pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northcentral Regional Office
CLEAN WATER PROGRAM

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Application Type	**Renewal**	Application No.	**PA0228524**
Facility Type	**Municipal**	APS ID	**1062094**
Major / Minor	**Minor**	Authorization ID	**1393805**

Applicant and Facility Information

Applicant Name	**Duncan Township**	Facility Name	**Duncan Township WWTF**
Applicant Address	42 Duncan Township Road	Facility Address	22 Antrim Main Street
	Wellsboro, PA 16901-8544		Wellsboro, PA 16901
Applicant Contact	Richard Putman	Facility Contact	Richard Putman
Applicant Phone	570-353-7532	Facility Phone	570-353-7532
Client ID	52924	Site ID	535598
Ch 94 Load Status	Not Overloaded	Municipality	Duncan Township
Connection Status	No Limitations	County	Tioga
Date Application Received	April 18, 2022	EPA Waived?	Yes
Date Application Accepted	May 18, 2022	If No, Reason	N/A
Purpose of Application	Renewal of NPDES Permit		

Summary of Review

INTRODUCTION

Duncan Township has proposed the renewal of the exiting NPDES permit which authorizes the discharge of treated domestic wastewater from the wastewater treatment facility (WWTF) serving the Village of Antrim in Duncan Township, Tioga County.

APPLICATION

Duncan Township submitted the NPDES Application for Individual Permit to Discharge Sewage Effluent from Minor Sewage Facilities (DEP #3800-PM-BCW0324b). This application was received by the Department on April 18, 2022 and considered administratively complete on May 18, 2022. Richard F. Putnam, WWTF Operator, is both the client and site contact. His additional contact information is (FAX) 570-353-7532 and (email) duncantwpww@ptd.net.

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.

The casefile, permit application package and draft permit will be available for public review at Department's Northcentral Regional Office. The address for this office is 208 West Third Street, Suite 101, Williamsport, PA 17701. An appointment can be made to review these materials during the comment period by calling the file coordinator at 570-327-3636.

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Approve	Deny	Signatures	Date
X		Jeffrey J. Gocek, EIT — Project Manager	09/11/2023
X		Nicholas W. Hartranft, PE — Environmental Engineer Manager	09/11/2023

DISCHARGE, RECEIVING WATERS AND WATER SUPPLY INFORMATION

Outfall No.	001	Design Flow (MGD)	0.03
Latitude	41° 37' 23.15"	Longitude	-77° 17' 2.26"
Quad Name	Antrim, PA	Quad Code	0527
Wastewater Description:	Treated Sewage Effluent		
Receiving Waters	Unnamed Tributary of Wilson Creek	Stream Code	21730 (see below)
NHD Com ID	66538289	RMI	2.62 (see below)
Drainage Area	18.91 (see below)	Yield (cfs/mi^2)	0.039
Q_{7-10} Flow (cfs)	0.74 (see below)	Q_{7-10} Basis	POFY (see below)
Elevation (ft)	1,220	Slope (ft/ft)	N/A
Watershed No.	9-A	Chapter 93 Class.	CWF, MF (see below)
Existing Use	None	Existing Use Qualifier	N/A
Exceptions to Use	None	Exceptions to Criteria	None
Assessment Status	Impaired		
Cause(s) of Impairment	Metals, pH		
Source(s) of Impairment	Abandoned Mine Drainage (AMD)		
TMDL Status	Final	Name	Babb Creek
Nearest Downstream Public Water Supply Intake	Jersey Shore Area Joint Water Authority		
PWS Waters	Pine Creek	Flow at Intake (cfs)	38.6
PWS RMI	1.9	Distance from Outfall (mi)	48

SITE SPECIFIC FLOW INFORMATION

The WWTP discharges to an Unnamed Tributary to Wilson Creek, not identified on topographic maps or Department Geographic Information Systems (GIS) data. Flows for this small tributary cannot be determined since the drainage area is so small and the stream is fed by AMD associated with deep mine pools. Any actual flows will therefore be higher than any calculated. This situation was confirmed via a site inspection conducted by a previous Department Permit Writer and previous Department Water Quality Specialist on July 6, 2011. Also, at this time, a Department Water Pollution Biologist confirmed that the receiving stream is considered impaired since impacted by AMD, in accordance with 25 PA § 95.5.

POINT OF FIRST USE

Due to the intermittent nature of the receiving stream, the Department considers Wilson Creek (stream code 21730), just after the confluence with the above-mentioned tributary, to be the Point of First Use (POFU). A POFU is required when/where the discharge is to intermittent streams or wetlands where there is limited flow and/or no mixing. This POFU is located at latitude 41°37'30.8" and longitude -77°17'42.0". Perennial flow occurs at the POFU and the stream characteristics there will allow for modeling of parameters not outlined in the Department's guidance "Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels, Swales and Storm Sewers" (DEP #391-2000-014). These are Ammonia Nitrogen and Total Residual Chlorine.

$Q_{7,10}$ DETERMINATION

The $Q_{7,10}$ is the lowest seven consecutive days of flow in a 10-year period and is used for modeling wastewater treatment plant discharges. 25 PA § 96.1 defines $Q_{7,10}$ as *the actual or estimated lowest seven consecutive day average flow that occurs once in 10 years for a stream with unregulated flow or the estimated minimum flow for a stream with regulated flow*.

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Basin characteristics, for a watershed based on the POFU location, were obtained from the USGS StreamStats webpage. A stream gage utilized during the previous renewal was again selected as a reference. The selected gage is USGS #01548500 (Pine Creek at Cedar Run, PA). A $Q_{7,10}$ and drainage area for this gage were obtained from *Selected Streamflow Statistics for Streamgage Locations in and near Pennsylvania* (USGS Open Files Report 2011-1070). The drainage area at the POFU (18.91 mi_2) was calculated by the *USGS Pennsylvania StreamStats* application. Knowing the drainage area at the POFU (18.91 mi_2) and both the drainage area (604 mi_2) and $Q_{7,10}$ (23.8 CFS) at the reference gage, the $Q_{7,10}$ at the POFU was calculated to be 0.74 CFS.

See Attachment 01 for the $Q_{7,10}$ determination.

TREATMENT FACILITY SUMMARY

The WWTP, which serves the Village of Antrim, PA, receives flow from five pump stations. Flow is conveyed to one of two Primary Anaerobic Treatment Tank (PATT) trains. Each train consists of four tank and only one train operates at any one time. The second is used as backup. Trains are alternated every six months. Total PATT volume is 32,000 gallons. Flow can then be stored in a 10,000-gallon equalization tank. The flows from the operable PATT train are then treated by a Rotating Biological Contactor (RBC), which provides secondary treatment. Following the RBC, half of the flow (mixed liquor) is sent to the clarifier while the other half is returned to the WWTP headworks. Liquid chlorine (sodium hypochlorite) is employed for disinfection and is added at the head of the baffled chlorine contact tank.

See Attachment 02 for a map of the WWTP location and discharge location.

Waste Type	Degree of Treatment	Process Type	Disinfection	Average Annual Flow (MGD)
Sewage	Secondary	RBC	Sodium Hypochlorite	0.03
Hydraulic Capacity (MGD)	**Organic Capacity (lbs BOD5/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
0.03	60	Not Overloaded	Thickening/Digestion	Other WWTP

This design was approved by Water Quality Management (WQM) permit #5902409, which was issued October 10, 2002.

The annual average flows for the three years prior to the application submission were 0.008 MGD, 0.007 MGD and 0.007 MGD. The highest monthly average flow in 2021 was 0.008 MGD and occurred in October.

Wasted sewage sludge is transported to both the Milton Sewer Authority WWTF and the Tiadaghton Valley Authority WWTF for disposal. Approximately 4.34 dry tons were generated in the year prior to application submission. This WWTF does not accept sludge from other facilities.

COMPLIANCE HISTORY

The WMS Query *Open Violations by Client* revealed no unresolved violations for Duncan Township.

The most recent Department inspection, a Compliance Evaluation Inspection (CEI), was performed July 20, 2023. No violations were noted during the inspection. The treatment units were observed, and onsite records were reviewed. The effluent was clear.

Recent Discharge Monitoring Report (DMR) data, from July 2022 through June 2023, is presented below.

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Parameter	JUN-23	MAY-23	APR-23	MAR-23	FEB-23	JAN-23	DEC-22	NOV-22	OCT-22	SEP-22	AUG-22	JUL-22
Flow (MGD) Average Monthly	0.004	0.005	0.006	0.007	0.006	0.008	0.008	0.007	0.005	0.008	0.004	0.004
Flow (MGD) Daily Maximum	0.005	0.013	0.013	0.013	0.011	0.021	0.026	0.026	0.007	0.023	0.006	0.005
pH (S.U.) Instantaneous Minimum	6.17	6.17	6.23	6.52	6.26	6.56	6.38	6.32	6.35	6.21	6.15	6.34
pH (S.U.) Instantaneous Maximum	6.72	7.13	7.07	7.07	6.98	7.33	7.46	7.41	7.00	7.38	6.89	7.11
DO (mg/L) Instantaneous Minimum	0.8	1.6	1.9	3.4	2.7	2.8	2.4	1.90	1.3	1.6	1.0	0.9
TRC (mg/L) Average Monthly	0.37	0.38	0.28	0.05	0.24	0.26	0.35	0.32	0.30	0.26	0.28	0.27
TRC (mg/L) Instantaneous Maximum	0.48	0.49	0.49	0.42	0.09	0.40	0.49	0.47	0.48	0.43	0.46	0.45
CBOD5 (lbs/day) Average Monthly	0.14	0.42	0.2	0.33	0.19	2.0	0.23	0.05	0.26	0.99	0.07	0.11
CBOD5 (lbs/day) Weekly Average	0.15	0.71	0.3	0.37	0.22	4.0	0.19	0.09	0.34	1.6	0.09	0.12
CBOD5 (mg/L) Average Monthly	3.0	4.8	3.0	4.0	4.3	3.0	3.0	4.0	5.3	6.0	3.1	3.0
CBOD5 (mg/L) Weekly Average	3.0	6.6	4.0	4.0	4.5	4.0	3.8	5.3	6.9	7.0	3.8	3.0
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	26.0	18.0	8.0	9.0	12.0	17.0	24.0	12.0	9.5	15.0	6.0	17.0
BOD5 (mg/L) Raw Sewage Influent Average Monthly	601.0	248.0	236.0	129.0	277.0	280.0	350.0	323.0	191.0	199.0	251.0	443.0
TSS (lbs/day) Average Monthly	0.22	0.45	0.11	< 7.5	0.12	1.0	< 1.0	0.05	0.32	0.91	0.10	0.17
TSS (lbs/day) Raw Sewage Influent Average Monthly	33.0	11.0	8.0	16.0	9.0	23.0	17.0	8.0	12.7	14.0	5.0	6.0
TSS (lbs/day) Weekly Average	0.25	0.75	0.23	< 11.0	0.25	< 1.0	< 4.0	0.10	0.40	1.33	0.10	0.21
TSS (mg/L) Average Monthly	5.0	5.0	3.0	< 4.0	3.0	< 1.0	< 4.0	2.0	6.8	10.0	3.1	5.0
TSS (mg/L) Raw Sewage Influent Average Monthly	700.0	160.0	165.0	199.0	204.0	245.0	221.0	226.0	254.0	216.0	223.0	151.0
TSS (mg/L) Weekly Average	6.0	7.0	7.0	< 4.0	6.0	< 1.0	< 4.0	4.0	8.0	12.0	3.8	5.0
Fecal Coliform (No./100 ml) Geometric Mean	< 1.0	2.0	< 1.0	3.0	1209	< 1.0	< 1.0	5.0	< 1.0	16.0	1.0	< 1.0
Fecal Coliform (No./100 ml) Instantaneous Maximum	< 1.0	2.0	< 1.0	3.0	2419	< 1.0	< 1.0	5.0	< 1.0	16.0	1.0	< 1.0
Total Nitrogen (lbs/day) Daily Maximum							< 1.0					
Total Nitrogen (mg/L) Daily Maximum							< 1.0					
Ammonia (lbs/day) Average Monthly	< 0.10	E	0.17	< 1.0	< 0.10	< 0.10	0.43	0.006	0.014	0.28	0.006	< 1.0
Ammonia (mg/L) Average Monthly	< 0.10	E	0.17	< 0.10	< 0.10	< 0.10	0.43	0.13	0.27	0.18	0.24	< 0.10
Total Phosphorus (lbs/day) Daily Maximum							0.30					
Total Phosphorus (mg/L) Daily Maximum							6.0					
Total Aluminum (lbs/day) Daily Maximum							< 1.0					
Total Aluminum (mg/L) Daily Maximum							< 1.0					
Total Iron (lbs/day) Daily Maximum							0.005					
Total Iron (mg/L) Daily Maximum							0.11					
Total Manganese (lbs/day) Daily Maximum							0.001					
Total Manganese (mg/L) Daily Maximum							0.02					

EXISTING LIMITATIONS

The following effluent limitations were established at the permit issuance on December 07, 2017.

Discharge Parameter	Mass Limits (lb/day)		Concentration Limits (mg/L)				Monitoring Requirements	
	Monthly Average	Weekly Average	Minimum	Monthly Average	Weekly Average	IMAX	Minimum Measurement Frequency	Required Sample Type
Flow (MGD)	Report	Report Daily Max.	XXX	XXX	XXX	XXX	Continuous	Metered
pH (SU)	XXX	XXX	6.0	XXX	XXX	9.0	1/Day	Grab
Dissolved Oxygen	XXX	XXX	Report	XXX	XXX	XXX	1/Day	Grab
Total Residual Chlorine	XXX	XXX	XXX	0.5	XXX	1.6	1/Day	Grab
BOD5 Raw Influent	Report	XXX	XXX	Report	XXX	XXX	2/Month	8-Hour Comp
CBOD5	6.0	10	XXX	25	40	50	2/Month	8-Hour Comp
TSS Raw Influent	Report	XXX	XXX	Report	XXX	XXX	2/Month	8-Hour Comp
TSS	7.5	11	XXX	30	45	60	2/Month	8-Hour Comp
Fecal Coliform (No./100mL) 05/01-09/30	XXX	XXX	XXX	200 Geo. Mean	XXX	1,000	2/Month	Grab
Fecal Coliform (No./100mL) 10/01-04/30	XXX	XXX	XXX	2,000 Geo. Mean	XXX	10,000	2/Month	Grab
NH3-N	Report	XXX	XXX	Report	XXX	XXX	1/Month	8-Hour Comp
Total Nitrogen	Report	XXX	XXX	Report	XXX	XXX	1/Year	8-Hour Comp
Total Phosphorus	Report	XXX	XXX	Report	XXX	XXX	1/Year	8-Hour Comp
Total Aluminum	Report	XXX	XXX	Report	XXX	XXX	1/Year	8-Hour Comp
Total Iron	Report	XXX	XXX	Report	XXX	XXX	1/Year	8-Hour Comp
Total Manganese	Report	XXX	XXX	Report	XXX	XXX	1/Year	8-Hour Comp

DEVELOPMENT OF EFFLUENT LIMITATIONS

Technology-Based Limitations

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)

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Total Residual Chlorine

The Department's *TRC_CALC spreadsheet* is a model used to evaluate Total Residual Chlorine (TRC) effluent limitations. This model determines applicable acute and chronic wasteload allocations (WLAs) for TRC based on the data supplied by the user and then compares the WLAs to the technology-based average monthly limit using the procedures described in the EPA Technical Support Document (for Water Quality-based Toxics Control).

Parameter	Effluent Limitations (mg/L)	
	Monthly Average	IMAX
Total Residual Chlorine	0.50	1.63

See Attachment 03 for the TRC_CALC output.

Water Quality-Based Limitations

$CBOD_5$, NH_3-N and DO

WQM 7.0 for Windows is a DEP computer model used to determine wasteload allocations and effluent limitations for $CBOD_5$, NH_3-N and DO for single and multiple point source discharge scenarios. This model simulates two basic processes. The NH_3-N module simulates the mixing and degradation of NH_3-N in the stream and compares calculated instream NH_3-N concentrations to the water quality criteria. The DO module simulates the mixing and consumption of DO in the stream due to degradation of $CBOD_5$ and NH_3-N and compares the calculated instream DO concentrations to the water quality criteria. The model then determines the highest pollutant loading the stream can assimilate and still meet water quality under design conditions.

This model was run at the POFU and recommended the following limitations.

Parameter	Effluent Limitations (mg/L)		
	30 Day Average	Maximum	Minimum
$CBOD_5$	25		
NH_3-N	25	50	
DO			3.0

See Attachment 04 for the WQM model output.

Because modeling occurs at low flow conditions, and because the flow does not reach the POFU at the low flow condition, the NH_3-N value above is not indicative of actual conditions. The Department will require only monthly monitoring for this parameter, as per policy, since the tech-based limit is more stringent than the water quality-based limit.

Toxics Screening Analysis

According to the application materials, there are no significant industrial or commercials users in the collection system. Because of this, no PENTOXSD modeling is required. *PENTOXSD for Windows* is a DEP computer model which considers mixing, first-order decay and other factors to determine recommended water quality-based effluent limitations (WQBELs).

Best Professional Judgment (BPJ) Limitations

In the absence of applicable effluent guidelines for the discharge or pollutant, permit writers must identify and/or develop needed technology-based effluent limitations (TBELs) TBELs on a case-by-case basis, in accordance with the statutory factors specified in the Clean Water Act.

Dissolved Oxygen (DO)

Department policy requires that sewage dischargers be limited to 4.0 mg/L of Dissolved Oxygen (as an instantaneous minimum) to ensure adequate operation and maintenance of the WWTF. DMR data indicates that this limit cannot be met.

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Anti-Backsliding

In order to comply with 40 CFR § 122.44(l)(1) (anti-backsliding requirements), the Department must issue a renewed permit with limitations as stringent as that the of the previous permit.

No less stringent limitations have been proposed.

RECEIVING STREAM

Stream Characteristics

The receiving stream is an Unnamed Tributary (UNT) to Wilson Creek. As mentioned above, the unnamed tributary does not appear on USGS topographic maps or Department GIS data. At the POFU, the receiving stream is Wilson Creek. Wilson Creek, according to 25 PA § 93.9L, is protected for Cold Water Fishes (CWF) and Migratory Fishes (MF). These are the streams *Designated Uses*, which is defined in 25 PA § 93.1 as "those uses specified in §§ 93.9a – 93.9z for each waterbody or segment whether or not the use is being attained". Designated uses are regulations promulgated by the Environmental Quality Board (EQB) throughout the rulemaking process. There is currently no *Existing Use* for this stream. Existing Use is defined in 25 PA § 93.1 as "those uses actually attained in the waterbody on or after November 28, 1975 whether or not they are included in the water quality standards".

This stream is located in (Chapter 93) drainage list L and State Water Plan 9A (Pine Creek). Wilson Creek is tributary to Babb Creek and then Pine Creek.

Impairment/TMDL

According to Department data, the stream is not attaining the designated use for supporting aquatic life. It is impaired by metals and pH (causes) due to Acid Mine Drainage (AMD, source). It is attaining its designated use for recreation.

A TMDL for metals and (low) pH was established for the Babb Creek Watershed in 2003. This TMDL was also approved by EPA in 2003. The TMDL recommends the reduction in the discharge of metals and acidity in excess of the Department's water quality standards. The TMDL required reductions in Aluminum (90%), Iron (19%), Manganese (76%) and Acidity (53%) for the Wilson Creek watershed in order to meet water quality standards in the Babb Creek Watershed.

The domestic effluent from the Duncan Township WWTP has no reasonable potential to discharge metals.

DEVELOPMENT OF EFFLUENT MONITORING

E.coli

The Department is requiring the monitoring of Eschericia coli (E.coli), a pathogenic bacterium normally found in the intestines of healthy people and animals which is used as a fecal contamination indicator in freshwater ecosystems. Section 303(c)(1) of the Clean Water Act requires that Pennsylvania periodically review and revise water quality standards, if necessary. The 2017 triennial review final form rulemaking, published in 2020, has revised the Chapter 93 water quality standards regulations for bacteria to include E. coli. To further characterize fecal contamination of surface waters during the swimming season, the Department is requiring the annual reporting of effluent E. coli effluent values. In accordance with 25 PA § 92a.61, the Department may impose reasonable monitoring requirements on pollutants which could have impact on the quality of the Commonwealth's waters or the quality of waters in other states.

Influent Monitoring

Department policy requires that all Publicly Owned Treatment Works (POTWs) with flows greater than 2,000 gallons per day (gpd) conduct influent BOD_5 and TSS monitoring at the same frequency and sample type as is used for the effluent $CBOD_5$ and TSS monitoring.

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REMOVAL OF EFFLUENT MONITORING

Chesapeake Bay TMDL

Despite 25 years of extensive restoration efforts, the Chesapeake Bay Total Maximum Daily Load (TMDL) was prompted by insufficient progress and continued poor water quality in the Chesapeake Bay and its tidal tributaries. This TMDL, required by the Clean Water Act, is the largest ever developed by the Environmental Protection Agency (EPA). This document identifies the necessary pollution reductions of nitrogen, phosphorus and sediment across Delaware, Maryland, New York, Virginia, West Virginia, District of Columbia and Pennsylvania. It also sets pollution limits necessary to meet applicable water quality standards in the Bay, tidal rivers and embayments.

Pennsylvania explains how and when it will meet its pollution allocations in its Watershed Implementation Plan (WIP), which is incorporated into the TMDL. Pennsylvania's permitting strategy for significant dischargers has been outlined in the Phase I WIP and incorporated in the Phase III WIP by reference, and imposes Total Nitrogen (TN) and Total Phosphorus (TP) cap loads on the significant dischargers.

Because the design of this facility is less than 0.2 MGD, the Department considers this an existing Phase 5 sewage facility for the purposes of implementing the Chesapeake Bay TMDL. This system has a design flow of 0.03 MGD. According to the Department's Wastewater Supplement to Phase III WIP (last revised July 29, 2022), renewed Phase 5 facilities are required to contain monitoring and reporting for TN and TP throughout the permit term at a frequency of no less than annually unless the facility has already conducted at least two years of nutrient monitoring.

Nutrient data was collected during the previous permit term. That data is summarized below.

Year	Parameter	Concentration (mg/L)	Loading (lb/day)
2018	Total Nitrogen	< 0.50	< 0.50
2018	Total Phosphorus	0.14	1.59
2019	Total Nitrogen	3.70	31.7
2019	Total Phosphorus	0.68	5.80
2020	Total Nitrogen	< 0.10	< 0.10
2020	Total Phosphorus	0.31	7.46
2021	Total Nitrogen	1.50	23.00
2021	Total Phosphorus	0.30	4.50
2022	Total Nitrogen	< 1.00	< 1.00
2022	Total Phosphorus	0.30	6.00

TMDL Parameters of Concern

The annual monitoring of the TMDL parameters of concern (Aluminum, Iron and Manganese) was required to ensure that the discharge is not contributing to the impairment of the receiving stream. The data over the last permit term has demonstrated that there is no reasonable potential for this discharge to contribute.

ADDITIONAL CONSIDERATIONS

Compliance Period/Schedule

The permit will include a three-year compliance period before the final more stringent limitation for Dissolved Oxygen becomes effective. The compliance schedule in the permit will require the submission of a Water Quality Management permit, as an interim deadline, if additional treatment facilities will be required to meet the new limitation. The effective date for final compliance in the draft permit is expected to be November 01, 2026. This date can be pushed back at issuance if the comment period, comment resolution (if necessary) and permit issuance takes longer than expected.

Hauled-In Wastes

According to the application materials, the Duncan Township WWTF does not accept hauled-in wastes.

Rounding of Limitations

Limitations have been rounded down in accordance with the Department's *Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits* (#362-0400-001).

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Limit Multipliers

The instantaneous maximum limitations have been calculated using multipliers of 2.0 (for sewage discharges) for determining the IMAX. This practice is in accordance with the Department's *Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits* (#362-0400-001).

Mass Limits

The mass limitations were calculated by multiplying the concentration (mg/L) by the flow (MGD) by the conversion (8.34).

Sample Frequencies and Types

The sample type and minimum measurement frequencies are in accordance with the Department's *Technical Guidance for the Development and Specification of Effluent Limitations and Other Permit Conditions in NPDES Permits* (#362-0400-001).

Standard Operating Procedures (SOPs)

The review of this permit application was performed in accordance with the Department's *SOP for New and Reissuance Sewage Individual NPDES Permit Applications* (unnumbered) and *SOP for Establishing Effluent Limitations for Individual Sewage Permits* (SOP #BPNPSM-PMT-033).

Special Permit Conditions

Stormwater Prohibition
Approval Contingencies
Proper Waste Disposal
Solids Management for Non-Lagoon Treatment Systems
Compliance Schedule
Chlorine Dose Optimization

Supplemental Discharge Monitoring Reports

Daily Effluent Monitoring
Non-Compliance Reporting
Biosolids Production and Disposal
Hauled-in Municipal Waste
Influent and Process Control
Lab Accreditation

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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

Discharge Parameter	Mass Limits (lb/day)		Concentration Limits (mg/L)				Monitoring Requirements	
	Monthly Average	Weekly Average	Minimum	Monthly Average	Weekly Average	IMAX	Minimum Measurement Frequency	Required Sample Type
Flow (MGD)	Report	Report Daily Max.	XXX	XXX	XXX	XXX	Continuous	Metered
pH (SU)	XXX	XXX	6.0 Instant. Min.	XXX	XXX	9.0	1/Day	Grab
Dissolved Oxygen INTERIM	XXX	XXX	Report	XXX	XXX	XXX	1/Day	Grab
Dissolved Oxygen FINAL	XXX	XXX	4.0 Instant. Min.	XXX	XXX	XXX	1/Day	Grab
Total Residual Chlorine	XXX	XXX	XXX	0.5	XXX	1.6	1/Day	Grab
BOD5 Raw Influent	Report	XXX	XXX	Report	XXX	XXX	2/Month	8-Hour Comp
CBOD5	6.0	10	XXX	25	40	50	2/Month	8-Hour Comp
TSS Raw Influent	Report	XXX	XXX	Report	XXX	XXX	2/Month	8-Hour Comp
TSS	7.5	11	XXX	30	45	60	2/Month	8-Hour Comp
Fecal Coliform (No./100mL) 05/01-09/30	XXX	XXX	XXX	200 Geo. Mean	XXX	1,000	2/Month	Grab
Fecal Coliform (No./100mL) 10/01-04/30	XXX	XXX	XXX	2,000 Geo. Mean	XXX	10,000	2/Month	Grab
NH3-N	Report	XXX	XXX	Report	XXX	XXX	1/Month	8-Hour Comp
E. Coli (No./100mL)	XXX	XXX	XXX	XXX	XXX	Report	1/Year	Grab

END of Fact Sheet.

Q_{7-10} Analysis	
Facility:	Duncan Township WWTP
Outfall:	001

NPDES Permit No.:	PA0228524
RMI at 001:	2.60 @ POFU

Reference Stream Gage Information	
Stream Name	Wilson Run
Reference Gage	01548500
Station Name	Pine Creek at Cedar Run, PA
Gage Drainage Area (sq. mi.)	604.00
Q_{7-10} at gage (cfs)	23.80
Yield Ratio (cfs/mi^2)	0.0394

Q7-10 at 001	
Drainage Area at 001 (sq. mi.)	18.91
Q7-10 at 001 (cfs)	0.745
Q7-10 at 001 (mgd)	0.4816

2/2/2012
ReferenceGageSelection Worksheet
C:\Documents and Settings\jikim\Desktop\Duncan Township\Template.xlsx

Information related to the reference streamgage.

Streamgage code	Streamgage number	Streamgage name
01548500	01548500	Pine Creek at Cedar Run, PA

Basin Characteristic	Value for the reference streamgage	Value at the ungaged site	Percent Difference
Drainage area, in miles squared	604.00	18.91	96.87
Average annual precipitation, in inches	36.34	33.00	9.19
Percent of basin with carbonate rock	0.00	0.00	0.00
Depth to bedrock, in feet	4.40	4.79	8.80
Drainage runoff curve number	3.67	4.03	---
Percent of basin that is impervious	0.23	1.09	0.86
Mean daily high temperature in degrees Farenheit	53.77	54.47	1.31
Outlet X-location, in PA Albers, meters	46087.44	58774.90	---
Outlet Y-location, in PA Albers, meters	280148.41	291725.00	---
Longitude, in decimal degrees	77.45	77.29	---
Distance between ungaged site and reference streamgage, in miles	10.67		

Correlation of streamflow between ungaged site and reference streamgage	0.97

Reference streamgages most-correlated with the ungaged site

Reference streamgages most-correlated with the ungaged site	Correlation	Drainage area, in miles squared	Average annual precipitation, in inches	Percent of basin with carbonate rock	Depth to bedrock, in feet	Drainage runoff curve number	Percent of basin that is impervious	Mean daily high temperature in degrees Farenheit
01548500 Pine Creek at Cedar Run, PA	0.968	604.00	36.34	0.00	4.40	3.67	0.23	53.77
01549700 Pine Creek below Little Pine Creek near Waterville, PA	0.967	944.00	36.91	0.00	4.47	3.55	0.20	54.35
01518500 Crooked Creek at Tioga, PA	0.953	122.00	33.11	0.00	4.38	3.75	0.29	55.29
01549500 Blockhouse Creek near English Center, PA	0.949	37.70	36.17	0.00	4.38	4.02	0.55	54.25
01520000 Cowanesque River near Lawrenceville, PA	0.940	298.00	34.14	0.00	4.53	3.80	0.26	55.19

Table 2. Selected low-flow statistics for streamgage locations in and near Pennsylvania.—Continued

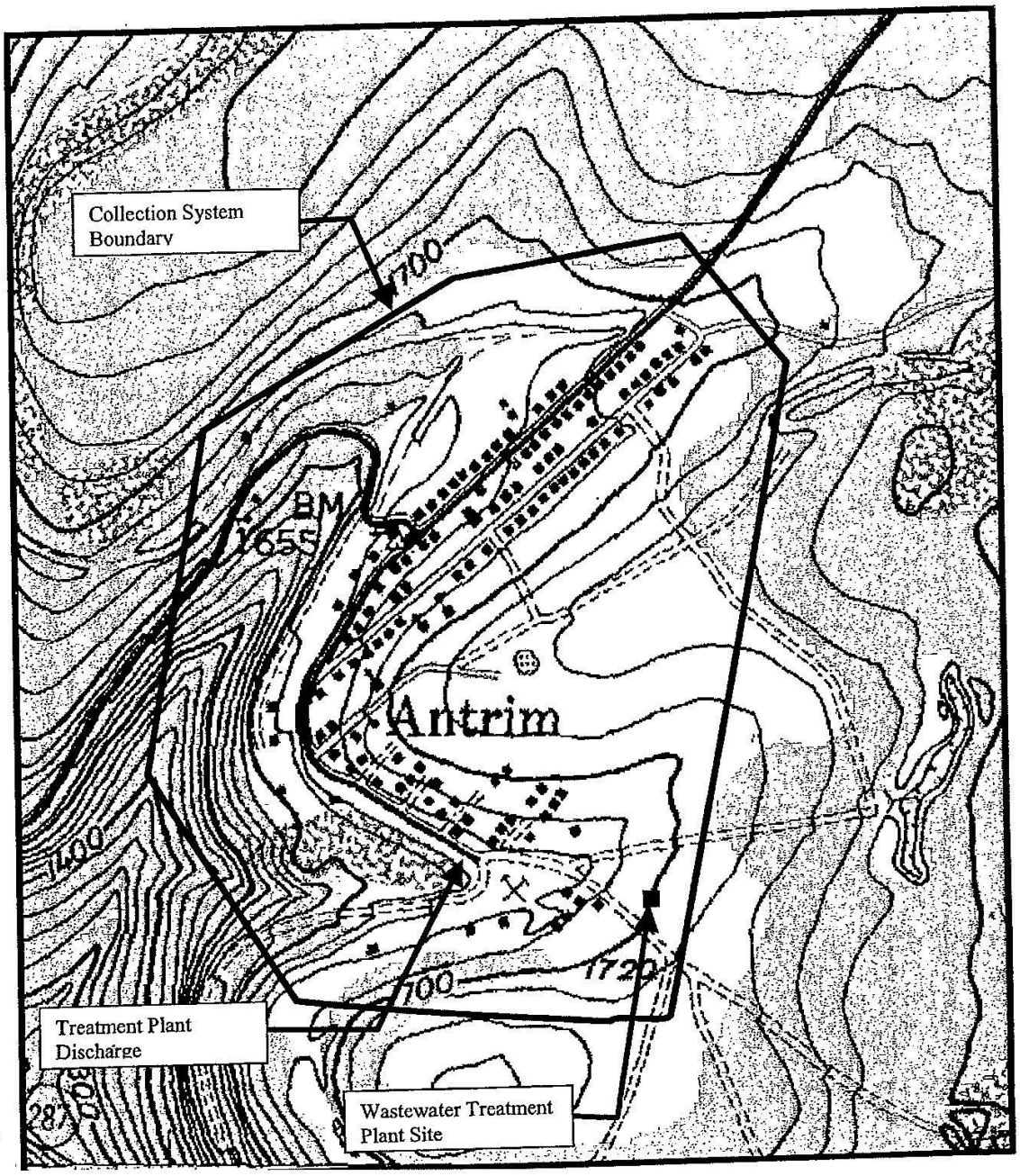
[ft³/s; cubic feet per second; —, statistic not computed; <, less than]

Streamgage number	Period of record used in analysis[1]	Number of years used in analysis	1-day, 10-year (ft³/s)	7-day, 10-year (ft³/s)	7-day, 2-year (ft³/s)	30-day, 10-year (ft³/s)	30-day, 2-year (ft³/s)	90-day, 10-year (ft³/s)
01546000	1912–1934	17	1.8	2.2	6.8	3.7	12.1	11.2
01546400	1986–2008	23	13.5	14.0	19.6	15.4	22.3	18.7
01546500	1942–2008	67	26.8	29.0	41.3	31.2	44.2	33.7
01547100	1969–2008	40	102	105	128	111	133	117
01547200	1957–2008	52	99.4	101	132	106	142	115
01547500	[2]1971–2008	38	28.2	109	151	131	172	153
01547500	[3]1956–1969	14	90.0	94.9	123	98.1	131	105
01547700	1957–2008	52	.5	.6	2.7	1.1	3.9	2.2
01547800	1971–1981	11	1.6	1.8	2.4	2.1	2.9	3.5
01547950	1970–2008	39	12.1	13.6	28.2	17.3	36.4	23.8
01548005	[2]1971–2000	25	142	151	206	178	241	223
01548005	[3]1912–1969	58	105	114	147	125	165	140
01548500	1920–2008	89	21.2	24.2	50.1	33.6	68.6	49.3
01549000	1910–1920	11	26.0	32.9	78.0	46.4	106	89.8
01549500	1942–2008	67	.6	.8	2.5	1.4	3.9	2.6
01549700	1959–2008	50	33.3	37.2	83.8	51.2	117	78.4
01550000	1915–2008	94	6.6	7.6	16.8	11.2	24.6	18.6
01551500	[2]1963–2008	46	520	578	1,020	678	1,330	919
01551500	[3]1901–1961	61	400	439	742	523	943	752
01552000	1927–2008	80	20.5	22.2	49.5	29.2	69.8	49.6
01552500	1942–2008	67	.9	1.2	3.1	1.7	4.4	3.3
01553130	1969–1981	13	1.0	1.1	1.5	1.3	1.8	1.7
01553500	[2]1968–2008	41	760	838	1,440	1,000	1,850	1,470
01553500	[3]1941–1966	26	562	619	880	690	1,090	881
01553700	1981–2008	28	9.1	10.9	15.0	12.6	17.1	15.2
01554000	[2]1981–2008	28	1,830	1,990	3,270	2,320	4,210	3,160
01554000	[3]1939–1979	41	1,560	1,630	2,870	1,880	3,620	2,570
01554500	1941–1993	53	16.2	22.0	31.2	25.9	35.7	31.4
01555000	1931–2008	78	33.5	37.6	58.8	43.4	69.6	54.6
01555500	1931–2008	78	4.9	6.5	18.0	9.4	24.3	16.6
01556000	1918–2008	91	43.3	47.8	66.0	55.1	75.0	63.7
01557500	1946–2008	63	2.8	3.2	6.3	4.2	8.1	5.8
01558000	1940–2008	69	56.3	59.0	79.8	65.7	86.2	73.7
01559000	1943–2008	66	104	177	249	198	279	227
01559500	1931–1958	28	9.3	10.5	15.0	12.4	17.8	15.8
01559700	1963–1978	16	.1	.1	.2	.1	.3	.2
01560000	1941–2008	68	8.5	9.4	15.6	12.0	20.2	16.2
01561000	1932–1958	27	.4	.5	1.6	.8	2.5	1.7
01562000	1913–2008	96	64.1	67.1	106	77.4	122	94.5
01562500	1931–1957	27	1.1	1.6	3.8	2.3	5.4	3.7
01563200	[2]1974–2008	35	—	—	—	112	266	129
01563200	[3]1948–1972	25	10.3	28.2	86.1	64.5	113	95.5
01563500	[2]1974–2008	35	384	415	519	441	580	493
01563500	[3]1939–1972	34	153	242	343	278	399	333
01564500	1940–2008	69	3.6	4.2	10.0	6.2	14.4	10.6

Table 1. List of U.S. Geological Survey streamgage locations in and near Pennsylvania with updated streamflow statistics.—Continued

[Latitude and Longitude in decimal degrees; mi², square miles]

Streamgage number	Streamgage name	Latitude	Longitude	Drainage area (mi²)	Regulated[1]
01541303	West Branch Susquehanna River at Hyde, Pa.	41.005	-78.457	474	Y
01541308	Bradley Run near Ashville, Pa.	40.509	-78.584	6.77	N
01541500	Clearfield Creek at Dimeling, Pa.	40.972	-78.406	371	Y
01542000	Moshannon Creek at Osceola Mills, Pa.	40.850	-78.268	68.8	N
01542500	WB Susquehanna River at Karthaus, Pa.	41.118	-78.109	1,462	Y
01542810	Waldy Run near Emporium, Pa.	41.579	-78.293	5.24	N
01543000	Driftwood Branch Sinnemahoning Creek at Sterling Run, Pa.	41.413	-78.197	272	N
01543500	Sinnemahoning Creek at Sinnemahoning, Pa.	41.317	-78.103	685	N
01544000	First Fork Sinnemahoning Creek near Sinnemahoning, Pa.	41.402	-78.024	245	Y
01544500	Kettle Creek at Cross Fork, Pa.	41.476	-77.826	136	N
01545000	Kettle Creek near Westport, Pa.	41.320	-77.874	233	Y
01545500	West Branch Susquehanna River at Renovo, Pa.	41.325	-77.751	2,975	Y
01545600	Young Womans Creek near Renovo, Pa.	41.390	-77.691	46.2	N
01546000	North Bald Eagle Creek at Milesburg, Pa.	40.942	-77.794	119	N
01546400	Spring Creek at Houserville, Pa.	40.834	-77.828	58.5	N
01546500	Spring Creek near Axemann, Pa.	40.890	-77.794	87.2	N
01547100	Spring Creek at Milesburg, Pa.	40.932	-77.786	142	N
01547200	Bald Eagle Creek below Spring Creek at Milesburg, Pa.	40.943	-77.786	265	N
01547500	Bald Eagle Creek at Blanchard, Pa.	41.052	-77.604	339	Y
01547700	Marsh Creek at Blanchard, Pa.	41.060	-77.606	44.1	N
01547800	South Fork Beech Creek near Snow Shoe, Pa.	41.024	-77.904	12.2	N
01547950	Beech Creek at Monument, Pa.	41.112	-77.702	152	N
01548005	Bald Eagle Creek near Beech Creek Station, Pa.	41.081	-77.549	562	Y
01548500	Pine Creek at Cedar Run, Pa.	41.522	-77.447	604	N
01549000	Pine Creek near Waterville, Pa.	41.313	-77.379	750	N
01549500	Blockhouse Creek near English Center, Pa.	41.474	-77.231	37.7	N
01549700	Pine Creek below Little Pine Creek near Waterville, Pa.	41.274	-77.324	944	Y
01550000	Lycoming Creek near Trout Run, Pa.	41.418	-77.033	173	N
01551500	WB Susquehanna River at Williamsport, Pa.	41.236	-76.997	5,682	Y
01552000	Loyalsock Creek at Loyalsockville, Pa.	41.325	-76.912	435	N
01552500	Muncy Creek near Sonestown, Pa.	41.357	-76.535	23.8	N
01553130	Sand Spring Run near White Deer, Pa.	41.059	-77.077	4.93	N
01553500	West Branch Susquehanna River at Lewisburg, Pa.	40.968	-76.876	6,847	Y
01553700	Chillisquaque Creek at Washingtonville, Pa.	41.062	-76.680	51.3	N
01554000	Susquehanna River at Sunbury, Pa.	40.835	-76.827	18,300	Y
01554500	Shamokin Creek near Shamokin, Pa.	40.810	-76.584	54.2	N
01555000	Penns Creek at Penns Creek, Pa.	40.867	-77.048	301	N
01555500	East Mahantango Creek near Dalmatia, Pa.	40.611	-76.912	162	N
01556000	Frankstown Branch Juniata River at Williamsburg, Pa.	40.463	-78.200	291	N
01557500	Bald Eagle Creek at Tyrone, Pa.	40.684	-78.234	44.1	N
01558000	Little Juniata River at Spruce Creek, Pa.	40.613	-78.141	220	N
01559000	Juniata River at Huntingdon, Pa.	40.485	-78.019	816	LF
01559500	Standing Stone Creek near Huntingdon, Pa.	40.524	-77.971	128	N
01559700	Sulphur Springs Creek near Manns Choice, Pa.	39.978	-78.619	5.28	N
01560000	Dunning Creek at Belden, Pa.	40.072	-78.493	172	N


Collection System Boundary
700
BM
1655
Antrim
1400
1720
700
Treatment Plant Discharge
Wastewater Treatment Plant Site

TRC_CALC

TRC EVALUATION

Input appropriate values in A3:A9 and D3:D9

0.74	= Q stream (cfs)	0.5	= CV Daily
0.03	= 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 = 5.105	1.3.2.iii	WLA cfc = 4.970
PENTOXSD TRG	5.1a	LTAMULT afc = 0.373	5.1c	LTAMULT cfc = 0.581
PENTOXSD TRG	5.1b	LTA_afc= 1.902	5.1d	LTA_cfc = 2.889

Source		Effluent Limit Calculations	
PENTOXSD TRG	5.1f	AML MULT = 1.231	
PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500	BAT/BPJ
		INST MAX LIMIT (mg/l) = 1.635	

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)**

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
09A	21730	WILSON 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)
2.620	Duncan Township	PA0228524	0.030	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			3

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
09A	21730	WILSON CREEK	**2.620**	1220.00	18.91	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	0.100	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
Duncan Township	PA0228524	0.0300	0.0300	0.0300	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

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
09A	21730	WILSON CREEK	**2.179**	1180.00	19.62	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	0.100	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
09A	21730	WILSON 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												
2.620	1.89	0.00	1.89	.0464	0.01718	.593	18.52	31.25	0.18	0.153	20.12	7.00
Q1-10 Flow												
2.620	1.21	0.00	1.21	.0464	0.01718	NA	NA	NA	0.14	0.195	20.18	7.00
Q30-10 Flow												
2.620	2.57	0.00	2.57	.0464	0.01718	NA	NA	NA	0.21	0.129	20.09	7.00

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
09A	21730	WILSON 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
2.620	Duncan Township	16.51	50	16.51	50	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
2.620	Duncan Township	1.88	25	1.88	25	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)		
2.62	Duncan Township	25	25	25	25	3	3	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
09A	21730	WILSON CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
2.620	0.030	20.120	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
18.518	0.593	31.248	0.177
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
2.55	0.322	0.60	0.706
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
8.117	28.901	Tsivoglou	5
Reach Travel Time (days)			
0.153			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.015	2.54	0.59	8.22
0.031	2.53	0.59	8.22
0.046	2.51	0.58	8.22
0.061	2.50	0.57	8.22
0.076	2.49	0.57	8.22
0.092	2.48	0.56	8.22
0.107	2.46	0.56	8.22
0.122	2.45	0.55	8.22
0.137	2.44	0.54	8.22
0.153	2.43	0.54	8.22