pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0025461**
Facility Type	**Municipal**	APS ID	**1012787**
Major / Minor	**Minor**	Authorization ID	**1307955**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Vernon Township Sanitary Authority**	Facility Name	**South Watson Run STP**
Applicant Address	16678 McMath Avenue	Facility Address	9868 S Watson Run Road
	Meadville, PA 16335-6568		Meadville, PA 16335-7258
Applicant Contact	Beverly Styborski	Facility Contact	Michael Davidson
Applicant Phone	(814) 337-8126	Facility Phone	(724) 372-3339
Client ID	6757	Site ID	462707
Ch 94 Load Status	Not Overloaded	Municipality	Vernon Township
Connection Status	No Limitations	County	Crawford
Date Application Received	March 2, 2020	EPA Waived?	Yes
Date Application Accepted	May 26, 2020	If No, Reason	

Purpose of Application: Renewal of an NPDES permit for an existing POTW discharge of treated sewage.

Summary of Review

Act 14 – Proof of Notification was submitted and received.

South Watson Run STP is currently registered to use the Departments eDMR system for reporting.

There are no open violations for subject client no. 6757 as of 10/5/2021.

Sludge use and disposal description and location(s): Septage must be pumped and hauled off-site by a septage hauler for land application under a general permit authorized by DEP or disposal at an STP.

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.

Approve	Deny	Signatures	Date
X		Jon F. Bucha Jonathan F. Bucha / Civil Engineer General	October 12, 2021
X		Justin C. Dickey Justin C. Dickey, P.E. / Environmental Engineer Manager	October 14, 2021

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.27
Latitude	41º 36' 2.38"	Longitude	-80º 13' 20.32"
Quad Name	Geneva	Quad Code	0604
Wastewater Description:	Sewage Effluent		
Receiving Waters	Watson Run (WWF)	Stream Code	52289
NHD Com ID	127348905	RMI	1.9
Drainage Area	13.8 mi^2	Yield (cfs/mi^2)	0.083 (USGS# 03024000 '72 – '08)
Q_{7-10} Flow (cfs)	1.15	Q_{7-10} Basis	Calculated
Elevation (ft)	1074	Slope (ft/ft)	-
Watershed No.	16-D	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)	7.0	Default
Temperature (°F)	25º C	WWF Default
Hardness (mg/L)	-	-
Other:	0.1 mg/L	NH_3-N Default

Nearest Downstream Public Water Supply Intake		Aqua PA Emlenton	
PWS Waters	Allegheny River	Flow at Intake (cfs)	1376
PWS RMI	90	Distance from Outfall (mi)	68

Changes Since Last Permit Issuance: Yield has been updated to reflect the most current USGS data.

Other Comments: This treatment facility is capable of meeting effluent requirements

Treatment Facility Summary

Treatment Facility Name: Vernon Township - S Watson Run STP

WQM Permit No.	Issuance Date
2009402	

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Ammonia Reduction	Extended Aeration	Hypochlorite	0.27

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.27	320	Not Overloaded	Aerobic Digestion	

Changes Since Last Permit Issuance: None

Other Comments: Treatment facility consists of a pump station, flow metering with recording, comminution with bypass bar screen, three parallel activated sludge units, clarification, gas chlorine disinfection, and aerated sludge holding tank.

Compliance History

DMR Data for Outfall 001 (from September 1, 2020 to August 31, 2021)

Parameter	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21	JAN-21	DEC-20	NOV-20	OCT-20	SEP-20
Flow (MGD) Average Monthly	0.108	0.143	0.097	0.136	0.108	0.131	0.139	0.172	0.212	0.133	0.094	0.068
pH (S.U.) Minimum	6.9	6.7	6.9	6.6	6.7	6.6	6.9	6.9	6.9	6.9	6.9	6.9
pH (S.U.) Maximum	7.5	7.2	7.5	7.2	7.1	7.0	7.2	7.2	7.3	7.2	7.3	7.2
DO (mg/L) Minimum	6.6	6.6	6.2	4.9	4.8	6.9	8.4	4.2	4.5	4.2	4.2	4.3
TRC (mg/L) Average Monthly	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
CBOD5 (lbs/day) Average Monthly	< 3.4	< 10.9	4.3	< 5.3	3.2	5.7	6.2	< 4.1	< 7.8	< 3.7	< 2.7	< 1.8
CBOD5 (lbs/day) Weekly Average	4.4	23.7	6.0	12.9	4.9	10.1	8.3	< 5.8	< 14.2	7.0	< 4.3	2.3
CBOD5 (mg/L) Average Monthly	< 5	< 8	5	< 4	4	5	6	< 3	< 5	< 4	< 3	< 3
CBOD5 (mg/L) Weekly Average	6	10	7	7	6	6	8	< 3	< 12	5	< 3	4
BOD5 (lbs/day) Influent Average Monthly	113	202	139	125	142	143	147	143	192	130	123	84
BOD5 (lbs/day) Influent Weekly Average	188	334	221	200	175	205	183	201	232	268	187	150
BOD5 (mg/L) Influent Average Monthly	132	176	163	114	181	132	153	106	121	124	140	157
BOD5 (mg/L) Influent Weekly Average	148	303	191	164	246	208	173	116	165	191	167	294
TSS (lbs/day) Average Monthly	< 4.2	< 7.5	< 6.0	< 6.5	5.8	9.2	8.4	7.9	< 11.6	< 6.8	6.1	6.6
TSS (lbs/day) Influent Average Monthly	105	89	115	115	104	105	135	99	152	107	86	87

TSS (lbs/day) Influent Weekly Average	151	125	169	126	129	163	150	130	243	233	157	173
TSS (lbs/day) Weekly Average	< 6.7	16.1	10.2	10.4	7.3	14.5	15.9	11.6	19.9	14.0	11.4	10.9
TSS (mg/L) Average Monthly	< 5	< 6	< 7	< 6	7	8	8	6	< 7	< 6	7	12
TSS (mg/L) Influent Average Monthly	136	95	145	116	128	90	141	79	93	100	99	163
TSS (mg/L) Influent Weekly Average	218	160	250	170	160	118	158	119	134	166	196	340
TSS (mg/L) Weekly Average	< 5	7	12	6	9	9	15	6	9	10	8	19
Fecal Coliform (CFU/100 ml) Geometric Mean	< 2	< 13	11	12	38	15	8	5	10	6	33	< 18
Total Nitrogen (mg/L) Average Monthly	18.8	17.5	21.7	16.3	19.9	14.7	15.8	10.29	9.85	13.9	19	19.2
Ammonia (lbs/day) Average Monthly	< 0.7	< 1.6	< 0.7	< 0.9	< 0.6	< 0.9	< 0.8	< 1.1	< 1.3	< 0.8	< 0.7	< 0.4
Ammonia (mg/L) Average Monthly	< 0.8	< 1.1	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Phosphorus (mg/L) Average Monthly	2.7	1.5	2.6	0.84	1.0	0.97	1.3	0.69	0.86	1.0	2.3	1.2

Compliance History

Summary of Inspections: An inspection occurred on 10/8/2020 where no violations were noted.

Summary of eDMRs: Reviewing the past 3 years of eDMR data, this facility has had no effluent exceedances and appears to be operating in good condition.

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .27
Latitude 41º 36' 2.38" **Longitude** -80º 13' 20.32"
Wastewater Description: Sewage Effluent

Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Pollutant	Limit (mg/l)	SBC	Federal Regulation	State Regulation
$CBOD_5$	25	Average Monthly	133.102(a)(4)(i)	92a.47(a)(1)
	40	Average Weekly	133.102(a)(4)(ii)	92a.47(a)(2)
Total Suspended Solids	30	Average Monthly	133.102(b)(1)	92a.47(a)(1)
	45	Average Weekly	133.102(b)(2)	92a.47(a)(2)
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)

Water Quality-Based Limitations

The following limitations were determined through water quality modeling (output files attached):

Parameter	Limit (mg/l)	SBC	Model
Total Residual Chlorine	0.4	Average Monthly	TRC_CALC Spreadsheet
Ammonia Nitrogen (May 1 – Oct 31)	4.0	Average Monthly	WQM 7.0
Ammonia Nitrogen (Nov 1 – Apr 30)	12.0	Average Monthly	WQM 7.0
$CBOD_5$	15.0	Average Monthly	WQM 7.0
Dissolved Oxygen	4.0	Daily Minimum	WQM 7.0

Comments: Modeling results show that the present limits of 0.3 mg/L and 2.5 mg/L for TRC, and Ammonia Nitrogen, respectively, are more stringent than the Water Quality-Based Limitations required to protect water quality. It is recommended that the current limits be re-imposed to protect the stream. Dissolved Oxygen had a monitoring schedule of 1/week monitoring frequency for a 5-year permit term on the previous renewal to allow for monitoring equipment and install, which will now be daily monitoring.

Best Professional Judgment (BPJ) Limitations

Comments: Total Nitrogen, Total Phosphorus, and E. Coli monitoring is based on Ch. 92a.61 and the Departments SOP for Establishing Effluent Limitations for Individual Sewage Permits (SOP No. BPNPSM-PMT-033). Total Nitrogen and Total Phosphorus monitoring frequency will remain at 1/week, which is in accordance with Table 6-3 from the Permit Writers Manual. E. Coli monitoring is a new addition to this permit renewal and will have a monitoring frequency of 1/quarter. Raw sewage influent monitoring will remain in the permit renewal as recommended by the SOP (No. BPNPSM-PMT-033) for parameters BOD_5 and Total Suspended Solids (TSS), at the same frequency as the effluent.

Anti-Backsliding

Anti-Backsliding considerations do not apply since the effluent limitations are all remaining the same as in the previous permit renewal.

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" (362-0400-001), SOPs and/or BPJ.

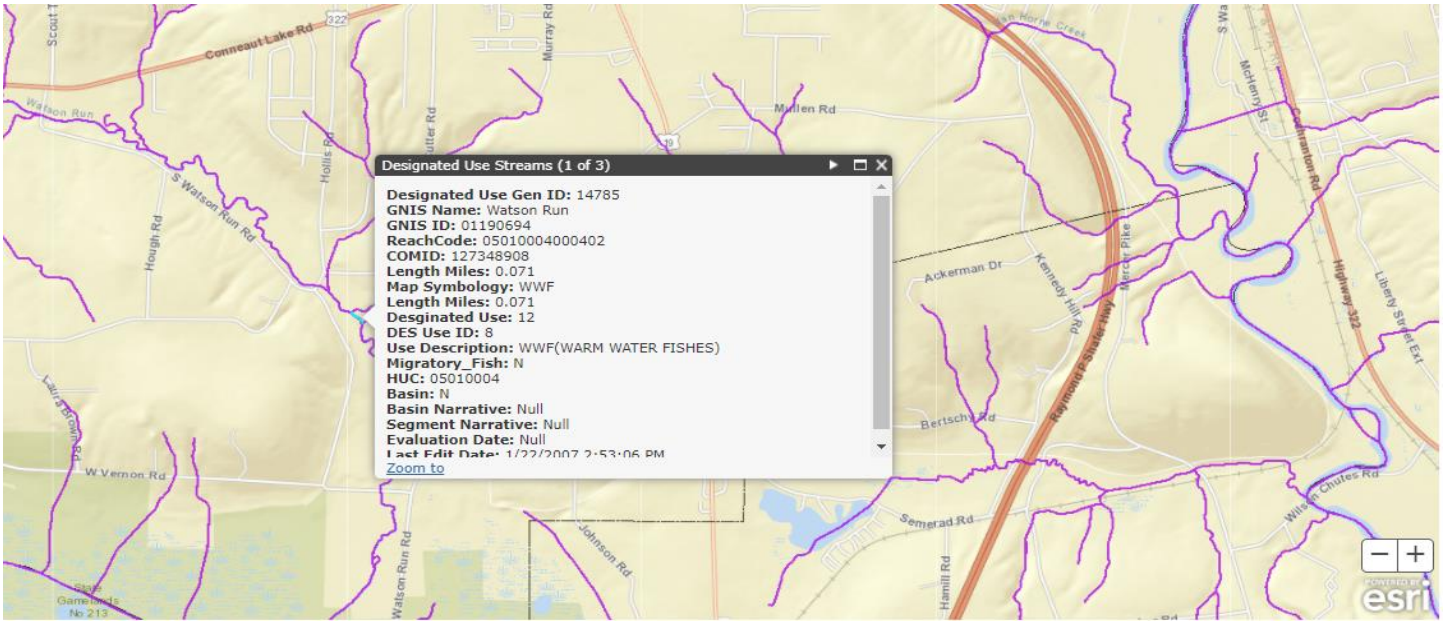
Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Weekly Average	Average Monthly	Maximum	Instant. Maximum		
Flow (MGD)	Report	XXX	XXX	XXX	XXX	XXX	Continuous	Recorded
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	4.0 Daily Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.3	XXX	1.3	1/day	Grab
CBOD5	34.0	45.0	20.0	15.0	XXX	30	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	Report	Report	Report	XXX	XXX	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	Report	Report	Report	XXX	XXX	1/week	24-Hr Composite
TSS	68.0	101.0	45.0	30.0	XXX	60	1/week	24-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200	XXX	1000	1/week	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/quarter	Grab
Ammonia-Nitrogen May 1 - Oct 31	5.5	XXX	XXX	2.5	XXX	5.0	1/week	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	16.5	XXX	XXX	7.5	XXX	15.0	1/week	24-Hr Composite
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) [1]		Concentrations (mg/L)				Minimum [2] Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Weekly Average	Average Monthly	Maximum	Instant. Maximum		
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite

Compliance Sampling Location: Outfall 001 after disinfection.

Attachment A – eMAP Stream Designation



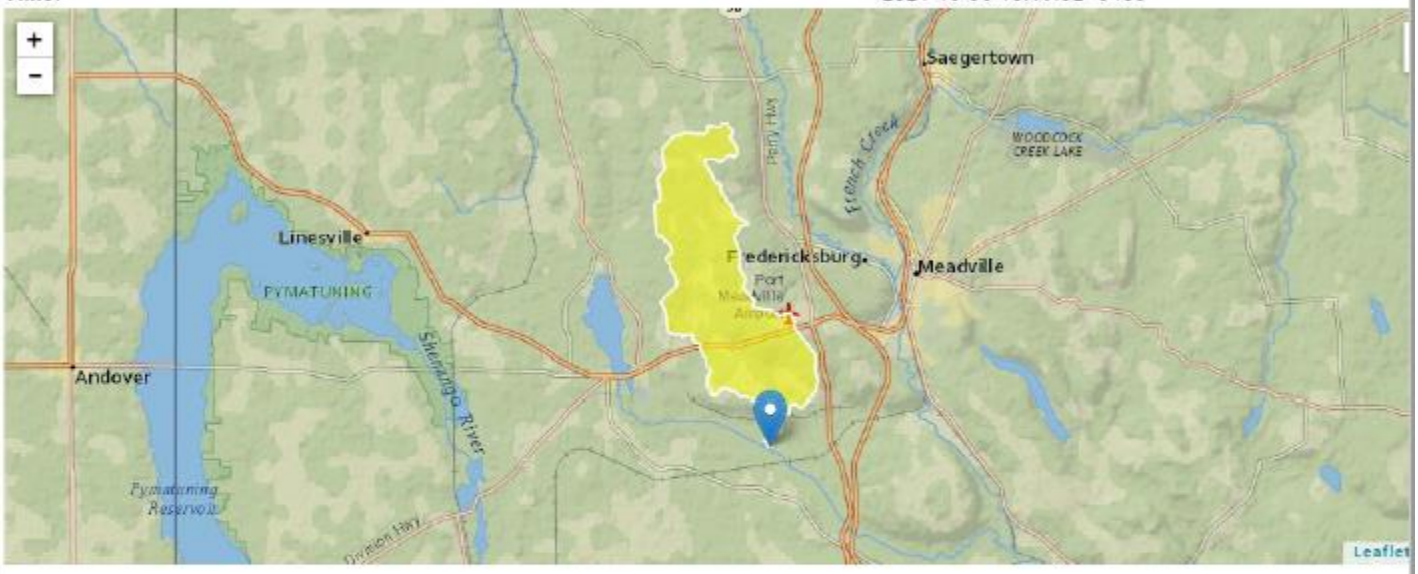
Attachment B – Streamstats Drainage Area (Discharge Point)

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	13.8	square miles
ELEV	Mean Basin Elevation	1282	feet
PRECIP	Mean Annual Precipitation	44	inches

Attachment C – Streamstats Drainage Area (End of Reach)

Region ID:	PA
Workspace ID:	PA20211006171911096000
Clicked Point (Latitude, Longitude):	41.57731, -80.22422
Time:	2021-10-06 13:19:32 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	15.1	square miles
ELEV	Mean Basin Elevation	1273	feet
PRECIP	Mean Annual Precipitation	44	inches

Attachment D – WQM 7.0 Modeling

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
16D	52289	WATSON RUN

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)
1.900	South WatsonRun	PA0025461	0.000	CBOD5	13.9		
				NH3-N	4.17	8.34	
				Dissolved Oxygen			4

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
16D	52289	WATSON RUN

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
1.900	0.270	23.664	7.025
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
20.169	0.572	35.238	0.135
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
5.18	0.519	1.19	0.928
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.594	1.820	Tsivoglou	5
Reach Travel Time (days)			
0.857			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.086	4.91	1.10	6.13
0.171	4.66	1.01	5.78
0.257	4.42	0.94	5.52
0.343	4.20	0.86	5.34
0.429	3.98	0.80	5.23
0.514	3.78	0.74	5.17
0.600	3.58	0.68	5.16
0.686	3.40	0.63	5.17
0.771	3.23	0.58	5.22
0.857	3.06	0.54	5.29

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
16D	52289	WATSON RUN	**1.900**	1074.00	13.80	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	0.083	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
South WatsonRun	PA0025461	0.0000	0.0000	0.2700	0.000	20.00	7.10

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	0.10	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
16D	52289	WATSON RUN	**0.001**	1061.00	15.10	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	0.083	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
16D	52289	WATSON RUN

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												
1.900	1.15	0.00	1.15	.4177	0.00130	.572	20.17	35.24	0.14	0.857	23.66	7.02
Q1-10 Flow												
1.900	0.73	0.00	0.73	.4177	0.00130	NA	NA	NA	0.11	1.017	23.19	7.03
Q30-10 Flow												
1.900	1.56	0.00	1.56	.4177	0.00130	NA	NA	NA	0.15	0.752	23.94	7.02

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		

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
16D	52289	WATSON RUN

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
1.900	South WatsonRu	7.51	20.52	7.51	20.52	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
1.900	South WatsonRu	1.43	6.38	1.43	6.38	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)		
1.90	South WatsonRun	13.9	13.9	4.17	4.17	4	4	0	0

Attachment E – Discharge pH

South Watson Run STP
Vernon Township, Crawford County
PA0025461 Discharge pH

Date	pH min	pH max	10^ -pH min	10^ -pH max	& pH max)	-Log (Ave pH)
Jul-21	6.7	7.2	1.99526E-07	6.3096E-08	1.3131E-07	6.9
Aug-21	6.9	7.5	1.25893E-07	3.1623E-08	7.8758E-08	7.1
Jul-20	6.9	7.2	1.25893E-07	6.3096E-08	9.4494E-08	7.0
Aug-20	7	7.4	0.0000001	3.9811E-08	6.9905E-08	7.2
Sep-20	6.9	7.2	1.25893E-07	6.3096E-08	9.4494E-08	7.0
Jul-19	6.9	7.4	1.25893E-07	3.9811E-08	8.2852E-08	7.1
Aug-19	7.1	7.4	7.94328E-08	3.9811E-08	5.9622E-08	7.2
Sep-19	7.1	7.3	7.94328E-08	5.0119E-08	6.4776E-08	7.2
Jul-18	6.7	7.2	1.99526E-07	6.3096E-08	1.3131E-07	6.9
Aug-18	6.8	7.1	1.58489E-07	7.9433E-08	1.1896E-07	6.9
					Median:	7.1

Attachment F – TRC CALC Spreadsheet

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

1.15	= Q stream (cfs)	0.5	= CV Daily
0.27	= 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)		=Decay Coefficient (K)

Source	Reference	AFC Calculations	Reference	CFC Calculations
TRC	1.3.2.iii	WLA afc = 0.897	1.3.2.iii	WLA cfc = 0.867
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 0.334	5.1d	LTA_cfc = 0.504

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.412	AFC
		INST MAX LIMIT (mg/l) = 1.346	

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)**