pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0020044**
Facility Type	**Municipal**	APS ID	**1042772**
Major / Minor	**Minor**	Authorization ID	**1360951**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Fredonia Borough**	Facility Name	**Fredonia WWTP**
Applicant Address	PO Box 487, 45 Water Street	Facility Address	25 Marstellar Road
	Fredonia, PA 16124-5013		Fredonia, PA 16124
Applicant Contact	Sheri Valimont	Facility Contact	Brian McClure
Applicant Phone	(724) 475-2352	Facility Phone	(724) 475-2352
Client ID	34929	Site ID	261203
Ch 94 Load Status	Existing Hydraulic Overload	Municipality	Fredonia Borough
Connection Status	No Limitations	County	Mercer
Date Application Received	June 28, 2021	EPA Waived?	Yes
Date Application Accepted	August 2, 2021	If No, Reason	

Purpose of Application: Renewal and transfer of NPDES permit.

Summary of Review

This application is for the renewal and transfer of the Individual NPDES permit for this POTW, along with the transfer of WQM permit numbers 4381405 and 365S47. *(The transfer is required under a May 28, 2021 Consent Order and Agreement.)* JCD

Act 14 – Proof of Notification was submitted and received.

Fredonia Borough is currently registered to use the Departments eDMR system for reporting

There is 1 open violation for subject client no. 34929 as of 2/15/2022 with the NWRO Safe Drinking Water Program. It is currently being determined if Fredonia Borough is resolving this violation with the department.

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	February 15, 2022
X		Justin C. Dickey Justin C. Dickey, P.E. / Environmental Engineer Manager	February 18, 2022

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.1
Latitude	41º 19' 31.50"	Longitude	-80º 15' 2.5"
Quad Name		Quad Code	
Wastewater Description:	Sewage Effluent		
Receiving Waters	Mill Run (TSF)	Stream Code	35718
NHD Com ID	130034626	RMI	0.38
Drainage Area	4.18 mi^2	Yield (cfs/mi^2)	0.063
Q_{7-10} Flow (cfs)	0.263	Q_{7-10} Basis	Cool Spring Ck near Mercer partial recording
Elevation (ft)	1121	Slope (ft/ft)	0.005
Watershed No.	20-A	Chapter 93 Class.	TSF
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 from NH_3-N guidance
Temperature (°C)	25	TSF default
Hardness (mg/L)	-	-
NH_3-N (mg/L)	0.1	default

Nearest Downstream Public Water Supply Intake	Beaver Falls Municipal Authority		
PWS Waters	Beaver River	Flow at Intake (cfs)	561
PWS RMI	3.5	Distance from Outfall (mi)	38

Changes Since Last Permit Issuance: None

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

Treatment Facility Summary

Treatment Facility Name: Fredonia Borough WWTP

WQM Permit No.	Issuance Date
365S47	June 20, 1966
4381405	January 5, 1982

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary	Activated Sludge	Gas Chlorine	0.1

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.1	167	Existing Hydraulic Overload	Drying Beds	Other WWTP

Changes Since Last Permit Issuance: None

Treatment consists of:

365S47: Comminutor, bypass bar screen, (2) extended aeration tanks, (2) clarifiers, and chlorination

4381405: (2) sludge drying beds (uncovered, intermittent use, total surface area of 1,800 ft^2)

Compliance History	
Summary of DMRs:	There have been numerous effluent violations in the past 3 years, which are listed in the table below. Fecal Coliform has been the primary parameter of concern. eDMR data shows that the other parameters from NPDES part A effluent limits are generally performing well. A significant factor of these chronic effluent violations has been the hydraulic overload on the facility, and the gas chlorine system not working to its potential.
Summary of Inspections:	An inspection occurred on 6/9/2020, where multiple violations were noted. These inspection violations are listed in Table 1 below. Some slip lining was competed to segments of the collection system in an effort to address the hydraulic overload conditions.

Table 1: Inspection Violations

Non-Compliances

1. **25 Pa. Code 302.1201:** Circuit rider failed to make available the general work plan and/or the system specific management plan.
   Verbal agreement only.
2. **25 Pa. Code 302.1201:** Circuit rider failed to make available the general work plan and/or the system specific management plan.
   Borough Manager was unaware of a plan.
3. **25 Pa. Code 302.1202:** Operator failed to comply with the Act or Chapter 302 regulations
   Discussed providing DMRs to the Authority to review violations.
4. **25 Pa. Code 92a.41(a)(10):** Failure to use an NIST thermometer.
   Composite samplers did not contain NIST thermometers. Sample refrigerator in the lab had a traceable thermometer but the batteries were dead. Discussed recording temperatures on sample days.
5. **25 Pa. Code 92a.41(a)(12):** Failure to submit monitoring reports or properly complete monitoring reports.
   A Laboratory Accreditation Form has not be submitted in eDMR. Include on-site analysis and only resubmit if a change is made to the laboratory or methods used to analyze parameters in the permit.
6. **25 Pa. Code 92a.61(f)(1):** Failure to properly document monitoring activities and results.
   Discussed updating on-site bench sheet to include sample time, analysis time, and initials.

Other Comments: **Fredonia Borough Municipal Authority entered a corrective action plan on May 25, 2016, to address chronic hydraulic overloading of the treatment facility. Conditions did not improve at the facility, therefore a Consent Order and Agreement was executed on May 28, 2021, which terminated the CAP mentioned above.**

The corrective actions proposed to address the hydraulic overload and effluent violations consists of:

- **Submission of Water Quality Permit to install a flow proportional meter to automatically feed gas chlorine**
- **Incorporate the sludge holding tank into the treatment process again**
- **Continue slip lining throughout the borough**

Compliance History

DMR Data for Outfall 001 (from January 1, 2021 to December 31, 2021)

Parameter	DEC-21	NOV-21	OCT-21	SEP-21	AUG-21	JUL-21	JUN-21	MAY-21	APR-21	MAR-21	FEB-21	JAN-21
Flow (MGD) Average Monthly	0.155	0.125	0.113	0.101	0.13	0.136	0.116	0.241	0.118	0.134	0.186	0.18
Flow (MGD) Weekly Average	0.174	0.135	0.147	0.117	0.17	0.186	0.189	0.545	0.139	0.167	0.213	0.23
pH (S.U.) Minimum	7.23	7.24	7.21	7.23	7.2	7.17	7.23	7.25	7.24	7.21	7.21	7.25
pH (S.U.) Maximum	7.28	7.28	7.29	7.32	7.32	7.31	7.31	7.33	7.34	7.32	7.29	7.34
DO (mg/L) Minimum	5.23	5.25	5.25	5.24	5.2	5.24	5.23	5.23	5.22	5.21	5.22	5.24
TRC (mg/L) Average Monthly	0.10	0.10	0.20	0.20	0.20	0.10	0.20	0.10	0.10	0.10	0.10	0.10
TRC (mg/L) Instantaneous Maximum	0.10	0.20	0.30	0.20	0.30	0.20	0.20	0.20	0.20	0.20	0.10	0.10
CBOD5 (lbs/day) Average Monthly	< 4	< 3	< 2	< 3	< 3	< 3	< 2	< 14	< 6	< 3.0	< 5	7
CBOD5 (lbs/day) Weekly Average	< 5	< 3	< 3	< 4	< 5	< 5	< 3	< 24	16	< 4.0	8	15
CBOD5 (mg/L) Average Monthly	< 3.0	< 3.0	< 3.0	< 3.6	< 3.0	< 3.0	< 3.0	< 6.2	< 6.4	3.2	< 3.4	< 5.5
CBOD5 (mg/L) Weekly Average	< 3.0	< 3.0	< 3.0	5.3	< 3.0	< 3.0	< 3.0	15.9	16.7	4.2	4.4	11.1
BOD5 (lbs/day) Influent Average Monthly	48	49	38	62	45	43	36	131	49	33.0	69	35
BOD5 (mg/L) Influent Average Monthly	37.8	57.5	46.9	72.2	52.7	41	46.5	36.9	51.8	37.5	45.6	27.7
TSS (lbs/day) Average Monthly	< 6	< 3	< 3	< 3	< 5	< 4	< 3	< 9	< 6	4.0	< 10	< 11
TSS (lbs/day) Influent Average Monthly	36	32	17	54	34	28	27	105	38	22	64	53
TSS (lbs/day) Weekly Average	12	< 3	< 3	5	14	< 5	7	< 24	15	7.0	23	31

TSS (mg/L) Average Monthly	< 4	< 3	< 3	< 4	< 4	< 3	< 4	< 3	< 7	4.0	< 6	< 9
TSS (mg/L) Influent Average Monthly	28	36.3	21	64.4	35	26	36	27.0	41	23.8	42	38
TSS (mg/L) Weekly Average	7.0	< 3.0	4	5	8	4	10	3.0	16	8.0	12	26
Fecal Coliform (No./100 ml) Geometric Mean	**1250.0**	695	1838	**2137**	**534**	**403**	157	**812**	36	230	1445	**2072**
Fecal Coliform (No./100 ml) Instantaneous Maximum	2420.0	2420	2420	**2420**	**2420**	**2420**	**1120**	**2420**	2420	2420	2420	2420
Total Nitrogen (mg/L) Average Monthly	1.03	1	1.37	1.78	< 1.12	1.23	2.33	1.12	< 2.69	1.26	< 1.01	2.44
Ammonia (lbs/day) Average Monthly	0.2	0.2	0.7	0.8	0.3	0.6	1.3	< 1.4	1	0.4	< 0.3	1
Ammonia (mg/L) Average Monthly	0.1	0.2	0.80	1.0	0.4	1.0	2.0	< 0.35	1.4	0.5	< 0.2	1.1
Total Phosphorus (mg/L) Average Monthly	0.37	0.44	0.22	0.45	0.56	0.56	0.27	0.10	0.66	0.44	< 0.23	0.27

Compliance History

Effluent Violations for past 3 years

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Fecal Coliform	09/30/21	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	09/30/21	Geo Mean	2137	No./100 ml	200	No./100 ml
Fecal Coliform	08/31/21	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	08/31/21	Geo Mean	534	No./100 ml	200	No./100 ml
Fecal Coliform	07/31/21	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	07/31/21	Geo Mean	403	No./100 ml	200	No./100 ml
Fecal Coliform	06/30/21	IMAX	1120	No./100 ml	1000	No./100 ml
Fecal Coliform	05/31/21	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	05/31/21	Geo Mean	812	No./100 ml	200	No./100 ml
Fecal Coliform	01/31/21	Geo Mean	2072	No./100 ml	2000	No./100 ml
Fecal Coliform	12/31/20	Geo Mean	2420	No./100 ml	2000	No./100 ml
Fecal Coliform	09/30/20	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	09/30/20	Geo Mean	284	No./100 ml	200	No./100 ml
Fecal Coliform	08/31/20	IMAX	1733	No./100 ml	1000	No./100 ml
Fecal Coliform	07/31/20	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	06/30/20	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	05/31/20	IMAX	2420	No./100 ml	1000	No./100 ml
Fecal Coliform	05/31/20	Geo Mean	261	No./100 ml	200	No./100 ml
TRC	04/30/20	IMAX	0.7	mg/L	0.38	mg/L
Fecal Coliform	03/31/20	IMAX	15150	No./100 ml	10000	No./100 ml
Fecal Coliform	02/29/20	IMAX	620000	No./100 ml	10000	No./100 ml
Fecal Coliform	02/29/20	Geo Mean	14211	No./100 ml	2000	No./100 ml
TSS	02/29/20	Weekly Average	66	lbs/day	37	lbs/day
Fecal Coliform	12/31/19	IMAX	61310	No./100 ml	10000	No./100 ml

Fecal Coliform	10/31/19	IMAX	14390	No./100 ml	10000	No./100 ml
Fecal Coliform	10/31/19	Geo Mean	2515	No./100 ml	2000	No./100 ml
TSS	10/31/19	Weekly Average	60	lbs/day	37	lbs/day
CBOD5	10/31/19	Weekly Average	< 36	lbs/day	33	lbs/day
Fecal Coliform	09/30/19	IMAX	43520	No./100 ml	1000	No./100 ml
Fecal Coliform	09/30/19	Geo Mean	9310	No./100 ml	200	No./100 ml
Fecal Coliform	08/31/19	IMAX	16070	No./100 ml	1000	No./100 ml
Fecal Coliform	08/31/19	Geo Mean	5217	No./100 ml	200	No./100 ml
Fecal Coliform	07/31/19	IMAX	34480	No./100 ml	1000	No./100 ml
Fecal Coliform	07/31/19	Geo Mean	6863	No./100 ml	200	No./100 ml
Fecal Coliform	06/30/19	IMAX	1986	No./100 ml	1000	No./100 ml
Fecal Coliform	06/30/19	Geo Mean	767	No./100 ml	200	No./100 ml
Ammonia Nitrogen	06/30/19	Average Monthly	21	lbs/day	3.3	lbs/day
Fecal Coliform	05/31/19	IMAX	14670	No./100 ml	1000	No./100 ml
Fecal Coliform	05/31/19	Geo Mean	1051	No./100 ml	200	No./100 ml
Fecal Coliform	04/30/19	IMAX	20640	No./100 ml	10000	No./100 ml
Fecal Coliform	04/30/19	Geo Mean	3479	No./100 ml	2000	No./100 ml
Fecal Coliform	02/28/19	IMAX	112000	No./100 ml	10000	No./100 ml
Fecal Coliform	02/28/19	Geo Mean	6396	No./100 ml	2000	No./100 ml

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .1
Latitude 41º 19' 31.50" **Longitude** -80º 15' 2.50"
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:

Parameter	Limit (mg/l)	SBC	Model
Ammonia Nitrogen	4.0	Avg Monthly	WQM 7.0
CBOD5	25.0	Avg Monthly	WQM 7.0
Dissolved Oxygen	4.0	Daily Minimum	WQM 7.0
Total Residual Chlorine	0.25	Avg Monthly	TRC Calc Spreadsheet
Total Residual Chlorine	0.38	imax	TRC Calc Spreadsheet

Comments: Ammonia Nitrogen modeling was less stringent than the current average monthly limit of 4.0 mg/L at 4.62 mg/L (Attachment D). The existing ammonia nitrogen limit of 4.0 mg/L will be continued on this permit renewal to ensure protection of stream uses. eDMR data shows the facility is consistently meeting the 4.0 mg/L ammonia nitrogen limit, and the facility does not meet the anti-backsliding requirements to have this parameter relaxed. A seasonal multiplier of 3 times the average monthly limit was used to determine the ammonia nitrogen wintertime limit of 12.0 mg/L

The TRC Calc Spreadsheet determined a TRC IMAX limit of 0.84 mg/L compared to the previous renewals more stringent calculation of 0.38 mg/L. The existing TRC IMAX limit of 0.38 mg/L will be continued on this permit for the same reasons as ammonia nitrogen above.

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, based on Table 6-3 of the Permit Writers Manual. E. Coli

monitoring is a new addition to this permit renewal and will have a monitoring frequency of 1/quarter based on the Establishing Effluent Limitations for Individual Sewage Permits SOP.

POTWs with a discharge greater than 2,000 gpd require raw sewage influent monitoring, and therefore 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 and sample type as the effluent.

Mass Loading Limitations

For POTWs, mass loading limits (lbs/day) are to be established for $CBOD_5$, TSS, and NH_3-N, which are determined by the formula (design flow)*(conc. limit (mg/L))*(conversion factor 8.34). Mass loading limits for $CBOD_5$, TSS, and NH_3-N are remaining the same as the previous permit renewal.

Reporting of average monthly mass loadings for raw sewage influent parameters BOD_5, and TSS are also being continued on this permit renewal.

Anti-Backsliding

Anit-backsliding does not apply since limitations are not being relaxed.

Proposed Effluent Limitations and Monitoring Requirements

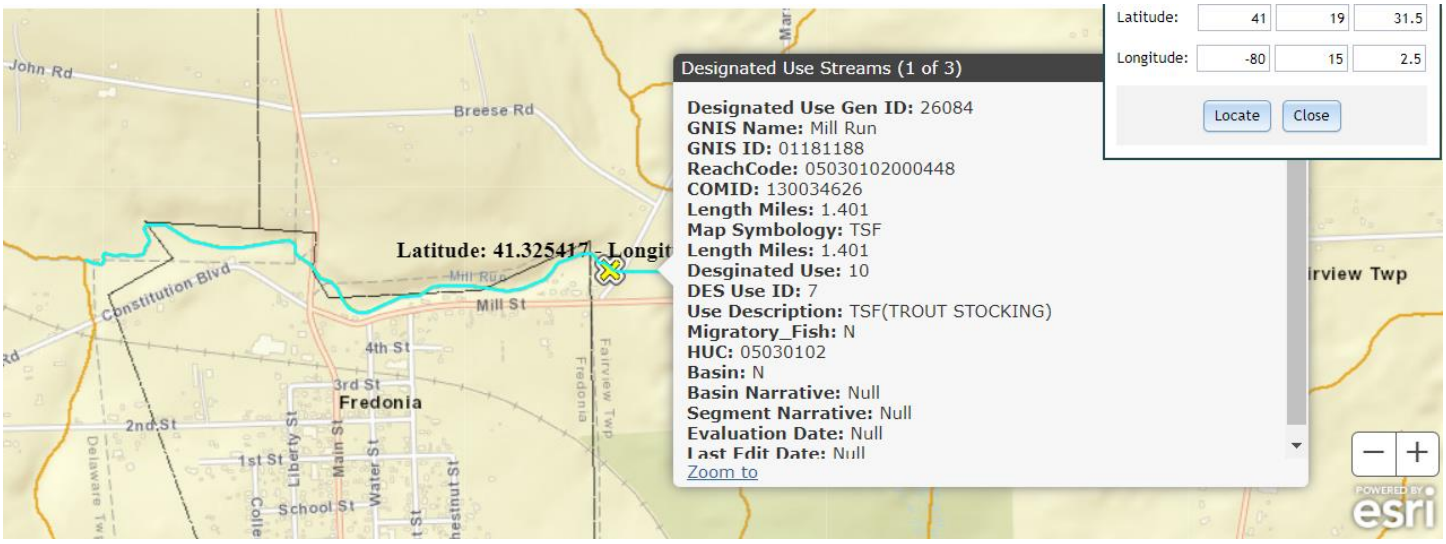
The limitations and monitoring requirements specified below are proposed for the draft permit, and reflect the most stringent limitations amongst technology, water quality and BPJ. Instantaneous Maximum (IMAX) limits are determined using multipliers of 2 (conventional pollutants) or 2.5 (toxic pollutants). 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	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
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	0.25	XXX	0.38	1/day	Grab
CBOD5	21.0 Wkly Avg	33.0	XXX	25.0	40.0	50	1/week	8-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	8-Hr Composite
TSS	25.0	37.0	XXX	30.0	45.0	60	1/week	8-Hr Composite
TSS Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	8-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/week	Grab
E. Coli (No./100 ml)	XXX	XXX	XXX	XXX	XXX	Report	1/quarter	Grab
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/week	8-Hr Composite
Ammonia Nov 1 - Apr 30	10.0	XXX	XXX	12.0	XXX	24	1/week	8-Hr Composite
Ammonia May 1 - Oct 31	3.3	XXX	XXX	4.0	XXX	8	1/week	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/week	8-Hr Composite

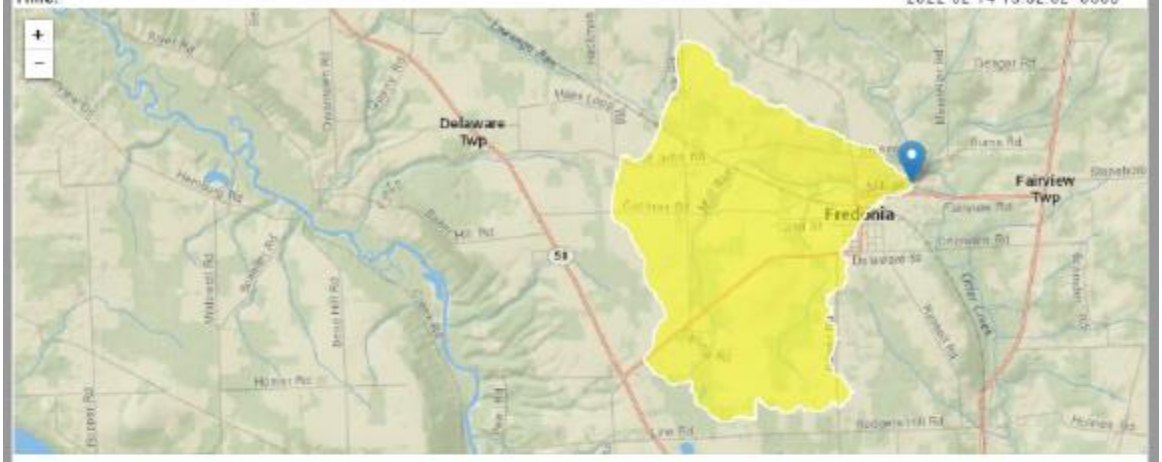
Compliance Sampling Location: Outfall 001 after disinfection.

Attachment A – eMAP Stream Designation



Attachment B – Streamstats Drainage Area (Discharge Point)

Region ID:	PA
Workspace ID:	PA20220214205140952000
Clicked Point (Latitude, Longitude):	41.32555, -80.25078
Time:	2022-02-14 15:52:02 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value
DRNAREA	Area that drains to a point on a stream	4.18
ELEV	Mean Basin Elevation	1246

Low-Flow Statistics Parameters [Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min
DRNAREA	Drainage Area	4.18	square miles	2.26
ELEV	Mean Basin Elevation	1246	feet	1050

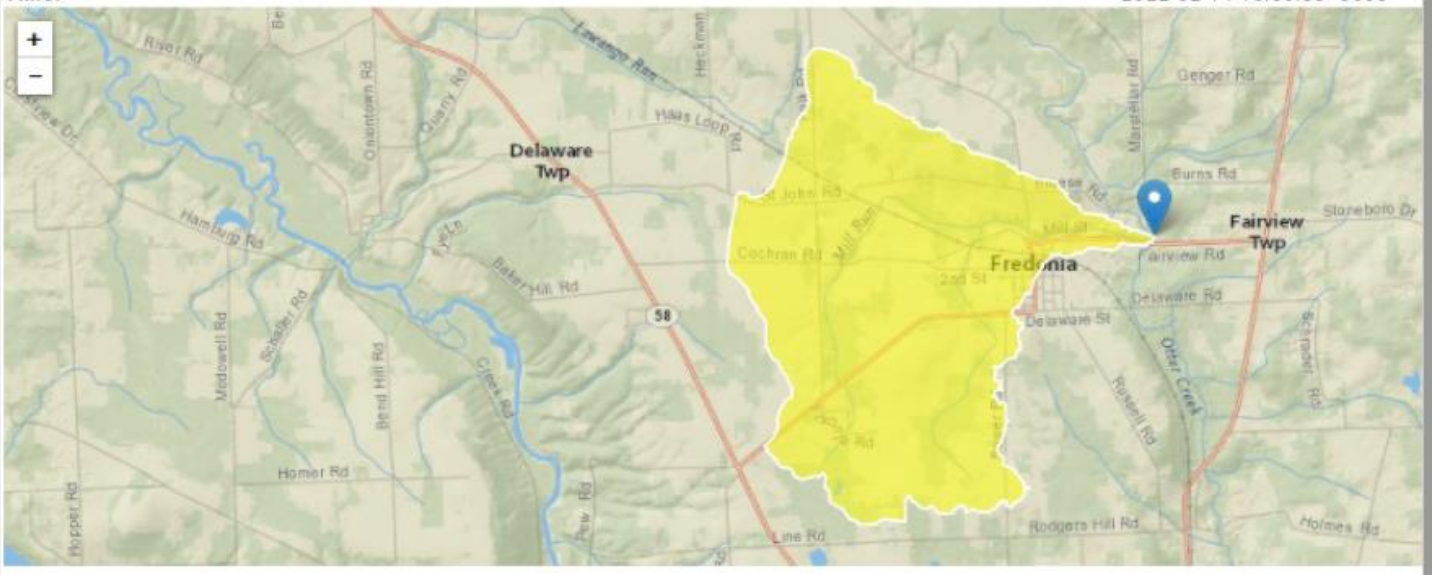
Low-Flow Statistics Flow Report [Low Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see repo

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.148	ft^3/s
30 Day 2 Year Low Flow	0.267	ft^3/s
7 Day 10 Year Low Flow	0.049	ft^3/s

Attachment C – Streamstats Drainage Area (End of Reach)

Region ID:	PA
Workspace ID:	PA20220214205543826000
Clicked Point (Latitude, Longitude):	41.32487, -80.24437
Time:	2022-02-14 15:56:03 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value
DRNAREA	Area that drains to a point on a stream	4.24
ELEV	Mean Basin Elevation	1244

Attachment D – WQM 7.0 Modeling

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
20A	35718	MILL 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)
0.380	Fredonia WWTP	PA0020044	0.100	CBOD5	25		
				NH3-N	4.62	9.24	
				Dissolved Oxygen			4

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
20A	35718	MILL RUN

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
0.380	0.100	23.150	7.089
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
10.014	0.444	22.574	0.094
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
10.51	1.283	1.77	0.892
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.230	21.592	Owens	5
Reach Travel Time (days)			
0.246			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.025	10.13	1.73	6.65
0.049	9.77	1.70	6.92
0.074	9.42	1.66	7.10
0.098	9.08	1.62	7.22
0.123	8.76	1.59	7.30
0.148	8.44	1.55	7.37
0.172	8.14	1.52	7.43
0.197	7.85	1.49	7.48
0.222	7.57	1.46	7.52
0.246	7.30	1.42	7.54

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
20A	35718	MILL RUN	0.380	1121.00	4.18	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	0.063	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
Fredonia WWTP	PA0020044	0.1000	0.1000	0.1000	0.000	20.00	7.30

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
20A	35718	MILL RUN	0.001	1111.00	4.24	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	0.063	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
20A	35718	MILL 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												
0.380	0.26	0.00	0.26	.1547	0.00500	.444	10.01	22.57	0.09	0.246	23.15	7.09
Q1-10 Flow												
0.380	0.17	0.00	0.17	.1547	0.00500	NA	NA	NA	0.08	0.284	22.61	7.12
Q30-10 Flow												
0.380	0.36	0.00	0.36	.1547	0.00500	NA	NA	NA	0.11	0.219	23.49	7.07

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
20A	35718	MILL 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
0.380	Fredonia WWTP	12.07	25.1	12.07	25.1	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
0.380	Fredonia WWTP	1.46	4.62	1.46	4.62	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)		
0.38	Fredonia WWTP	25	25	4.62	4.62	4	4	0	0

Attachment E – Discharge pH

Fredonia WWTP
Fredonia Borough, Mercer County
PA0020044 Discharge pH

Date	pH min	pH max	10^ -pH min	10^ -pH max	& pH max)	-Log (Ave pH)
Sep-21	7.23	7.32	5.88844E-08	4.7863E-08	5.3374E-08	7.3
Aug-21	7.2	7.32	6.30957E-08	4.7863E-08	5.5479E-08	7.3
Jul-21	7.17	7.31	6.76083E-08	4.8978E-08	5.8293E-08	7.2
Sep-20	7.25	7.33	5.62341E-08	4.6774E-08	5.1504E-08	7.3
Aug-20	7.24	7.31	5.7544E-08	4.8978E-08	5.3261E-08	7.3
Jul-20	7.23	7.33	5.88844E-08	4.6774E-08	5.2829E-08	7.3
Sep-19	7.24	7.34	5.7544E-08	4.5709E-08	5.1626E-08	7.3
Aug-19	7.21	7.32	6.16595E-08	4.7863E-08	5.4761E-08	7.3
Jul-19	7.24	7.34	5.7544E-08	4.5709E-08	5.1626E-08	7.3
Sep-18	7.2	7.36	6.30957E-08	4.3652E-08	5.3374E-08	7.3
					Median:	7.3

Attachment F – TRC CALC Spreadsheet

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

0.263	= Q stream (cfs)	0.5	= CV Daily
0.1	= 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 = 0.561	1.3.2.iii	WLA cfc = 0.540
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 0.209	5.1d	LTA_cfc = 0.314

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.257	AFC
		INST MAX LIMIT (mg/l) = 0.842	

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