Pennsylvania Department of Environmental Protection

Northwest Regional Office
CLEAN WATER PROGRAM

NPDES PERMIT FACT SHEET INDIVIDUAL SEWAGE

Application Type	**Renewal**	Application No.	**PA0025607**
Facility Type	**Non-Municipal**	APS ID	**1101439**
Major / Minor	**Minor**	Authorization ID	**1462796**

Applicant and Facility Information

Applicant Name	**Barkeyville Sewerage, LLC**	Facility Name	**Barkeyville Sewerage WWTP**
Applicant Address	PO Box 941	Facility Address	Stevenson Road
	Oil City, PA 16301-0941		Barkeyville, PA 16127
Applicant Contact	Andrew Restauri (arestauri@heathoilinc.com)	Facility Contact	Andrew Restauri (arestauri@heathoilinc.com)
Applicant Phone	(814) 671-7029	Facility Phone	(814) 671-7029
Client ID	258144	Site ID	539659
Ch 94 Load Status	Not Overloaded	Municipality	Barkeyville Borough
Connection Status	No Limitations	County	Venango
Date Application Received	October 31, 2023	EPA Waived?	Yes
Date Application Accepted	November 27, 2023	If No, Reason	-
Purpose of Application	Renewal of an existing NPDES Permit for an existing discharge of treated sanitary wastewater from a non-municipal STP.		

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 applicant 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
- F. Little or No Assimilative Capacity

SPECIAL CONDITIONS:

- II. Solids Management
- III. Compliance Schedule for NH3-N
- IV. Compliance Schedule for Dissolved Oxygen (DO)
- V. Requirements for Total Residual Chlorine (TRC)
- VI. TRC Effluent Limitations Below Quantitation Limits

There are no open violations in efacts associated with the subject Client ID (258144) as of 4/10/2025.

Approve	Deny	Signatures	Date
X		Stephen A. McCauley Stephen A. McCauley, E.I.T. / Project Manager	4/10/2025
X		Adam Olesnanik Adam Olesnanik, P.E. / Environmental Engineer Manager	4/14/2025

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.15
Latitude	41º 11' 50.00"	Longitude	-79º 58' 53.00"
Quad Name	-	Quad Code	-
Wastewater Description:	Sewage Effluent		
Receiving Waters	North Branch Slippery Rock Creek (CWF)	Stream Code	34687
NHD Com ID	126216160	RMI	8.5
Drainage Area	0.01	Yield (cfs/mi^2)	0.07
Q_{7-10} Flow (cfs)	0.0007	Q_{7-10} Basis	calculated
Elevation (ft)	1370	Slope (ft/ft)	0.00919
Watershed No.	20-C	Chapter 93 Class.	CWF
Existing Use	-	Existing Use Qualifier	-
Exceptions to Use	-	Exceptions to Criteria	-
Assessment Status	Impaired*		
Cause(s) of Impairment	Metals / Nutrients, Organic Enrichment, and Total Suspended Solids (TSS)		
Source(s) of Impairment	Acid Mine Drainage (AMD) / Municipal Point Source Discharges		
TMDL Status	-	Name	-

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

Nearest Downstream Public Water Supply Intake	PA American Water Company - Ellwood City		
PWS Waters	Connoquenessing Creek	Flow at Intake (cfs)	27.6
PWS RMI	0.2	Distance from Outfall (mi)	43.0

* - The receiving stream is impaired by metals from AMD. Per the SOP, monitoring for Aluminum, Iron, Manganese will be added to this renewal, as recommended in the SOP.

The receiving stream is also impaired by nutrients and TSS. Monitoring for Total Nitrogen, Total Phosphorus, and TSS is already in place and will be retained with this permit renewal.

Sludge use and disposal description and location(s): All sludge is sent to the Hermitage STP, where it is then 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 0.15 MGD of treated sewage from an existing STP in Barkeyville Borough, Venango County.

Treatment under Water Quality Management Permit No. 6191402 A-1 consists of: Grit removal, screening, a comminutor, extended aeration, clarification, aerobic digestion, and chlorine disinfection.

1. Streamflow:

North Branch Slippery Rock Creek at Outfall 001:

Yieldrate:	0.07	cfsm	(small streams)
Drainage Area:	0.01	sq. mi.	(from StreamStats)
% of stream allocated:	100%	Basis:	no nearby discharges
Q_{7-10}:	0.0007	cfs	(calculated)

2. Wasteflow:

Maximum discharge: 0.15 MGD = 0.23 cfs

Runoff flow period: 24 hours Basis: Runoff flow for this STP

There is less than 3 parts stream flow (Q7-10) to 1 part effluent (design flow) at the discharge point. However, since this is an existing discharge, and the more stringent treatment requirements cannot be achieved, 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, will not be implemented in this NPDES Permit renewal.

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, E. Coli, Total Phosphorus, Total Nitrogen, 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 previously set 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 No./100ml	(monthly average)
	1,000 No./100ml	(instantaneous maximum)
10/01 - 04/30:	2,000 No./100ml	(monthly average)
	10,000 No./100ml	(instantaneous maximum)

Basis: Application of Chapter 92a47 technology-based limits

d. E. Coli

Monitoring was added for E. Coli at a frequency of 1quarter.

Basis: Application of Chapter 92a.61 as recommended by the SOP for flows between 0.05 MGD and 1.0 MGD.

e. Total Phosphorus

Chapter 96.5 does not apply. However, the previous monitoring for Total Phosphorus will be retained in accordance with the SOP, based on Chapter 92a.61.

f. Total Nitrogen

The previous monitoring for Total Nitrogen will be retained 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 for modeling purposes)
Median stream pH to be used:	7.5	Standard Units (S.U.)
		Basis: Default value used in the absence of data
Stream Temperature:	20˚C	(Default value used for CWF modeling purposes)
Background NH_3-N concentration:	0.1	mg/l
		Basis: Default value used for modeling purposes
Calculated NH_3-N Summer limits:	1.3	mg/l (monthly average)
	2.6	mg/l (instantaneous maximum)
Calculated NH_3-N Winter limits:	3.9	mg/l (monthly average)
	11.7	mg/l (instantaneous maximum)

Result: The receiving stream is impaired and is not supporting life from the discharge point to 1.6 miles downstream (see Attachment 3). Previous modeling incorrectly used this downstream point as the first point of use for the stream.

WQ modeling resulted in the summer limits above (see Attachment 1), which are more

restrictive than the previous NPDES Permit. Based on eDMR data, the more restrictive limits are not attainable so a three year compliance schedule will be added with this renewal.

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 for modeling purposes)

Median stream pH to be used: 7.5 Standard Units (S.U.)

Basis: Default value used in the absence of data

Stream Temperature: 20˚C (Default value used for CWF modeling purposes)

Background $CBOD_5$ concentration: 2.0 mg/l

Basis: Default value used for modeling purposes

Calculated $CBOD_5$ limits: 20.8 mg/l (monthly average)
41.6 mg/l (instantaneous maximum)

Result: The receiving stream is impaired and is not supporting life from the discharge point to 1.6 miles downstream (see Attachment 3). Previous modeling incorrectly used this downstream point as the first point of use for the stream.

WQ modeling resulted in the limits above (see Attachment 1), which are more restrictive than the previous NPDES Permit. Based on eDMR data, the more restrictive limits are attainable so a compliance schedule will not be necessary.

i. Dissolved Oxygen (DO)

A Dissolved Oxygen technology-based minimum of 6.0 mg/l was recommended by the WQ Model (see Attachment 1) and the SOP based on Chapter 93.7, under the authority of Chapter 92a.61. Based on eDMR data, the more restrictive limit is not attainable so a 1 year compliance schedule will be added with this renewal.

The measurement frequency was previously set 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) limits: 0.009 mg/l (monthly average)
0.028 mg/l (instantaneous maximum)

Basis: The TRC limits above are water quality-based using the TRC_Calc Spreadsheet (see Attachment 2) and are more restrictive than the previous limits set under the previous practice for dry stream discharges. Based on eDMR data, the more restrictive limits are not attainable so a three year compliance schedule will be added with this renewal.

The measurement frequency was previously set 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 for Outfall 001 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). Since no relevant sampling was provided, mass-balance calculations were not performed.

Nearest Downstream potable water supply (PWS): PA American Water Company - Ellwood City
Distance downstream from the point of discharge: 43.0 miles (approximate)

6. Industrial/Commercial users:

Business Name	Business Type	Average Flow (gpd)
Arby's	Restaurant	14,433
Burger King	Restaurant	24,333
Diesel Injection	Commercial	0 (closed)
Dollar General	Commercial	1,633
Fyda Freightliner Pittsburgh, Inc.	Commercial	4,500
Gahr Truck and Tire Service	Commercial	1,500
Glenn O Hawbaker	Commercial	149,467
Heath Oil	Commercial	6,250
King's Family Restaurant	Restaurant	0 (closed)
Motel 6	Hotel	93,933
Quality Inn	Hotel	89,000
FerrellGas d/b/a Blue Rhino	Commercial	25,000
Speedway	Commercial	110,000
Truck Stop of America	Commercial	421,000
Team Hardinger	Commercial	6,000
United Refining Company	Commercial	49,603
Venango Leasing	Commercial	154,650
Iron Mountain	Document Management	-

7. 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.

8. Attachment List:

Attachment 1 - WQ Modeling Printouts

Attachment 2 - TRC_Calc Spreadsheet

Attachment 3 - 2013 Stream Survey

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

Compliance History

DMR Data for Outfall 001 (from March 1, 2024 to February 28, 2025)

Parameter	FEB-25	JAN-25	DEC-24	NOV-24	OCT-24	SEP-24	AUG-24	JUL-24	JUN-24	MAY-24	APR-24	MAR-24
Flow (MGD) Average Monthly	0.0266	0.0136	0.0184	0.015	0.147	0.01212	0.02	0.01568	0.0246	0.017	0.0245	0.0231
pH (S.U.) Instantaneous Minimum	7.7	7.6	7.6	7.5	7.0	7.0	6.8	6.9	6.0	6.5	7.6	7.6
pH (S.U.) Instantaneous Maximum	8.0	8.2	8.1	8.3	8.3	8.5	7.8	7.9	7.8	7.7	8.7	8.7
DO (mg/L) Instantaneous Minimum	5.0	4.8	4.8	6.4	4.7	4.7	4.4	4.5	4.8	5.6	5.7	5.7
TRC (mg/L) Average Monthly	0.3	0.32	0.34	0.34	0.35	0.03	0.33	0.35	0.33	0.3	0.40	0.4
TRC (mg/L) Instantaneous Maximum	0.4	0.38	0.36	0.36	0.36	0.034	0.36	0.41	0.43	0.66	0.5	0.5
CBOD5 (lbs/day) Average Monthly	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
CBOD5 (mg/L) Average Monthly	< 4.7	< 4.4	< 4.4	< 3.4	< 3.2	4.0	< 4.3	< 3.0	< 3.0	< 3.4	< 3.0	< 3.0
TSS (lbs/day) Average Monthly	4.2	< 5.0	8.0	< 5.0	< 3.0	55.0	5.8	< 5.0	3.69	< 20.0	< 1.0	< 1.0
TSS (mg/L) Average Monthly	19	14.0	16	14.0	10	55.0	35	13.0	18.0	34	< 6.0	< 6.0
Fecal Coliform (No./100 ml) Geometric Mean	< 13	< 1	4	87	< 7.0	< 2.0	19	< 1	< 2.0	8	10	32
Fecal Coliform (No./100 ml) Instantaneous Maximum	614	2	9	2420	2420	11	2420	4.0	8	162	89	326
Total Nitrogen (mg/L) Average Quarterly			68.5			146.0			10			33.5
Ammonia (lbs/day) Average Monthly	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ammonia (mg/L) Average Monthly	1.75	2.3	< 0.38	0.2	2.1	2.89	2.04	2.61	1.16	4.87	0.23	0.19
Total Phosphorus (mg/L) Average Quarterly			6.82			17.2			9.93			2.64

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 May 31, 2026.

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	Continuous	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	1.6	1/day	Grab
CBOD5	26.0	XXX	XXX	20.8	XXX	41.6	1/week	8-Hr Composite
TSS	37.5	XXX	XXX	30.0	XXX	60	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 Avg Qrtly	XXX	XXX	2/quarter	8-Hr Composite
Ammonia Nov 1 - Apr 30	11.4	XXX	XXX	9.0	XXX	18	1/week	8-Hr Composite
Ammonia May 1 - Oct 31	3.8	XXX	XXX	3.0	XXX	6	1/week	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report Avg Qrtly	XXX	XXX	2/quarter	8-Hr Composite
Total Aluminum	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab

Outfall 001, Continued (from Permit Effective Date through May 31, 2026)

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		
Total Iron	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
Total Manganese	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab

Compliance Sampling Location: at Outfall 001, after disinfection.

Flow is monitor only based on Chapter 92a.61. The limits for pH and Dissolved Oxygen are technology-based on Chapter 93.7. The limits for Total Residual Chlorine (TRC) are technology-based on Chapter 92a.48. The limits for $CBOD_5$, Total Suspended Solids, and Fecal Coliforms are technology-based on Chapter 92a.47. The limits for Ammonia-Nitrogen are water quality-based on Chapter 93.7. Monitoring for E. Coli, Total Nitrogen, Total Phosphorus, Total Aluminum, Total Iron, and Total Manganese is based on Chapter 92a.61.

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: June 1, 2026 through May 31, 2028.

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	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	6.0 Inst Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
CBOD5	26.0	XXX	XXX	20.8	XXX	41.6	1/week	8-Hr Composite
TSS	37.5	XXX	XXX	30.0	XXX	60	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 Avg Qrtly	XXX	XXX	2/quarter	8-Hr Composite
Ammonia Nov 1 - Apr 30	11.4	XXX	XXX	9.0	XXX	18	1/week	8-Hr Composite
Ammonia May 1 - Oct 31	3.8	XXX	XXX	3.0	XXX	6	1/week	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report Avg Qrtly	XXX	XXX	2/quarter	8-Hr Composite
Total Aluminum	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab

Outfall 001, Continued (from June 1, 2026 through May 31, 2028)

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		
Total Iron	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
Total Manganese	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab

Compliance Sampling Location: at Outfall 001, after disinfection.

Flow is monitor only based on Chapter 92a.61. The limits for pH and Dissolved Oxygen are technology-based on Chapter 93.7. The limits for Total Residual Chlorine (TRC) are technology-based on Chapter 92a.48. The limits for $CBOD_5$, Total Suspended Solids, and Fecal Coliforms are technology-based on Chapter 92a.47. The limits for Ammonia-Nitrogen are water quality-based on Chapter 93.7. Monitoring for E. Coli, Total Nitrogen, Total Phosphorus, Total Aluminum, Total Iron, and Total Manganese is based on Chapter 92a.61.

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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: June 1, 2028 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	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Inst Min	XXX	XXX	9.0	1/day	Grab
DO	XXX	XXX	6.0 Inst Min	XXX	XXX	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.009	XXX	0.028	1/day	Grab
CBOD5	26.0	XXX	XXX	20.8	XXX	41.6	1/week	8-Hr Composite
TSS	37.5	XXX	XXX	30.0	XXX	60	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 Avg Qrtly	XXX	XXX	2/quarter	8-Hr Composite
Ammonia Nov 1 - Apr 30	4.8	XXX	XXX	3.9	XXX	11.7	1/week	8-Hr Composite
Ammonia May 1 - Oct 31	1.6	XXX	XXX	1.3	XXX	2.6	1/week	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report Avg Qrtly	XXX	XXX	2/quarter	8-Hr Composite

Outfall 001, Continued (from June 1, 2028 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		
Total Aluminum	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
Total Iron	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab
Total Manganese	XXX	XXX	XXX	XXX	Report Daily Max	XXX	1/quarter	Grab

Attachment 1

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
20C	34687	NORTH BRANCH SLIPPERY ROCK 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)
8.500	Barkeyville Sew	PA0025607x	0.150	CBOD5	20.84		
				NH3-N	1.37	2.74	
				Dissolved Oxygen			6

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
20C	34687	NORTH BRANCH SLIPPERY ROCK CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
8.500	0.150	24.985	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
1.413	0.612	2.308	0.269
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
20.78	1.250	1.37	1.027
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.007	25.118	Owens	6
Reach Travel Time (days)			
0.238			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.024	20.02	1.34	6.10
0.048	19.28	1.30	6.19
0.072	18.57	1.27	6.27
0.095	17.89	1.24	6.34
0.119	17.23	1.21	6.42
0.143	16.60	1.18	6.49
0.167	15.99	1.15	6.55
0.191	15.40	1.13	6.62
0.215	14.83	1.10	6.68
0.238	14.29	1.07	6.74

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	6		

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
20C	34687	NORTH BRANCH SLIPPERY ROCK	**8.500**	1370.00	0.01	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	0.070	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	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
Barkeyville Sew	PA0025607x	0.1500	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	8.24	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
20C	34687	NORTH BRANCH SLIPPERY ROCK	**7.450**	1319.00	1.55	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	0.070	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	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
20C	34687	NORTH BRANCH SLIPPERY ROCK 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												
8.500	0.00	0.00	0.00	.2321	0.00920	.612	1.41	2.31	0.27	0.238	24.98	7.00
Q1-10 Flow												
8.500	0.00	0.00	0.00	.2321	0.00920	NA	NA	NA	0.27	0.239	24.99	7.00
Q30-10 Flow												
8.500	0.00	0.00	0.00	.2321	0.00920	NA	NA	NA	0.27	0.238	24.98	7.00

WQM 7.0 Wasteload Allocations

SWP Basin	Stream Code	Stream Name
20C	34687	NORTH BRANCH SLIPPERY ROCK 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
8.500	Barkeyville Sew	11.08	11.1	11.08	11.1	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
8.500	Barkeyville Sew	1.37	1.37	1.37	1.37	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)		
8.50	Barkeyville Sew	20.84	20.84	1.37	1.37	6	6	0	0

Attachment 2

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

0.0007	= Q stream (cfs)	0.5	= CV Daily
0.15	= 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 =	0.020	1.3.2.iii	WLA cfc =	0.012
PENTOXSD TRG	5.1a	LTAMULT afc =	0.373	5.1c	LTAMULT cfc =	0.581
PENTOXSD TRG	5.1b	LTA_afc=	0.007	5.1d	LTA_cfc =	0.007

Source		Effluent Limit Calculations		
PENTOXSD TRG	5.1f	AML MULT =	1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) =	0.009	CFC
		INST MAX LIMIT (mg/l) =	0.028	

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)**

Attachment 3

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHWEST REGIONAL OFFICE **MEMO**

TO: Dave Balog DeB
Environmental Engineering Manager
Clean Water Program

FROM: Jay Gerber JRG
Water Pollution Biologist 2
Clean Water Program

THROUGH: Joe Brancato JCB
Water Pollution Biologist 3
Clean Water Program

Christina Nagy CSN
Operations Group Manager
Clean Water Program

DATE: February 19, 2013

SUBJECT: Aquatic Biology Investigation
Barkeyville Sewerage Wastewater Treatment Plant (PA0025607)
North Branch Slippery Rock Creek (Stream Code 34687)
Barkeyville Borough, Venango County

INTRODUCTION

At the request of the Clean Water Management Program, an aquatic biological investigation was completed on the North Branch Slippery Rock Creek, Barkeyville Borough, Venango County on February 14, 2013. The survey was completed to determine the impacts, if any, the Barkeyville Sewerage Wastewater Treatment Plant (BWWTP) may be having on water quality and aquatic life in the North Branch Slippery Rock Creek. Three sites were examined for benthic macroinvertebrates, basic water quality, and habitat.

The BWWTP is located in Barkeyville Borough, Venango County. It discharges treated effluent to an Unnamed Tributary (UNT), which flows southwest approximately 100 meters from the discharge before emptying into the North Branch Slippery Rock Creek (known throughout the duration of this report as the North Branch). The flow in this UNT is

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composed entirely of the BWWTP effluent. It currently operates under permit number PA0025607, which expired on November 19, 2012. Since July 2009, the BWWTP has had over twenty violations, including exceeding permit limits for carbonaceous biochemical oxygen demand, total residual chlorine, ammonia, zinc, and fecal coliforms. Zinc, fecal coliforms, and ammonia were the most common permit violations.

The North Branch originates approximately 400 meters upstream of its confluence with the UNT, draining a wetland as well as receiving flow from the TA Travel Plaza stormwater retention pond. At its confluence with the UNT, the North Branch drains 0.22 square miles (USGS StreamStats). This basin is 41.9% forested, while 47.0% is considered urban land cover. Impervious surfaces account for 18.1% of the land cover. From its confluence with the UNT, the North Branch flows south 9.7 miles before emptying into Slippery Rock Creek. The North Branch is located in the Slippery Rock Creek drainage basin (State Water Plan 20C) and the Connoquenessing Creek Hydrologic Unit (Hydrologic Unit Code 05030105).

At the discharge, the North Branch is currently not supporting its designated aquatic life use as Cold Water Fishes (CWF) under 25 Pa. Code §93.9w. Impairments include "Municipal Point Source - Organic Enrichment/Low Dissolved Oxygen, Municipal Point Source – Nutrients, Municipal Point Source – Suspended Solids, and Abandoned Mine Drainage – Metals." The "Municipal Point Source" impairment listings were due to findings of previous surveys completed on the BWWTP discharge. These impairments extend downstream 1.6 miles before the North Branch is considered to be supporting its designated aquatic life use. ←

One previous study of the BWWTP discharge on the North Branch was completed by the Department (DEP 2006). This study determined the discharge was having a significant impact on water quality and aquatic life within the stream, leading to the impairments listed above. The benthic macroinvertebrate community downstream of the discharge was severely depressed. Additionally, solids were observed in the stream and nutrient levels were elevated.

METHODS AND MATERIALS

On February 14, 2013, benthic macroinvertebrates, basic water quality, and habitat were examined at three sites (Figure 1). A reference site was completed just below the TA Travel Plaza stormwater retention pond (NB1). An impact site was completed ~25 meters downstream of the confluence of the North Branch and the UNT comprised of the BWWTP effluent (NB2). A third site was completed approximately 500 meters downstream of the confluence of the North Branch and UNT (NB3) to determine if the North Branch appeared to be improving from upstream impacts. Sampling was restricted throughout this study. The stream was largely low gradient, draining and coursing through wetlands. There were significant instream habitat differences among sites. Other locations would likely have been more suitable for sampling, however habitat availability was lacking along the entire survey length. As a direct result, the reference and recovery site contained good to fair substrate, while the impact station substrate was poor, containing mostly sand and clay.

Macroinvertebrates were sampled by completing four one-meter kick nets (500µm mesh netting) at each site. Kick net samples were standardized to riffles utilizing the best available habitat at each site. Care was taken to disturb the same approximate area and exert a similar amount of effort at each site. The relative abundance of observed taxa was recorded for each kick, while representative taxa were placed in 95% ethyl alcohol and transported to our wet lab for verification. These vouchers were identified to the lowest possible taxonomic level using a dissecting microscope. Peckarsky *et al.* (1990), Pfeiffer *et al.* (2006) and Merritt *et al.* (2008) were used as taxonomic references.

Basic water quality parameters, including dissolved oxygen, pH, specific conductivity, and temperature were measured *in situ* at each site prior to the macroinvertebrate surveys. In addition to the three macroinvertebrate sites, water quality was determined on the North Branch immediately upstream of its confluence with the TA Travel Plaza stormwater retention pond. All parameters were determined using field meters.

Physical habitat assessments, modified for the Department from the EPA Rapid Bioassessment Protocols (Barbour *et al.* 1999), were completed at each site. These assessments consisted of twelve criteria, encompassing instream and riparian zone parameters, scored from 0-20. Total scores result in habitat characterizations of poor (0-60), marginal (72-120), suboptimal (132-180), or optimal (>192). The decision is left to the discretion of the investigator if a score falls between any of these categories.

RESULTS

Benthic macroinvertebrate communities were significantly different among sites (Table 1). The reference station was located immediately downstream of the TA Travel Plaza stormwater retention pond. In the four kick screens, only six total individuals were observed. An orange precipitate covered the substrate, consistent with abandoned mine drainage. The impact station (NB2) was dominated by pollution tolerant macroinvertebrates, particularly midges and red midges. Red midges are generally indicators of low oxygen concentration environments (Walshe 1947, Brodersen *et al.* 2008). All other taxa were recorded in low numbers at this site. NB3 showed signs of modest improvement. Red midges were no longer collected and most taxa were pollution facultative. Rock picks showed additional sensitive taxa, including the caddisflies *Neophylax* and *Lepidostoma*, not seen with the kick screens.

Basic water quality showed some variations among sites (Table 2), though it appeared the BWWTP discharge did not drive any of these changes. pH was similar at all stations. Dissolved oxygen was lowest and specific conductivity was highest at NB1, just downstream of the TA Travel Plaza retention pond. Dissolved oxygen was similar at the two stations downstream of the discharge, while specific conductivity continued to decrease as one moved downstream.

Habitat varied considerably among the three sampling locations (Table 3). The largest difference was instream habitat. Riffles were lacking at the impact station (NB2). While NB1 and NB3 were relatively similar with a fair amount of cobble and gravel, substrate at NB2 consisted mostly of sand and clay. Some very small particles of gravel were noted at NB2.

DISCUSSION AND CONCLUSIONS

The BWWTP currently discharges to an UNT which flows approximately 100 meters before emptying into North Branch Slippery Rock Creek. Over the past three years, over twenty violations of their National Pollutant Discharge Elimination System Permit have occurred, the majority being for zinc, fecal coliforms, and ammonia. A previous study by Department biologists concluded the discharge was having a detrimental impact on the aquatic community and water quality. The results of our current study indicate the BWWTP is continuing to have a negative impact on water quality in the North Branch, though the extent is difficult to quantify.

The North Branch is clearly impacted by abandoned mine drainage (AMD). Strip mines were common in this general area and many neighboring streams are impaired from previous mining activities. The high specific conductivity observed downstream of the retention pond confirms this impairment. Additionally at this location, the substrate was cemented with orange precipitate, consistent with iron pollution from mining seeps (Figure 2). This AMD has resulted in nearly sterile conditions in the upper reach of North Branch Slippery Rock Creek. Very few macroinvertebrate individuals were observed in the sample collected immediately downstream of the discharge. While this is a confounding factor on this study, it cannot completely explain some of our findings.

The BWWTP discharges to an UNT which is entirely comprised of treated effluent (Figure 3). While no biologic samples were taken in the UNT due to lack of habitat, upon examination, small pieces of sewage related paper products as well as solids and floc were observed in the stream (Figures 4 & 5). This can lead to eutrophication of the water body, resulting in the stream reaching an anoxic state. The proliferation of red midges, commonly called bloodworms, at the impact site suggest anoxic conditions are occurring in the North Branch in a reach downstream of the discharge. Additionally, violations in permit limits suggest organic loading is harming the water quality of the North Branch. Examination of the NB3 station suggests water quality is slightly improving as the macroinvertebrate assemblage changes from a community dominated by pollution tolerant taxa to one dominated by pollution facultative taxa. As previously mentioned, several sensitive taxa were also observed at NB3, though not in our macroinvertebrate sample.

The objective of this study was to determine the impacts, if any, the BWWTP discharge is having on water quality and aquatic life within the North Branch. Even though the stream is impacted by AMD and the habitat at the sampling location downstream of the BWWTP was marginal, it appears the discharge is having a detrimental impact on the stream. The permit exceedences, presence of sewage related paper products as well as solids and floc in

the stream, and the proliferation of bloodworms at the impact site indicate the discharge is having a negative effect on the stream, though due to confounding impacts, the full extent of harm is difficult to quantify.

Electronic cc: Stream File – Slippery Rock Creek (SC 34032)
Tony Shaw, DEP – Central Office, WQS Monitoring Chief
Neil Bullock DEP – NWRO, Water Quality Specialist
Chris Hall DEP – NWRO, Compliance Specialist

JG:ll

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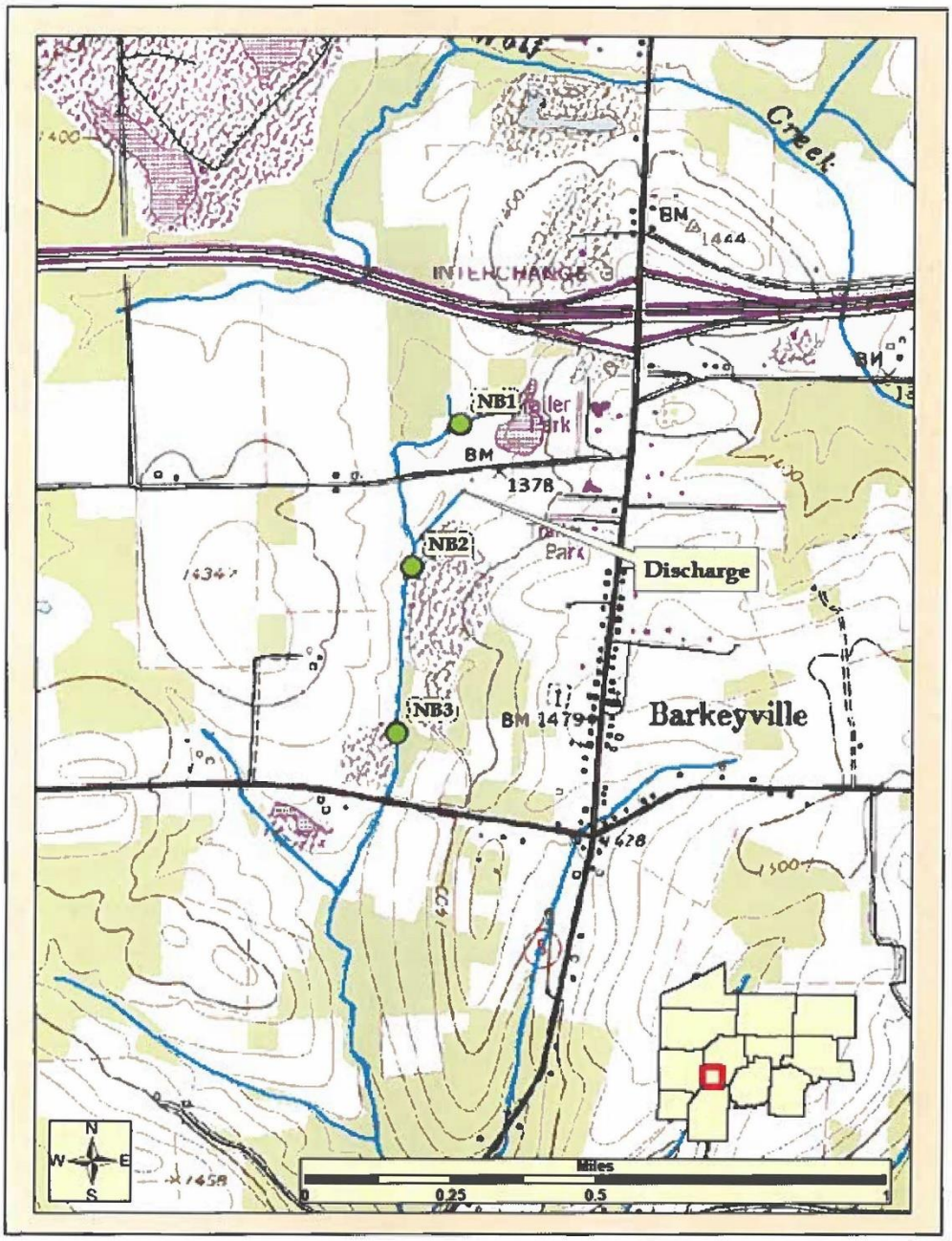

Figure 1. A map from the Barkeyville USGS Quad showing sampling locations on the North Branch Slippery Rock Creek collected on February 14, 2013. NB1 was sampled immediately downstream of the TA Travel Plaza retention pond outfall, NB2 was sampled approximately 25 meters downstream of where an UNT containing the BWWTP discharge empties into the North Branch, and NB3 was taken approximately 500 meters downstream of the confluence of the North Branch and the UNT.

Table 1. Macroinvertebrates collected at three sites on the North Branch Slippery Rock Creek on February 14, 2013.

Taxa	Hilsenhoff Score	NB1				NB2				NB3			
		1	2	3	4	1	2	3	4	1	2	3	4
Coleoptera (Beetles)													
Elmidae													
Optioservus	4									-	R	R	R
Trichoptera (Caddisflies)													
Hydropsychidae													
Hydropsyche	5									P	P	P	P
Cheumatopsyche	6									P	P	P	P
Diptera (True Flies)													
Chironomidae	6	-	-	R	R	A	VA	A	A	A	VA	VA	A
Red Chironomidae	10					A	A	VA	VA				
Simulidae													
Simulium	6									A	VA	C	A
Tipulidae													
Tipula	4	R	R	-	-	R	-	R	R	-	R	-	R
Non-Insect Taxa													
Oligochaeta (Worms)	10	-	-	-	R	R	P	P	R				
Cambaridae (Crayfish)	6									R	-	-	-
Isopoda (Sowbugs)													
Caecidotea	6					-	R	-	-	-	C	R	P
Physidae (Snails)													
Physa	8					-	R	R	-	R	-	R	R
Total Taxa		1	1	1	2	4	5	5	4	6	7	7	8

Table 2. Basic water quality collected at four sites on the North Branch Slippery Rock Creek on February 14, 2013.

Field Parameter	Upstream	NB1	NB2	NB3
Temperature (°C)	1.4	3.3	0.6	0.4
Specific Conductivity (µS/cm)	2860	4030	2550	1559
pH (Units)	7.64	7.36	7.41	7.48
Dissolved Oxygen (mg/L)	13.68	11.14	13.04	12.98
Dissolved Oxygen (% Saturation)	95.7	84.4	91.7	90.8

Table 3. Habitat scores from three sites on the North Branch Slippery Rock Creek.

Habitat Metric	Scoring Range	NB1	NB2	NB3
1. Instream Cover	0-20	9	3	9
2. Epifaunal Substrate	0-20	10	4	14
3. Embeddedness	0-20	5	4	7
4. Velocity/Depth Regimes	0-20	10	10	10
5. Channel Alteration	0-20	7	12	12
6. Sediment Deposition	0-20	8	3	7
7. Frequency of Riffles	0-20	7	6	6
8. Channel Flow Status	0-20	14	12	15
9. Condition of Banks	0-20	8	6	6
10. Bank Vegetative Protection	0-20	15	16	16
11. Grazing/Disruptive Pressures	0-20	15	16	17
12. Riparian Vegetation Zone Width	0-20	15	16	17
Total Score	**0-240**	**123**	**108**	**136**
Rating		**Marginal**	**Marginal**	**Suboptimal**

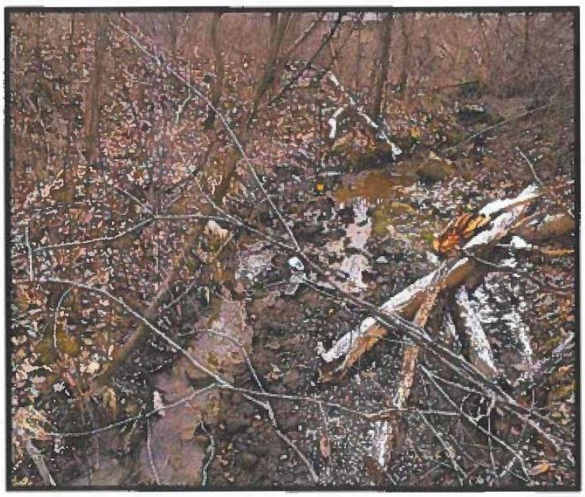

Figure 2. Sampling location of NB1. Stream has orange tint, consistent with AMD.

Figure 3. BWWTP treated effluent outfall pipe.

Figure 4. Sewage related paper products observed in UNT approximately 15 meters downstream of BWWTP outfall pipe.

Figure 5. Solids and floc observed in UNT approximately 20 meters downstream of BWWTP outfall pipe.