instantaneous Maximum	2420	< 1	37	420	< 1	240	2420	2420	2420	50	436	51
Total Nitrogen (mg/L) Semi-Annual Average						30.5						78.0
Ammonia (mg/L) Average Monthly	6.41	1.5	1.32	< 2.2	0.64	9.06	< 0.47	0.55	< 1	< 0.9	14.5	< 6.8
Total Phosphorus (mg/L) Semi-Annual Average						2.1						12

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). Sample frequencies and types are derived from the "NPDES Permit Writer's Manual" (386-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly	Minimum	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	XXX	XXX	XXX	XXX	XXX	1/week	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	4.0 Inst Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.2	1/day	Grab
CBOD5	XXX	XXX	XXX	25.0	XXX	50	2/month	8-Hr Composite
TSS	XXX	XXX	XXX	30.0	XXX	60	2/month	8-Hr Composite
Fecal Coliform (No./100 ml) Nov 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	2/month	Grab
Fecal Coliform (No./100 ml) May 1 - Oct 31	XXX	XXX	XXX	200 Geo Mean	XXX	1000	2/month	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/year	Grab
Total Nitrogen	XXX	XXX	XXX	Report Annl Avg	Report Daily Max	XXX	1/year	8-Hr Composite
Ammonia	XXX	XXX	XXX	Report	XXX	XXX	2/month	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report Annl Avg	Report Daily Max	XXX	1/year	8-Hr Composite

Compliance Sampling Location: at Outfall 001, after disinfection.

Flow and Dissolved Oxygen are monitor only based on Chapter 92a.61. The limits for pH are technology-based on Chapter 93.7. The Total Residual Chlorine (TRC) limits are technology-based on Chapter 92a.48. The limits for CBOD5, Total Suspended Solids, and Fecal Coliforms are technology-based on Chapter 92a.47. Monitoring for E. Coli, Total Nitrogen, Ammonia-Nitrogen, and Total Phosphorus is based on Chapter 92a.61.

Attachment 1

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
16G	51322	SANDY CREEK

RMI	Name	Permit Number	Disc Flow (mgd)	Parameter	Effl. Limit 30-day Ave. (mg/L)	Effl. Limit Maximum (mg/L)	Effl. Limit Minimum (mg/L)
1.510	Seneca Hills	PA0100129	0.017	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			4

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
16G	51322	SANDY CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
1.510	0.017	25.000	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
42.211	0.775	54.441	0.225
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.08	0.045	0.09	1.029
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.527	22.473	Tsivoglou	5
Reach Travel Time (days)			
0.408			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.041	2.08	0.09	7.54
0.082	2.07	0.08	7.54
0.122	2.07	0.08	7.54
0.163	2.06	0.08	7.54
0.204	2.06	0.07	7.54
0.245	2.05	0.07	7.54
0.285	2.05	0.07	7.54
0.326	2.04	0.06	7.54
0.367	2.04	0.06	7.54
0.408	2.03	0.06	7.54

WQM 7.0 Modeling Specifications

Parameters	Both	Use Inputted Q1-10 and Q30-10 Flows	☑
WLA Method	EMPR	Use Inputted W/D Ratio	☐
Q1-10/Q7-10 Ratio	0.64	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.36	Temperature Adjust Kr	☑
D.O. Saturation	90.00%	Use Balanced Technology	☑
D.O. Goal	5		

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
16G	51322	SANDY CREEK	**1.510**	992.00	149.63	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.049	0.00	0.00	0.000	0.000	0.0	0.00	0.00	25.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
Seneca Hills	PA0100129	0.0170	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	4.00	7.54	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

Input Data WQM 7.0

SWP Basin	Stream Code	Stream Name	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope (ft/ft)	PWS Withdrawal (mgd)	Apply FC
16G	51322	SANDY CREEK	**0.010**	918.00	161.04	0.00000	0.00	☑

Stream Data

Design Cond.	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	Rch Trav Time (days)	Rch Velocity (fps)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Tributary Temp (°C)	Tributary pH	Stream Temp (°C)	Stream pH
Q7-10	0.049	0.00	0.00	0.000	0.000	0.0	0.00	0.00	25.00	7.00	0.00	0.00
Q1-10		0.00	0.00	0.000	0.000							
Q30-10		0.00	0.00	0.000	0.000							

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	Disc Temp (°C)	Disc pH
		0.0000	0.0000	0.0000	0.000	25.00	7.00

Parameter Data

Parameter Name	Disc Conc (mg/L)	Trib Conc (mg/L)	Stream Conc (mg/L)	Fate Coef (1/days)
CBOD5	25.00	2.00	0.00	1.50
Dissolved Oxygen	3.00	8.24	0.00	0.00
NH3-N	25.00	0.00	0.00	0.70

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
16G	51322	SANDY CREEK

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope (ft/ft)	Depth (ft)	Width (ft)	W/D Ratio	Velocity (fps)	Reach Trav Time (days)	Analysis Temp (°C)	Analysis pH
Q7-10 Flow												
1.510	7.33	0.00	7.33	.0263	0.00934	.775	42.21	54.44	0.22	0.408	25.00	7.00
Q1-10 Flow												
1.510	4.69	0.00	4.69	.0263	0.00934	NA	NA	NA	0.18	0.523	25.00	7.00
Q30-10 Flow												
1.510	9.97	0.00	9.97	.0263	0.00934	NA	NA	NA	0.27	0.343	25.00	7.00

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
16G	51322	SANDY CREEK

NH3-N Acute Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
1.510	Seneca Hills	11.07	50	11.07	50	0	0

NH3-N Chronic Allocations

RMI	Discharge Name	Baseline Criterion (mg/L)	Baseline WLA (mg/L)	Multiple Criterion (mg/L)	Multiple WLA (mg/L)	Critical Reach	Percent Reduction
1.510	Seneca Hills	1.37	25	1.37	25	0	0

Dissolved Oxygen Allocations

RMI	Discharge Name	CBOD5		NH3-N		Dissolved Oxygen		Critical Reach	Percent Reduction
		Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)	Baseline (mg/L)	Multiple (mg/L)		
1.51	Seneca Hills	25	25	25	25	4	4	0	0

Attachment 2

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

7.33	= Q stream (cfs)	0.5	= CV Daily
0.017	= Q discharge (MGD)	0.5	= CV Hourly
30	= no. samples	1	= AFC_Partial Mix Factor
0.3	= Chlorine Demand of Stream	1	= CFC_Partial Mix Factor
0	= Chlorine Demand of Discharge	15	= AFC_Criteria Compliance Time (min)
0.5	= BAT/BPJ Value	720	= CFC_Criteria Compliance Time (min)
0	= % Factor of Safety (FOS)	0	=Decay Coefficient (K)

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 88.930	1.3.2.iii	WLA cfc = 86.692
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 33.137	5.1d	LTA_cfc = 50.399

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) = 1.635	

WLA afc	**(.019/e(-k*AFC_tc)) + [(AFC_Yc*Qs*.019/Qd*e(-k*AFC_tc))...** **...+ Xd + (AFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT afc	EXP((0.5*LN(cvh^2+1))-2.326*LN(cvh^2+1)^0.5)
LTA_afc	wla_afc*LTAMULT_afc
WLA_cfc	**(.011/e(-k*CFC_tc) + [(CFC_Yc*Qs*.011/Qd*e(-k*CFC_tc))...** **...+ Xd + (CFC_Yc*Qs*Xs/Qd)]*(1-FOS/100)**
LTAMULT_cfc	EXP((0.5*LN(cvd^2/no_samples+1))-2.326*LN(cvd^2/no_samples+1)^0.5)
LTA_cfc	wla_cfc*LTAMULT_cfc
AML MULT	EXP(2.326*LN((cvd^2/no_samples+1)^0.5)-0.5*LN(cvd^2/no_samples+1))
AVG MON LIMIT	MIN(BAT_BPJ,MIN(LTA_afc,LTA_cfc)*AML_MULT)
INST MAX LIMIT	**1.5*((av_mon_limit/AML_MULT)/LTAMULT_afc)**