pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0025283**
Facility Type	**Municipal**	APS ID	**975406**
Major / Minor	**Minor**	Authorization ID	**1241216**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Knox Borough**	Facility Name	**Knox Borough STP**
Applicant Address	PO Box 366	Facility Address	194 McElhattan Road
	Knox, PA 16232		Knox, PA 16232
Applicant Contact	Sharon Heeter, Secretary	Facility Contact	Jeffrey McCleary, STP Operator
Applicant Phone	(814) 797-1376	Facility Phone	(814) 797-1376
Client ID	65957	Site ID	457559
Ch 94 Load Status	Not Overloaded	Municipality	Knox Borough
Connection Status	No Limitations	County	Clarion County
Date Application Received	August 21, 2018	EPA Waived?	Yes
Date Application Accepted	August 23, 2018	If No, Reason	-
Purpose of Application	Renewal of an NPDES Permit for an existing discharge of treated sanitary wastewater from a municipal sewer system.		

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. Effluent Chlorine Optimization and Minimization

SPECIAL CONDITIONS:

II. Solids Management
III. Schedule of Compliance (CBOD5)
IV. Requirements for Total Residual Chlorine (TRC)

There are NO open violations in efacts associated with the subject Client ID (65957) as of 8/14/2019.

Approve	Deny	Signatures	Date
X		Stephen A. McCauley, E.I.T. / Environmental Engineering Specialist	
X		Justin C. Dickey, P.E. / Environmental Engineer Manager	

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	001	Design Flow (MGD)	0.502
Latitude	41º 13' 24.00"	Longitude	-79º 31' 12.00"
Quad Name	-	Quad Code	-
Wastewater Description:	Sewage Effluent		
Receiving Waters	Canoe Creek (HQ-CWF)	Stream Code	49377
NHD Com ID	102670459	RMI	5.3
Drainage Area	9.1	Yield (cfs/mi^2)	0.14
Q_{7-10} Flow (cfs)	1.27	Q_{7-10} Basis	calculated
Elevation (ft)	1269	Slope (ft/ft)	0.002552
Watershed No.	17-B	Chapter 93 Class.	HQ-CWF
Existing Use	-	Existing Use Qualifier	-
Exceptions to Use	-	Exceptions to Criteria	-
Assessment Status	Impaired		
Cause(s) of Impairment	Metals, pH		
Source(s) of Impairment	Acid Mine Drainage, Petroleum/Natural Gas Activities		
TMDL Status	-	Name	-
Background/Ambient Data		Data Source	
pH (SU)	-	-	
Temperature (°F)	-	-	
Hardness (mg/L)	-	-	
Other:	-	-	
Nearest Downstream Public Water Supply Intake		Parker Area Water Authority	
PWS Waters	Allegheny River	Flow at Intake (cfs)	951
PWS RMI	85.0	Distance from Outfall (mi)	18.0

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 0.502 MGD of treated sewage from an existing Publicly Owned Treatment Works (POTW) in Knox Borough, Clarion County.

Permitted treatment (WQM Permit no. 1614402) consists of: A cylindrical fine screen with a manually cleaned bypass bar screen, a parshall flume with an ultrasonic flow meter, a flow splitter box, two extended aeration tanks, two secondary

clarifiers, two chlorine contact tanks with a gas chlorination feed system, a dechlorination tank with a sodium bisulfate feed system, two aerobic digesters and eight sand sludge drying beds with polymer addition.

Facility Area: See the topographical map (Attachment 1) and the aerial map (Attachment 2)

1. Streamflow: Canoe Creek @ Outfall 001:

Drainage Area:	9.1	sq. mi.	(USGS StreamStats)
Yieldrate:	0.14	cfsm	Piney Creek (previous WQPR)
% of stream allocated:	100%	Basis:	No nearby discharges
Q_{7-10}:	1.27	cfs	

2. Wasteflow:

Maximum discharge: 0.502 MGD = 0.77 cfs

Runoff flow period: 24 hours Basis: Runoff flow for a Municipal STP

There is less than 3 parts stream flow (Q7-10) to 1 part effluent (design flow). However, since this is an existing discharge, the more stringent treatment requirements cannot be achieved, and the receiving stream is not impaired by the discharge, the standards in DEP guidance (391-2000-014) will not be applied. 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 Total Residual Chlorine. NH_3-N, $CBOD_5$, and Dissolved Oxygen were evaluated using WQM 7.0 at the discharge point.

NO_2-NO_3, Fluoride, Phenolics, Sulfates, and Chlorides can be evaluated using PentoxSD at the nearest downstream potable water supply (PWS). Since there is significant dilution available, no modeling was performed for this facility.

a. pH

Between 6.0 and 9.0 at all times

Basis: Application of Chapter 93.7 technology-based limits.

b. Total Suspended Solids

Limits are 30 mg/l as a monthly average and 60 as a daily 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. Phosphorus

☐ Limit necessary due to:

☐ Discharge to lake, pond, or impoundment
☐ Discharge to stream

☒ Limit not necessary

Basis: Chapter 96.5 does not apply. However, monitoring for Total Phosphorus and Total Nitrogen will be retained with this renewal as recommended by the SOP to provide data for review during the next renewal application to ensure the discharge is not high in nutrients.

e. NO_2-NO_3, Fluoride, Phenolics, Sulfates, and Chlorides

Nearest Downstream potable water supply (PWS): Due to the High Quality designation of the Canoe Creek, the discharge point is evaluated rather than the Parker Area Water Authority that is 18 miles downstream.

Distance downstream from the point of discharge: 0.0 miles (approximate)

☒ No limits necessary
☐ Limits needed

Basis: Significant dilution available.

f. Ammonia-Nitrogen (NH_3-N)

Median discharge pH to be used: 6.3 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: 20˚C (default value used for CWF modeling)

Background NH_3-N concentration: 0.1 mg/l

Basis: Default value.

Calculated NH_3-N Summer limits: 3.1 mg/l (monthly average)
6.2 mg/l (instantaneous maximum)

Calculated NH_3-N Winter limits: 9.3 mg/l (monthly average)
18.6 mg/l (instantaneous maximum)

Result: WQ modeling resulted in the summer water quality-based limits above (see Attachment 3). The winter limits are calculated as three times the summer limits. The limits are more restrictive than in the previous NPDES Permit. Based on the eDMR data, the new limits will be attainable, so a compliance schedule will not be necessary.

g. $CBOD_5$

Median discharge pH to be used: 6.3 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: 20˚C (default value used for CWF modeling)

Background $CBOD_5$ concentration: 2.0 mg/l

Basis: Default value

$CBOD_5$ Summer limits: 10.5 mg/l (monthly average)
21.0 mg/l (instantaneous maximum)

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

Result: WQ modeling resulted in the above summer water quality-based limits (see Attachment 3). The winter limits are calculated as three times the summer limits, but since the technology-based limits are more protective, they will be used. The limits are more restrictive than in the previous NPDES Permit. Based on the eDMR data, the new limits will not be immediately attainable so a three year compliance schedule will be added.

h. Dissolved Oxygen (DO)

Discussion: The previous Dissolved Oxygen technology-based minimum of 6.0 mg/l will be retained with this renewal.

i. Total Residual Chlorine (TRC)

☐ No limit necessary
☒ TRC limits: 0.24 mg/l (monthly average)
0.81 mg/l (instantaneous maximum)

Basis: The Water quality-based limits for TRC above were calculated using the Department's TRC Calculation Spreadsheet (see Attachment 4). The limits are more restrictive than in the previous NPDES Permit. Based on the eDMR data, the new limits will not be immediately attainable so a three year compliance schedule will be added.

j. Influent Total Suspended Solids and BOD_5

Monitoring for these two parameters will be added as recommended in the SOP for POTWs, as authorized under Chapter 92a.61.

k. 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.

4. Reasonable Potential Analysis:

A Reasonable Potential Analysis was performed in accordance with State practices for Outfall 001 by first using the Toxics Screening Analysis Spreadsheet (see Attachment 5) to determine which parameters should be modeled using the PentoxSD program (see Attachment 6).

Total Dissolved Solids, Chloride, Bromide, and Sulfate were determined to have a reasonable potential.

Since PentoxSD does not calculate WQBELs for PWS-related parameters, Total Dissolved Solids and Chloride were evaluated using a mass-balance calculation.

PWS Evaluation:

Stream flow (sf) at the potable water supply intake = 951 cfs
Waste flow (wf) from the STP = 0.502 MGD = 0.777 cfs

Background Concentrations:
TDS = 10 mg/l (assumed - no data)
Chloride = 10 mg/l (assumed - no data)

Mass balance for TDS at the potable water supply intake:
(sf @ PWS)(bkrd. conc.) + (wf)(x) = (tot. flow)(criteria)
(951cfs)(10 mg/l) + (0.777 cfs)(x) = (951.777 cfs)(500 mg/l)

x = 600,229 mg/l (renewal application maximum was 531 mg/l - ok)
since the discharge is to a HQ stream, TDS is evaluated at the point of discharge. The PWS criteria is 500 mg/l, so while the discharge is slightly higher, there is no reasonable potential.

Mass balance for Chloride at the potable water supply intake:
(sf @ PWS)(bkrd. conc.) + (wf)(x) = (tot. flow)(criteria)
(951cfs)(10 mg/l) + (0.777 cfs)(x) = (951.777 cfs)(250 mg/l)

x = 293,995 mg/l (renewal application maximum was 130 mg/l - ok)
since the discharge is to a HQ stream, TDS is evaluated at the point of discharge. The PWS criteria is 250 mg/l, there is no reasonable potential.

5. Additional Information:

The Knox Boro STP receives 3.5% of its flow from the Beaver Township, with the remaining 96.5% of its flow from the Know Borough. Both municipalities are 100% separate sewer systems.

6. Attachment List:

Attachment 1 - Topographical Map of the Facility Area
Attachment 2 - Aerial Image of the Facility Area
Attachment 3 - WQM7 printouts
Attachment 4 - TRC_Calc Spreadsheet
Attachment 5 - Toxics Screening Analysis Spreadsheet
Attachment 6 - PentoxSD model printouts

If viewing this electronically, please refer to the following PDF to view the above Attachments:

Adobe Acrobat Document

Compliance History

DMR Data for Outfall 001 (from June 1, 2018 to May 31, 2019)

Parameter	MAY-19	APR-19	MAR-19	FEB-19	JAN-19	DEC-18	NOV-18	OCT-18	SEP-18	AUG-18	JUL-18	JUN-18
Flow (MGD) Average Monthly	0.188	0.209	0.218	0.371	0.294	0.314	0.354	0.259	0.345	0.226	0.232	0.256
Flow (MGD) Weekly Average	0.242	0.271	0.313	0.474	0.404	0.401	0.369	0.341	0.519	0.241	0.265	0.286
pH (S.U.) Minimum	6.2	6.1	6.2	6.2	6.2	6.3	6.3	6.2	6.3	6.1	6.1	6.1
pH (S.U.) Maximum	6.5	6.5	6.5	6.6	6.6	6.7	6.6	6.5	6.6	6.6	6.5	6.6
DO (mg/L) Minimum	7.7	8.3	8.4	8.9	6.4	8.5	8.6	7.9	7.5	7.6	7.4	7.5
TRC (mg/L) Average Monthly	0.36	0.28	0.30	0.32	< 0.34	0.40	0.30	0.40	< 0.30	0.40	0.40	0.40
TRC (mg/L) Instantaneous Maximum	0.53	0.48	0.56	0.99	0.77	0.65	0.57	1.03	0.88	0.95	0.65	0.84
CBOD5 (lbs/day) Average Monthly	28	17	10	< 19	< 13	11	25	31	60	53	47	24
CBOD5 (lbs/day) Weekly Average	36	25	15	32	25	15	37	41	75	73	56	29
CBOD5 (mg/L) Average Monthly	19	12	6	< 5	< 5	5	8	16	20	27	24	12
CBOD5 (mg/L) Weekly Average	22	34	9	8	7	6	9	21	33	28	33	16
TSS (lbs/day) Average Monthly	17	23	< 16	< 36	14	< 9	< 14	14	32	15	16	< 17
TSS (lbs/day) Weekly Average	34	39	37	74	26	11	21	26	61	19	45	28
TSS (mg/L) Average Monthly	11	17	< 10	< 9	6	< 4	< 4	7	10	8	7	< 8
TSS (mg/L) Weekly Average	19	34	18	18	12	5	5	13	17	9	15	15
Fecal Coliform (CFU/100 ml) Geometric Mean	4	5	4	< 6	< 2	< 1	1	< 1	< 2	< 3	7	2
Fecal Coliform (CFU/100 ml) Instantaneous Maximum	12	11	23	18	3	1	2	5	3	6	44	4
Total Nitrogen (mg/L) Average Monthly	18.5	36.3	27.2	29.6	19.8	19.9	20.5	20.1	22.8	26.6	27.7	37.3

Ammonia-Nitrogen (lbs/day) Average Monthly	0.7	0.5	0.3	0.6	0.4	0.3	0.5	0.40	1	0.6	0.6	0.7
Ammonia-Nitrogen (mg/L) Average Monthly	0.46	0.33	< 0.1	0.16	0.15	< 0.1	< 0.1	< 0.1	< 0.1	0.0	0.0	0.0
Total Phosphorus (mg/L) Average Monthly	2.44	4.79	3.16	3.01	2.03	1.9	2	2.29	3.75	2.47	4.24	5.22

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 November 29, 2022.

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 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	0.43	XXX	1.4	1/day	Grab
CBOD5 Nov 1 - Apr 30	105.0	167.0	XXX	25.0	40.0	50	1/week	24-Hr Composite
CBOD5 May 1 - Oct 31	63.0	94.0	XXX	15.0	22.5	30	1/week	24-Hr Composite
TSS	126.0	188.0	XXX	30.0	45.0	60	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-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
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	38.9	XXX	XXX	9.3	XXX	18.6	1/week	24-Hr Composite

Outfall 001, Continued (from Permit Effective Date through November 29, 2022)

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		
Ammonia-Nitrogen May 1 - Oct 31	12.9	XXX	XXX	3.1	XXX	6.2	1/week	24-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite

Compliance Sampling Location: 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 water quality-based on Chapter 93.7. The limits for $CBOD_5$ and Ammonia-Nitrogen are water quality-based on Chapter 93.7. The limits for Total Suspended Solids and Fecal Coliforms are technology-based on Chapter 92a.47. Monitoring for influent BOD5 and TSS is based on Chapter 92a.61. Monitoring for Total Nitrogen and Total Phosphorus 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" (362-0400-001), SOPs and/or BPJ.

Outfall 001, Effective Period: November 30, 2022 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 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	0.24	XXX	0.81	1/day	Grab
CBOD5 Nov 1 - Apr 30	105.0	167.0	XXX	25.0	40.0	50	1/week	24-Hr Composite
CBOD5 May 1 - Oct 31	43.9	65.7	XXX	10.5	15.7	21	1/week	24-Hr Composite
TSS	125.6	188	XXX	30.0	45.0	60	1/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-Hr Composite
TSS Raw Sewage Influent	Report	XXX	XXX	Report	XXX	XXX	1/week	24-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
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	38.9	XXX	XXX	9.3	XXX	18.6	1/week	24-Hr Composite

Outfall 001, Continued (from November 30, 2022 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		
Ammonia-Nitrogen May 1 - Oct 31	12.9	XXX	XXX	3.1	XXX	6.2	1/week	24-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite

Compliance Sampling Location: 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 water quality-based on Chapter 93.7. The limits for $CBOD_5$ and Ammonia-Nitrogen are water quality-based on Chapter 93.7. The limits for Total Suspended Solids and Fecal Coliforms are technology-based on Chapter 92a.47. Monitoring for influent BOD5 and TSS is based on Chapter 92a.61. Monitoring for Total Nitrogen and Total Phosphorus is based on Chapter 92a.61.