Northwest Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0221619**
Facility Type	**Municipal**	APS ID	**1079388**
Major / Minor	**Minor**	Authorization ID	**1424191**

NPDES PERMIT FACT SHEET INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Otto Township Sanitary Authority Mckean County**	Facility Name	**Otto Township STP**
Applicant Address	PO Box 213	Facility Address	1005 Main Street
	Duke Center, PA 16729-0213		Duke Center, PA 16729-9515
Applicant Contact	Stacey Claycomb	Facility Contact	Stacey Claycomb
Applicant Phone	(814) 558-8920	Facility Phone	(814) 558-8920
Client ID	44814	Site ID	246336
Ch 94 Load Status	Not Overloaded	Municipality	Otto Township
Connection Status	No Limitations	County	McKean
Date Application Received	January 17, 2023	EPA Waived?	Yes
Date Application Accepted		If No, Reason	

Purpose of Application: This is a renewal of a Minor Sewage Facility which serves Otto Township in McKean County.

Summary of Review

This facility discharges to Knapp Creek, which is classified as Cold Water Fishes and has Aquatic Life and Recreational uses.

Act 14 – Notifications were submitted and received.

85.2% of the Flow Contribution comes from Otto Township, the remaining 14.8% of the flow comes from additional sanitary sewers not within the Otto Township limits.

There are currently 4 open violations in WMS for the subject Client ID (44814) as of 3/20/24. The open violations consist of several violations regarding the discharge and operation of the facility.

Sludge use and disposal description and location(s): This facility produced and disposed of 4.8 dry tons of sludge / biosolids which was hauled to Bradford WWTP by JJ Honey Dipper.

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		Dustin Hargenrater Dustin Hargenrater / Civil Engineer	April 15, 2024
		Vacant / Environmental Engineer Manager	Okay to Draft JCD 4/15/2024

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	.23
Latitude	41º 56' 4.02"	Longitude	-78º 26' 10.03"
Quad Name	Eldred	Quad Code	41078H4
Wastewater Description:	Sewage Effluent		

Receiving Waters	Knapp Creek (CWF)	Stream Code	57507
NHD Com ID	112365763	RMI	0.1400 (Stream RMI 4.68)
Drainage Area	27	Yield (cfs/mi^2)	0.064
Q_{7-10} Flow (cfs)	1.73	Q_{7-10} Basis	USGS – StreamStats
Elevation (ft)	1476	Slope (ft/ft)	0.00271
Watershed No.	16-C	Chapter 93 Class.	CWF
Existing Use	**Statewide**	Existing Use Qualifier	None
Exceptions to Use	None	Exceptions to Criteria	None
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	

Background/Ambient Data		Data Source
pH (SU)	7.23	Monitoring Point 48146, Warm Month (May – Sept.) Averages from samples taken between 2003 and 2021
Temperature (°F)	68	Default
Hardness (mg/L)	100	Default
Other:		

Nearest Downstream Public Water Supply Intake		State of New York	
PWS Waters	Allegheny River	Flow at Intake (cfs)	31
PWS RMI	263.4	Distance from Outfall (mi)	9.34

Changes Since Last Permit Issuance: The OTSAB is planning to evaluate the cost of repairing and returning the press to operation versus hauling sludge. A decision is expected by the April board meeting (held on 3rd Tuesday of the month). Once a decision is known, Ms. Claycomb will contact the Department to clarify the course of action, which may include an amendment to the site's WQM Permit.

Other Comments: Kinzua Reservoir is 45.4 miles downstream.

Treatment Facility Summary

Treatment Facility Name: Otto Township STP

WQM Permit No.	Issuance Date
4209401	1/16/2009

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Ammonia Reduction	Sequencing Batch Reactor	Ultraviolet	0.23

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
0.23	621	Not Overloaded	Aerobic Digestion	Bradford WWTP

Changes Since Last Permit Issuance: The facility has open violations regarding Failure to notify DEP of planned physical changes to a facility. This violation is in regard to the repair of the sewage sludge press being inoperable. A decision will be made whether to repair the unit and continue using the sewage sludge press or to continue hauling waste to Bradford WWTP in late April.

Other Comments: Waste sources include a septage receiving station.

Treatment is primary screening followed by two parallel sequencing batch reactors, effluent equalization and UV radiation disinfection. Included was alkalinity addition, post aeration, belt filter press, and aerobic sludge digestion. No as built certification was required. Sludge may be taken to another STP or a landfill. Alkalinity feed is to the headworks. Belt filter press filtrate is sent to the septage tank for return to the headworks.

Post Construction certification is dated June 9, 2011 for WQM permit 4209401 (low pressure sewers). Related to this permit was General Storm Water Construction permit PAG2004208003.

Compliance History

DMR Data for Outfall 001 (from February 1, 2023 to January 31, 2024)

Parameter	JAN-24	DEC-23	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23	FEB-23
Flow (MGD) Average Monthly	0.19001	0.1498	0.1078	0.1006	0.0899	0.3497	0.1083	0.0891	0.1009	0.1194	0.1444	0.13736
pH (S.U.) Daily Minimum	7.1	7.12	7.27	7.28	7.22	6.91	6.73	7.01	6.7	6.92	6.8	E
pH (S.U.) Daily Maximum	7.67	7.54	7.63	7.65	7.75	7.64	7.61	7.57	7.8	7.71	7.41	E
DO (mg/L) Daily Minimum	6.4	6.06	5.1	5.06	4.73	5.21	5.13	4.39	4.5	7.34	7.87	E
CBOD5 (lbs/day) Average Monthly	< 5	< 4.0	< 3.0	3.0	3.0	< 5.0	2	< 3.0	< 3.0	< 2.0	< 4.00	< 3.1
CBOD5 (lbs/day) Weekly Average	8	5.0	6.0	4.0	3.0	16.0	3	5.0	5.0	3.0	6.00	2.2
CBOD5 (mg/L) Average Monthly	< 3.2	< 3.5	< 2.9	4.3	3.6	< 2.6	3.1	< 3.5	< 3.2	< 2.2	< 3.5	< 3.1
CBOD5 (mg/L) Weekly Average	4.1	4.8	5.5	4.9	4.53	3.3	3.7	5.0	4.4	2.7	5.2	2.2
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	81	73	94	191	52	41	103	78	228	197	48	60
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	81	73	94	191	52	41	103	78	228	197	94	60
BOD5 (mg/L) Raw Sewage Influent Average Monthly	57	69	127	256	115	60	118	122	160	195	42	60.0
TSS (lbs/day) Average Monthly	< 7	< 5.0	< 3.0	< 3.0	3.0	7.0	< 3.0	10.00	8.0	9.0	< 14.00	11.00
TSS (lbs/day) Raw Sewage Influent Average Monthly	188	76	98.0	9	9	67	160	79	219	161	59	12.0
TSS (lbs/day) Raw Sewage Influent Daily Maximum	188	76	98.0	9	9	67	160	79	219	161	115	12.0

TSS (lbs/day) Weekly Average	11	8.0	3.0	4.0	3.0	24.00	3.0	33.0	15.0	17.0	30.00	21.50
TSS (mg/L) Average Monthly	< 5.00	< 4.0	< 3.0	< 4.0	5.0	3.0	< 4.0	10.0	8.00	9.0	< 13.00	11.00
TSS (mg/L) Raw Sewage Influent Average Monthly	132	72	132.00	12	20	99	184	124	154	160	51	12.0
TSS (mg/L) Weekly Average	9.50	7.50	4.50	6.0	5.5	4.0	4.0	30.0	12.50	15.0	26.50	21.50
Fecal Coliform (No./100 ml) Geometric Mean	< 2	< 1.0	< 16.00	< 28.0	48	< 5.0	< 2.0	< 2.0	< 3.0	< 307.00	152.00	< 6.0
Fecal Coliform (No./100 ml) Instantaneous Maximum	57.1	4.0	980.4	2419	78	2419	14.8	17.5	22.8	2239	2419	19.7
UV Intensity (µw/cm²) Average Monthly	13.4	3.17	0.20	0.40	1.0	1.24	2.1	0.80	0.80	0.90	5.3	E
Total Nitrogen (mg/L) Average Monthly	< 0.5	1.68	1.66	1.206	< 0.5000	1.307	8.785	2.90	3.62	16.015	1.325	< 1.0
Ammonia (lbs/day) Average Monthly				0.80	< 0.20	< 0.60	0.10	2.0	< 0.40			
Ammonia (mg/L) Average Monthly	< 0.2631	< 0.10	1.2211	1.0333	< 0.3975	< 0.1588	0.1233	0.832	< 0.398	< 0.199	< 0.315	< 0.103
Ammonia (mg/L) Instantaneous Maximum	0.53	< 0.10	4.656	3.191	1.2898	0.2178	0.1517	1.938	0.798	0.338	0.40	0.111
Total Phosphorus (mg/L) Average Monthly	2.24	1.58	3.86	2.51	2.28	2.62	1.31	3.42	1.78	1.79	1.10	1.78

Compliance History

Effluent Violations for Outfall 001, from: March 1, 2023 To: January 31, 2024

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
Fecal Coliform	08/31/23	IMAX	2419	No./100 ml	1000	No./100 ml

Summary of Inspections: There have been a total of 5 inspections within the last 5 years. There have been 3 Chapter 94 inspections within this time frame, all of which no violations were noted. There has also been one Administrative/File Review which took place on 3/1/23 where one violation was noted. This violation prompted a Compliance Evaluation inspection on 3/29/23, this compliance evaluation noted 5 violations by the facility. The violations noted in the inspection report include: CSL – Failure to apply for and/or obtain a WQM permit for the construction of sewage or industrial waste facilities. NPDES – Failure to notify DEP of planned physical changes to a facility. NPDES – Failure to properly operate and maintain all facilities which are installed or used by the permittee to achieve compliance. NPDES - Discharge contained floating materials, scum, sheen, foam, oil, grease, or substances that produced an observable change or resulted in deposits in receiving waters for NPDES permitted activities. CSL – Unauthorized, unpermitted discharge of sewage to waters of the Commonwealth. The CSL violation for failure to apply and/or obtain a WQM permit for the construction of sewage or industrial waste facilities was resolved on 4/20/2023. An amendment/new WQM application has not yet been received.

Other Comments: The open violations are currently in the works to be resolved.

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** .23
Latitude 41º 56' 4.03" **Longitude** -78º 26' 10.03"
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

This discharge was modeled using WQM 7.0 to evaluate CBOD5, Dissolved Oxygen, and Ammonia-Nitrogen parameters. The modeling results from the previous permit term were more stringent than the suggested limits from WQM 7.0 so the previously calculated limits will be used for the permit renewal. From the previous fact sheet, no winter requirements were recommended as the normally applied 3 times winter adjustment factor generated a 30 mg/L limitation that was greater than the assumed 25 mg/L raw waste ammonia concentration.

Best Professional Judgment (BPJ) Limitations

Comments: A Dissolved Oxygen minimum limitation of 4.0 mg/L will be implemented based on the standard in 25 PA Code Chapter 93 and Best Professional Judgement.

Anti-Backsliding

N/A

Proposed Effluent Limitations and Monitoring Requirements

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

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

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	XXX	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	9.0 Daily Max	XXX	5/week	Grab
DO	XXX	XXX	4.0 Daily Min	XXX	XXX	XXX	5/week	Grab
CBOD5	48	76	XXX	25.0	40.0	50	1/week	8-Hr Composite
BOD5 Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/month	8-Hr Composite
TSS	57	86	XXX	30.0	45.0	60	1/week	8-Hr Composite
TSS Raw Sewage Influent	Report	Report Daily Max	XXX	Report	XXX	XXX	1/month	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	Report Avg Qrtrly	XXX	XXX	1/quarter	Grab
UV Intensity (µw/cm²)	XXX	XXX	XXX	Report	XXX	XXX	1/day	Recorded
Total Nitrogen	XXX	XXX	XXX	Report	XXX	XXX	1/month	8-Hr Composite
Ammonia Nov 1 - Apr 30	XXX	XXX	XXX	30.0	XXX	60.0	1/week	8-Hr Composite
Ammonia May 1 - Oct 31	19.0	XXX	XXX	10.0	XXX	20.0	1/week	8-Hr Composite
Total Phosphorus	XXX	XXX	XXX	Report	XXX	XXX	1/month	8-Hr Composite

Compliance Sampling Location: Outfall 001, after disinfection.

Other Comments: No new limits added, sampling frequencies will remain the same through the next permit term.

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
	16C	57507	KNAPP CREEK	**4.680**	1476.00	27.00	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	0.064	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.23	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
Otto Twp STP	PA0221619	0.2300	0.2300	0.2300	0.000	25.00	7.20

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

		Dustin Hargenrater / Civil Engineer	April 15, 2024
		Vacant / Environmental Engineer Manager	Okay to Draft JCD 4/15/2024

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
16C	57507	KNAPP CREEK	**4.177**	1465.00	27.40	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	0.064	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.23	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	20.00	7.23

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
16C	57507	KNAPP CREEK	**1.575**	1429.00	29.80	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	0.064	0.00	0.00	0.000	0.000	0.0	0.00	0.00	20.00	7.23	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	20.00	7.23

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

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
16C	57507	KNAPP 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												
4.680	1.73	0.00	1.73	.3558	0.00414	.594	23.23	39.12	0.15	0.204	20.85	7.22
4.177	1.75	0.00	1.75	.3558	0.00262	.6	24.06	40.08	0.15	1.089	20.84	7.22
Q1-10 Flow												
4.680	1.11	0.00	1.11	.3558	0.00414	NA	NA	NA	0.12	0.248	21.22	7.22
4.177	1.12	0.00	1.12	.3558	0.00262	NA	NA	NA	0.12	1.329	21.20	7.22
Q30-10 Flow												
4.680	2.35	0.00	2.35	.3558	0.00414	NA	NA	NA	0.17	0.176	20.66	7.23
4.177	2.38	0.00	2.38	.3558	0.00262	NA	NA	NA	0.17	0.940	20.65	7.23

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
16C	57507	KNAPP 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
4.680	Otto Twp STP	12.09	49.65	12.09	49.65	0	0
4.177		NA	NA	12.1	NA	NA	NA

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
4.680	Otto Twp STP	1.63	12.36	1.63	12.36	0	0
4.177		NA	NA	1.63	NA	NA	NA

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)		
4.68	Otto Twp STP	25	25	12.36	12.36	4	4	0	0
4.18		NA	NA	NA	NA	NA	NA	NA	NA

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
16C	57507	KNAPP CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
4.680	0.230	20.854	7.225
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
23.229	0.594	39.124	0.151
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
5.93	1.030	2.11	0.748
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.519	6.064	Tsivoglou	5
Reach Travel Time (days)			
0.204			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.020	5.80	2.08	7.37
0.041	5.67	2.05	7.25
0.061	5.55	2.02	7.15
0.081	5.43	1.99	7.07
0.102	5.31	1.96	7.00
0.122	5.20	1.93	6.95
0.143	5.09	1.90	6.90
0.163	4.98	1.87	6.87
0.183	4.87	1.84	6.85
0.204	4.77	1.81	6.83

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
4.177	0.230	20.843	7.225
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
24.063	0.600	40.078	0.146
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
4.73	0.667	1.79	0.747
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.848	3.709	Tsivoglou	5
Reach Travel Time (days)			
1.089			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.109	4.39	1.65	6.62
0.218	4.07	1.52	6.54
0.327	3.77	1.40	6.55
0.436	3.50	1.29	6.62
0.544	3.24	1.19	6.73
0.653	3.01	1.10	6.85
0.762	2.79	1.01	6.98
0.871	2.59	0.93	7.11
0.980	2.40	0.86	7.24
1.089	2.22	0.79	7.36

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
16C	57507	KNAPP 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)
4.680	Otto Twp STP	PA0221619	0.230	CBOD5	25		
				NH3-N	12.36	24.72	
				Dissolved Oxygen			4