pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Northcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0115088**
Facility Type	**Municipal**	APS ID	**1023945**
Major / Minor	**Minor**	Authorization ID	**1328225**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Benton Borough Municipal Water & Sewer Authority**	Facility Name	**Benton Municipal Water & Sewer Authority Sewer System**
Applicant Address	PO Box 516	Facility Address	PA 239
	Benton, PA 17814-0516		Benton, PA 17814
Applicant Contact	Richard Clocker Richard.clocker@yahoo.com	Facility Contact	Richard Clocker
Applicant Phone	(570) 925-6341	Facility Phone	(570) 925-6341
Client ID	66431	Site ID	462771
Ch 94 Load Status	Not Overloaded	Municipality	Benton Borough
Connection Status	No Limitations	County	Columbia
Date Application Received	September 22, 2020	EPA Waived?	Yes
Date Application Accepted	October 5, 2020	If No, Reason	

Purpose of Application: Application for a renewal of an NPDES permit for discharge of treated Sewage.

Summary of Review

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		*Jonathan P. Peterman* Jonathan P. Peterman / Project Manager	March 10, 2021
X		*Nicholas W. Hartranft* Nicholas W. Hartranft, P.E. / Environmental Engineer Manager	March 11, 2021

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.132
Latitude	41º 11' 28.72"	Longitude	-76º 23' 11.07"
Quad Name	Benton	Quad Code	0934
Wastewater Description:	Sewage Effluent		
Receiving Waters	Fishing Creek (CWF)	Stream Code	27623
NHD Com ID	65636313	RMI	22.38
Drainage Area	72.3	Yield (cfs/mi^2)	0.06
Q_{7-10} Flow (cfs)	4.43	Q_{7-10} Basis	Stream Gage No. 01539000
Elevation (ft)	748	Slope (ft/ft)	0.003
Watershed No.	5-C	Chapter 93 Class.	CWF
Existing Use	CWF	Existing Use Qualifier	N/A
Exceptions to Use	None	Exceptions to Criteria	None
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment	N/A		
Source(s) of Impairment	N/A		
TMDL Status	N/A	Name	N/A
Nearest Downstream Public Water Supply Intake	United Water PA Bloomsburg		
PWS Waters	Fishing Creek	Flow at Intake (cfs)	16.8
PWS RMI	2.68	Distance from Outfall (mi)	19.7

Changes Since Last Permit Issuance: A Q_{7-10} analysis was conducted using downstream gage (01539000) to approximate the Q_{7-10} stream flow at the discharge point. The updated Q_{7-10} data was obtained from the updated stream gage information obtained from *Stuckey, M.H., and Roland, M.A., 2011, Selected Streamflow Statistics for Streamgage Locations In and Near Pennsylvania*. The Q_{7-10} calculations, which are attached in Appendix A, indicate that the Q_{7-10} is 4.43.

Other Comments: None.

Treatment Facility Summary

Treatment Facility Name: Benton Municipal Water & Sewer Authority Sewer System
Tributary Sewer System Information: The facility receives flows from Benton Borough (90%) and Benton Township (10%).

WQM Permit No.	Issuance Date	Notes:
1973401	6/4/1973	Initial construction of original plant and collection system.
1992410	11/23/1993	Initial construction of new plant and pump stations.
1992410-A1	2/25/2003	Removal of basket strainer and installation of comminutor.
1992410-A2	9/5/2008	Drying bed synthetic media and drain system and polymer feed system.

Waste Type	Degree of Treatment	Process Type	Disinfection	Design Flow (MGD)
Sewage	Secondary	Extended Aeration	Gas Chlorine	0.132
Hydraulic Capacity (MGD)	**Organic Capacity (lbs/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
0.132	275	Not Overloaded	Aerobic Digestion	Other WWTP

Treatment System Components for Outfall 001:

- One (1) Influent pump station.
- One (1) Comminutor.
- One (1) Manual bar screen.
- One (1) Equalization tank.
- Two (2) Aeration tanks.
- Two (2) Clarifiers.
- One (1) Gas chlorination system.
- One (1) Chlorine contact tank.
- One (1) Open channel weir flow meter.
- One (1) Outfall 001 to Fishing Creek.
- Two (2) Sludge Digesters
- Four (4) Drying beds

Changes Since Last Permit Issuance: None.
Other Comments: None.

TMDL Impairment

The Department's Geographical Information System indicates that there are no associated TMDLs for this segment of Fishing Creek. No further TMDL analysis is required.

Anti-Backsliding

In accordance with 40 CFR 122.44(l)(1) and (2), this permit does not contain effluent limitations, standards, or conditions that are less stringent than the previous permit.

Chesapeake Bay Requirements

Since this facility's annual average design flow is 0.132 MGD, the permittee will be required to monitor and report TN and TP throughout the permit term at a frequency no less than annually in accordance with the Phase II WIP Chesapeake Bay Strategy for Phase V facilities (0.002 MGD to 0.2 MGD) unless 1) the facility has already conducted at least two years of nutrient monitoring and 2) a summary of the monitoring results are included in the next permit's fact sheet. The summarized results for this monitoring are contained below and the full data set is contained on an attached sheet. Since the permittee conducted this monitoring in the previous permit term and the data is summarized in the fact sheet below, the conditions have been met and Chesapeake Bay monitoring will not be required.

Existing Effluent Limitations and Monitoring Requirements

Existing Limits – Outfall 001

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 Daily Max	XXX	XXX	XXX	XXX	Continuous	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	9.0 Max	XXX	1/day	Grab
Dissolved Oxygen	XXX	XXX	Report	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
Carbonaceous Biochemical Oxygen Demand (CBOD5)	28	44	XXX	25.0	40.0	50	1/week	8-Hr Composite

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		
Biochemical Oxygen Demand (BOD5) Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	1/week	8-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	1/week	8-Hr Composite
Total Suspended Solids	33	50	XXX	30.0	45.0	60	1/week	8-Hr Composite
Fecal Coliform (No./100 ml) Nov 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Oct 31	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/week	Grab
Total Nitrogen	Report Annl Avg	Report Total Annual	XXX	Report Annl Avg	XXX	XXX	1/year	8-Hr Composite
Ammonia-Nitrogen	Report	Report	XXX	Report	XXX	XXX	2/month	8-Hr Composite
Total Phosphorus	Report Annl Avg	Report Total Annual	XXX	Report Annl Avg	XXX	XXX	1/year	8-Hr Composite

*The existing effluent limits for Outfall 001 were based on a design flow of 0.132 MGD.

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 0.132
Latitude 41º 11' 29.10" **Longitude** -76º 23' 11.70"
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	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)

(10/1 – 4/30)				
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

To establish whether or not water-quality based effluent limitations (WQBELs) are required, the Department models in-stream conditions. In order to determine limitations for CBOD5, ammonia-N and dissolved oxygen, the Department utilizes the WQM 7.0 v1.0b model and in order to determine limitations for toxics, the Department utilizes the Toxic Screening analysis spreadsheet.

WQM 7.0 for Windows, Version 1.0b, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen

The model was run using the latest information on Q7-10 stream flow, background water quality, average annual design flow, and other discharge characteristics. The existing technology-based effluent limits for $CBOD_5$ (25 mg/l) and NH3-N (25 mg/l) were used as inputs for the modeling. The DO minimum daily average criterion from §93.7 (5.0 mg/L for CWF) was used for the in-stream objective for the model. The summary of the output is as follows:

Parameter	Effluent Limit		
	30 Day Average	Maximum	Minimum
CBOD5	25	N/A	N/A
Ammonia-N	25	50	N/A
Dissolved Oxygen	N/A	N/A	3

The model indicates that the effluent limits for ammonia-nitrogen and CBOD5 as shown above are still protective of water quality. The model does not recommend water-quality based effluent limitations with regards to dissolved oxygen. Refer to the Appendix for the WQM 7.0 inputs and results.
Comments: None.

Best Professional Judgment (BPJ) Limitations

See Dissolved Oxygen and Ammonia-nitrogen sections below.
Comments: None.

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 the abovementioned 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) and/or BPJ.

Proposed Limits - Outfall 001, Effective Period: Permit Effective Date through Permit Expiration Date

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Weekly Average	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report Daily Max	XXX	XXX	XXX	XXX	Continuous	Metered
pH (S.U.)	XXX	XXX	6.0	XXX	9.0 Max	XXX	1/day	Grab
Dissolved Oxygen	XXX	XXX	Report	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab

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		
Carbonaceous Biochemical Oxygen Demand (CBOD5)	28	44	XXX	25.0	40.0	50	1/week	8-Hr Composite
Biochemical Oxygen Demand (BOD5) Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	1/week	8-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	1/week	8-Hr Composite
Total Suspended Solids	33	50	XXX	30.0	45.0	60	1/week	8-Hr Composite
Fecal Coliform (No./100 ml) Nov 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Oct 31	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/week	Grab
Ammonia-Nitrogen	Report	Report	XXX	Report	XXX	XXX	2/month	8-Hr Composite

*The proposed effluent limits for Outfall 001 were based on a design flow of 0.132 MGD.

Effluent Limit Determination for Outfall 001

General Information

The associated mass-based limits (lbs/day) for all parameters were based on the formula: design flow (average annual) (MGD) x concentration limit (mg/L) at design flow x conversion factor (8.34). All effluent limits were then rounded down in accordance with the rounding rules established in the *Technical Guidance for the Development and Specification of Effluent Limitations (362-0400-001)*, Chapter 5 - Specifying Effluent Limitations in NPDES Permits. The existing monitoring frequencies and sample types for these parameters generally correspond with the *Technical Guidance for the Development and Specification of Effluent Limitations* (362-0400-001) Table 6-3 and will remain.

Flow

Reporting of the daily maximum flow is consistent with monitoring requirements for other treatment plants and will remain.

Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)

The results of the WQM 7.0 model show that the previously applied secondary treatment standards (25 PA Code §92a.47 (a) (1&2)) for $CBOD_5$ are protective of water quality and will remain.

Total Suspended Solids (TSS)

The previously applied technology based secondary treatment standards (25 PA Code §92a.47 (a) (1&2)) for TSS will remain as well.

pH

CFR Title 40 §133.102(c) and 25 PA Code §95.2(1) provide the basis of effluent limitations for pH.

Total Residual Chlorine (TRC)

In accordance with 25 Pa. Code § 92a.48(b)(1), a site-specific BAT value of 0.5 mg/l (which is also the existing effluent limit) was used as the input in the TRC model evaluation. The attached TRC model indicates that the existing BAT effluent limits of 0.5 mg/L (Average Monthly) and 1.6 mg/L (Instantaneous Maximum) are protective of water quality.

Fecal Coliforms
The existing fecal coliform limits with I-max limits were previously updated from the previous Chapter 92 code to correspond with what is specified in the updated 25 PA Code § 92a.47 (a)(4)&(5). The existing effluent limits will remain.

Ammonia-Nitrogen (NH3-N)
Based on BPJ, monitoring for NH3-N will remain with a monitoring frequency of 2 month.

Dissolved Oxygen (DO)
25 PA Code §93.7 provides specific water quality criteria for DO and monitoring for this parameter will ensure that the facility is not creating or contributing to an in-stream excursion below these water quality standards

Influent BOD_5 and TSS
The Department requires the reporting of raw sewage influent monitoring for BOD_5 and TSS in all POTW permits. This provides the Department with the ability to monitor the percent removal of each parameter as stipulated in section 2 of the Part A conditions and maintain records of the BOD_5 loading as required by 25 Pa. Code Chapter 94. The monitoring frequencies and sample types are identical to the effluent sampling.

Compliance History

Summary of Inspections -The most recent Clean Water Program onsite inspections for this facility were a Compliance Evaluation Inspection on 12/18/19. No issues were noted in the inspection.

WMS Query Summary - A WMS Query was run at *Reports - Violations & Enforcements – Open Violations for Client Report* to determine whether there are any unresolved violations associated with the client that will affect issuance of the permit (per CSL Section 609). This query revealed the following open violation. The NCRO Safe Drinking Water program will be notified of this open violation.

CLIENT ID	CLIENT	FACILITY	INSP PROGRAM	PROGRAM SPECIFIC ID	INSP ID	VIOLATION ID	VIOLATION DATE	VIOLATION CODE	VIOLATION	PF INSPECTOR	INSP REGION
66431	BENTON BORO MUNI WATER & SEW AUTH COLUMBIA CNTY	BENTON MUNICIPAL WATER AUTH	Safe Drinking Water	4190014	3047872	887318	06/25/2020	C3F	FAILURE TO TEST ALARM AND SHUTDOWN CAPABILITIES OR RESPOND TO ALARM AND SHUTDOWN EQUIPMENT FAILURES	MARTIN, RICHARD	NCRO

Summary eDMR Data -The facility has generally been in compliance with the effluent limits. No violations are noted below.

Benton Appendices

Compliance History

DMR Data for Outfall 001 (from December 1, 2019 to November 30, 2020)

Parameter	NOV-20	OCT-20	SEP-20	AUG-20	JUL-20	JUN-20	MAY-20	APR-20	MAR-20	FEB-20	JAN-20	DEC-19
Flow (MGD) Average Monthly	0.063	0.056	0.056	0.054	0.052	0.054	0.077	0.08	0.088	0.093	0.086	0.076
Flow (MGD) Daily Maximum	0.085	0.077	0.064	0.066	0.071	0.073	0.193	0.170	0.112	0.156	0.143	0.119
pH (S.U.) Minimum	6.8	6.8	6.8	6.7	6.7	6.7	6.6	6.8	6.8	7.0	7.1	7.1
pH (S.U.) Maximum	7.3	7.3	7.3	7.2	7.1	7.3	7.2	7.1	7.3	7.6	7.6	7.8
DO (mg/L) Minimum	3.2	3.1	3.1	2.8	2.6	2.9	3.4	3.7	3.0	3.0	3.2	2.8
TRC (mg/L) Average Monthly	0.32	0.25	0.32	0.31	0.33	0.28	0.3	0.28	0.29	0.32	0.29	0.24
TRC (mg/L) Instantaneous Maximum	0.77	0.82	1.17	0.67	1.2	0.76	0.65	0.76	0.64	1.1	0.89	0.60
CBOD5 (lbs/day) Average Monthly	7	6	6	8	7	5	6	9	8	5	8	9
CBOD5 (lbs/day) Weekly Average	8	7	8	11	8	6	9	14	15	6	12	15
CBOD5 (mg/L) Average Monthly	12.0	13.0	11.0	17.0	15.0	12.0	9.0	12.0	10.0	7.0	11.0	15.0
CBOD5 (mg/L) Weekly Average	14.0	14.0	18.0	25.0	19.0	14.0	10.0	16.0	16.0	9.0	18.0	27.0
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	121	148	134	106	127	133	92	81	76	131	109	127
BOD5 (lbs/day) Raw Sewage Influent Weekly Average	182	266	153	135	174	155	126	130	114	165	158	159
BOD5 (mg/L) Raw Sewage Influent Average Monthly	215.0	321	266	231	281	307	167	118.3	104.5	189	157.2	208.7
TSS (lbs/day) Average Monthly	6	< 2	< 3	4	< 3	< 2	< 4	8	7	< 5	< 5	< 4

TSS (lbs/day) Raw Sewage Influent Average Monthly	109	168	141	58	108	81	103	59	91	135	88	99
TSS (lbs/day) Raw Sewage Influent Weekly Average	139	339	181	74	192	115	176	98	174	197	120	138
TSS (lbs/day) Weekly Average	7	3	4	7	5	3	5	6	10	11	9	6
TSS (mg/L) Average Monthly	11.0	< 5.0	< 5.0	9.0	< 7.0	< 5.0	< 7.0	9.0	9.0	< 7.0	< 6.0	< 6.0
TSS (mg/L) Raw Sewage Influent Average Monthly	200	363	281	126	245	185	178	87.0	128	197	125	162.0
TSS (mg/L) Weekly Average	14.0	6.0	7.0	13.0	10.0	6.0	12.0	10.0	13.0	12.0	9.0	10.0
Fecal Coliform (No./100 ml) Geometric Mean	< 1.0	12	< 1	< 9.0	< 5	< 2	< 2.0	24	< 30.0	< 5	49.0	< 77
Fecal Coliform (No./100 ml) Instantaneous Maximum	< 1.0	140.6	2.0	133.1	13.2	9.7	11.9	2419.6	2419.6	204.6	2419.6	2419.6
Total Nitrogen (lbs/day) Annual Average												423
Total Nitrogen (lbs/day) Total Annual												423
Total Nitrogen (mg/L) Annual Average												23.4
Ammonia (lbs/day) Average Monthly	18	11	14	16	13	14	14	18	14	17	17	9
Ammonia (lbs/day) Weekly Average	17	12	16	19	14	16	15	20	16	18	18	15
Ammonia (mg/L) Average Monthly	34.8	25.5	27.8	32.2	28.7	32.3	19.9	24.4	21.0	25.6	25.0	15.5
Total Phosphorus (lbs/day) Annual Average												52
Total Phosphorus (lbs/day) Total Annual												52

Total Phosphorus (mg/L) Annual Average												2.9

Tools and References Used to Develop Permit	
☒	WQM for Windows Model (see Attachment **B**)
☐	PENTOXSD for Windows Model (see Attachment)
☐	TRC Model Spreadsheet (see Attachment)
☐	Temperature Model Spreadsheet (see Attachment)
☐	Toxics Screening Analysis Spreadsheet (see Attachment)
☐	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☒	Technical Guidance for the Development and Specification of Effluent Limitations, 362-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 362-2000-003, 3/98.
☒	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 362-2000-008, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 362-2183-003, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 362-2183-004, 12/97.
☐	Pennsylvania CSO Policy, 385-2000-011, 9/08.
☐	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 391-2000-002, 4/97.
☒	Determining Water Quality-Based Effluent Limits, 391-2000-003, 12/97.
☐	Implementation Guidance Design Conditions, 391-2000-006, 9/97.
☐	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 391-2000-007, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 391-2000-008, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 391-2000-010, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 391-2000-011, 5/2004.
☒	Implementation Guidance for Section 93.7 Ammonia Criteria, 391-2000-013, 11/97.
☒	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 391-2000-014, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 391-2000-015, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 391-2000-017, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 391-2000-018, 10/97.
☐	Implementation Guidance for Application of Section 93.5(e) for Potable Water Supply Protection Total Dissolved Solids, Nitrite-Nitrate, Non-Priority Pollutant Phenolics and Fluorides, 391-2000-019, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 391-2000-021, 3/99.
☐	Implementation Guidance for the Determination and Use of Background/Ambient Water Quality in the Determination of Wasteload Allocations and NPDES Effluent Limitations for Toxic Substances, 391-2000-022, 3/1999.
☒	Design Stream Flows, 391-2000-023, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 391-2000-024, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 391-3200-013, 6/97.
☒	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☐	SOP:
☐	Other:

APPENDIX A

$Q_{7\text{-}10}$ ANALYSIS AND STREAM DATA

Q_{7-10} Analysis

Facility: Benton Mun. Water and Sewer Authority
Outfall: 001

NPDES Permit No.: PA0115088
RMI at Outfall: 22.38 Elev. 748

Was Ecoflows Used?	No
Correlation From Ecoflows	

Reference Stream Gage Information	
Stream Name	Fishing Creek
Reference Gage	1539000
Station Name	Fishing Creek near Bloomsburg, PA
Gage Drainage Area (sq. mi.)	274
Q_{7-10} at gage (cfs)	16.8
Yield Ratio (cfs/mi^2)	0.0613

Check Dilution Ratio		
Discharge at Outfall (wf) (mgd)	0.132	
	sf (cfs)	wf (cfs)
Dilution Ratio = sf/wf	4.4330	0.204234195
Dilution Ratio =	21.70543819 to 1	

Q_{7-10} at Outfall	
Drainage Area at site (sq. mi.)	72.3
Q_{7-10} at discharge site (cfs)	4.4330
Q_{7-10} at discharge site (mgd)	2.8651
Low Flow Yield Ratio of 0.1 cfs/mi^2 (For Approx. Comparison Only)	
Q_{7-10} at discharge site (cfs)	7.2300
Q_{7-10} at discharge site (mgd)	4.6729

Q_{7-10} at Downstream Reach #1	
Drainage Area at Reach (sq. mi.)	89.7
RMI	21.73
Q_{7-10} at reach (cfs)	5.4999
Q_{7-10} at reach (mgd)	3.5546
	Elev. 738

Q_{7-10} at Downstream Reach #2	
Drainage Area at Reach (sq. mi.)	[Drainage Area @ Reach #2]
RMI	[RMI @ Reach #2]
Q_{7-10} at reach (cfs)	#VALUE!
Q_{7-10} at reach (mgd)	#VALUE!

Q_{7-10} at Downstream Reach #3	
Drainage Area at Reach (sq. mi.)	[Drainage Area @ Reach #3]
RMI	[RMI @ Reach #3]
Q_{7-10} at reach (cfs)	#VALUE!
Q_{7-10} at reach (mgd)	#VALUE!

Basin Characteristics Report at [Site / Reach]

Date: Thurs Jan 21, 2016 10:28:06 AM GMT-5
Study Area: Pennsylvania
NAD 1983 Latitude: 41.1911 (41 11 28)
NAD 1983 Longitude: -76.3864 (-76 23 11)

Label	Value
DRNAREA	72.3
STRMTOT	140.22
STRDEN	1.94
BSLOPD	11
CENTROIDX	133673
CENTROIDY	257660.2
OUTLETX	135335
OUTLETY	244535
LONG_OUT	-76.38646
BSLOPDRAW	11.2
FOREST	94
PRECIP	44
URBAN	0
GLACIATED	99
ROCKDEP	4.5
CARBON	0
STORAGE	0
ELEV	1832.6
MAXTEMP	53
DRN	4
IMPNLCD01	0
LC01DEV	2
LC11IMP	0.24
LC11DEV	2.38

Basin Map at Outfall

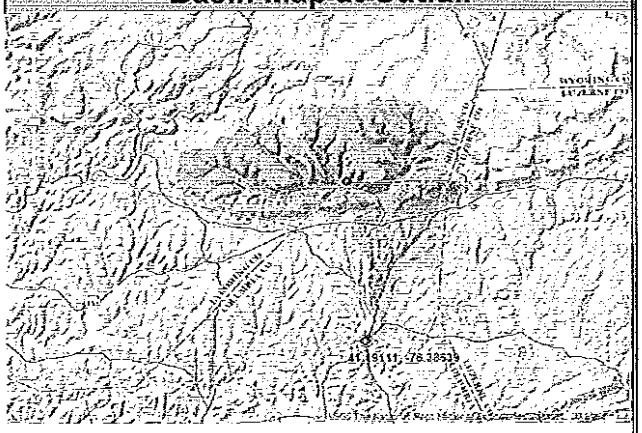


Table 2. Selected low-flow statistics for streamgage locations in and near Pennsylvania.—Continued

[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)
01530500	1940–2008	69	5.0	6.1	11.0	7.6	13	9.0
01531000	[2]1981–2008	28	138	147	237	169	296	203
01531000	[3]1905–1979	68	86.3	97.0	175	116	219	161
01531500	[2]1981–2008	28	550	592	1,030	733	1,340	952
01531500	[3]1915–1979	65	539	571	990	675	1,230	928
01532000	1915–2008	94	2.2	2.8	9.7	4.6	14.4	9.4
01532850	1967–1979	13	.1	.2	.4	.3	.8	.7
01533400	[2]1981–2008	28	602	648	1,110	790	1,430	1,060
01533500	1942–1958	17	.4	.6	1.5	.8	2.0	1.7
01533950	1962–1978	17	.2	.3	1.0	.6	1.4	1.0
01534000	1915–2008	94	15.2	17.3	35.9	24.2	51.0	38.7
01534300	1960–2008	49	1.1	1.7	5.1	2.8	7.6	4.8
01534500	[2]1961–2008	48	16.7	18.8	29.2	21.9	35.8	27.6
01534500	[3]1941–1959	19	18.8	23.0	33.3	25.6	39.2	34.9
01536000	[2]1961–2008	48	28.7	32.7	51.7	40.8	68.1	54.3
01536000	[3]1940–1959	20	77.8	93.9	119	105	138	124
01536500	[2]1981–2008	28	828	872	1,450	1,030	1,830	1,350
01536500	[3]1901–1979	79	778	811	1,350	927	1,640	1,260
01537000	1943–1993	51	1.3	2.0	4.9	3.1	6.4	4.7
01537500	1941–1990	50	.2	.3	1.9	.5	3.1	1.6
01538000	1921–2008	88	3.1	3.6	7.1	5.0	9.3	7.5
01539000	1940–2008	69	15.4	16.8	36.8	21.1	51.1	36.8
01539500	1942–1958	17	.1	.3	1.4	1.0	3.3	2.3
01540200	1965–1981	17	0	0	.3	.1	.3	.1
01540500	[2]1981–2008	28	1,080	1,120	1,870	1,320	2,330	1,690
01540500	[3]1906–1979	74	927	978	1,660	1,160	2,050	1,590
01541000	1915–2008	94	25.3	27.9	50.7	35.3	66.6	49.6
01541200	[3]1967–2008	40	34.6	45.2	66.0	63.1	100	92.4
01541200	[3]1957–1965	9	22.9	24.7	44.7	27.7	58.2	36.4
01541303	1980–2008	29	53.4	58.5	94.0	74.4	123	102
01541308	1969–1979	11	1.3	1.3	1.9	1.6	2.4	2.1
01541500	[2]1962–2008	47	39.0	41.9	66.5	51.9	86.3	70.6
01541500	[3]1915–1960	46	14.9	21.3	41.9	28.5	55.0	42.9
01542000	1942–1993	52	8.1	9.1	14.8	11.3	17.8	14.6
01542500	[2]1967–2008	33	216	235	326	285	435	402
01542500	[3]1941–1965	20	—	131	189	152	243	221
01542810	1966–2008	43	.1	.1	.3	.2	.5	.3
01543000	1915–2008	94	2.9	4.2	16.0	9.6	27.4	19.2
01543500	1940–2008	69	10.7	14.5	44.9	26.6	74.9	50.5
01544000	[2]1957–2008	52	3.3	6.9	19.0	11.2	31.1	19.0
01544500	1942–2008	67	4.2	4.9	12.5	7.5	17.4	11.7
01545000	[2]1964–2008	45	6.8	8.2	21.2	12.0	32.7	20.7
01545500	[2]1963–2008	46	217	238	446	306	629	428
01545500	[3]1909–1961	53	125	141	278	190	387	296
01545600	1966–2008	43	1.2	1.5	4.4	2.4	6.7	4.2

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]
01508803	West Branch Tioughnioga River at Homer, N.Y.	42.638	-76.176	71.5	N
01509000	Tioughnioga River at Cortland, N.Y.	42.603	-76.159	292	N
01510000	Otselic River at Cincinnatus, N.Y.	42.541	-75.900	147	N
01512500	Chenango River near Chenango Forks, N.Y.	42.218	-75.848	1,483	N
01515000	Susquehanna River near Waverly, N.Y.	41.985	-76.501	4,773	N
01516350	Tioga River near Mansfield, Pa.	41.797	-77.080	153	N
01516500	Corey Creek near Mainesburg, Pa.	41.791	-77.015	12.2	N
01518000	Tioga River at Tioga, Pa.	41.908	-77.129	282	Y
01518700	Tioga River at Tioga Junction, Pa.	41.953	-77.115	446	Y
01518862	Cowanesque River at Westfield, Pa.	41.923	-77.532	90.6	N
01520000	Cowanesque River near Lawrenceville, Pa.	41.997	-77.140	298	Y
01520500	Tioga River at Lindley, N.Y.	42.029	-77.132	771	Y
01521500	Canisteo River at Arkport, N.Y.	42.396	-77.711	30.6	Y
01523500	Canacadea Creek near Hornell, N.Y.	42.335	-77.683	57.9	Y
01524500	Canisteo River below Canacadea Creek at Hornell, N.Y.	42.314	-77.651	158	Y
01526500	Tioga River near Erwins, N.Y.	42.121	-77.129	1,377	Y
01527000	Cohocton River at Cohocton, N.Y.	42.500	-77.500	52.2	N
01527500	Cohocton River at Avoca, N.Y.	42.398	-77.417	152	N
01528000	Fivemile Creek near Kanona, N.Y.	42.388	-77.358	66.8	N
01529000	Mud Creek near Savona, N.Y.	42.308	-77.197	76.6	Y
01529500	Cohocton River near Campbell, N.Y.	42.253	-77.217	470	N
01529950	Chemung River at Corning, N.Y.	42.146	-77.057	2,006	Y
01530332	Chemung River at Elmira, N.Y.	42.086	-76.801	2,162	Y
01530500	Newtown Creek at Elmira, N.Y.	42.105	-76.798	77.5	Y
01531000	Chemung River at Chemung, N.Y.	42.002	-76.635	2,506	Y
01531500	Susquehanna River at Towanda, Pa.	41.765	-76.441	7,797	Y
01532000	Towanda Creek near Monroeton, Pa.	41.707	-76.485	215	N
01532850	MB Wyalusing Creek near Birchardville, Pa.	41.863	-76.007	5.67	N
01533400	Susquehanna River at Meshoppen, Pa.	41.607	-76.050	8,720	Y
01533500	North Branch Mehoopany Creek near Lovelton, Pa.	41.531	-76.156	35.2	N
01533950	SB Tunkhannock Creek near Montdale, Pa.	41.575	-75.642	12.6	N
01534000	Tunkhannock Creek near Tunkhannock, Pa.	41.558	-75.895	383	N
01534300	Lackawanna River near Forest City, Pa.	41.680	-75.472	38.8	Y
01534500	Lackawanna River at Archbald, Pa.	41.505	-75.542	108	Y
01536000	Lackawanna River at Old Forge, Pa.	41.359	-75.744	332	Y
01536500	Susquehanna River at Wilkes-Barre, Pa.	41.251	-75.881	9,960	Y
01537000	Toby Creek at Luzerne, Pa.	41.281	-75.896	32.4	Y
01537500	Solomon Creek at Wilkes-Barre, Pa.	41.228	-75.904	15.7	N
01538000	Wapwallopen Creek near Wapwallopen, Pa.	41.059	-76.094	43.8	N
01539000	Fishing Creek near Bloomsburg, Pa.	41.078	-76.431	274	N
01539500	Little Fishing Creek at Eyers Grove, Pa.	41.080	-76.511	56.5	N
01540200	Trexler Run near Ringtown, Pa.	40.853	-76.280	1.77	N
01540500	Susquehanna River at Danville, Pa.	40.958	-76.619	11,220	Y
01541000	West Branch Susquehanna River at Bower, Pa.	40.897	-78.677	315	N
01541200	West Branch Susquehanna River near Curwensville, Pa.	40.961	-78.519	367	Y

APPENDIX B

WQM 7.0 MODEL RESULTS

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
05C	27623	FISHING CREEK	**22.380**	748.00	72.30	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	4.43	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
Benton Mun. WSA	PA00115088	0.0000	0.1320	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
05C	27623	FISHING 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												
22.380	4.43	0.00	4.43	.2042	0.00291	.695	36.05	51.83	0.18	0.215	20.22	7.00
Q1-10 Flow												
22.380	4.06	0.00	4.06	.2042	0.00291	NA	NA	NA	0.18	0.225	20.24	7.00
Q30-10 Flow												
22.380	5.54	0.00	5.54	.2042	0.00291	NA	NA	NA	0.21	0.191	20.18	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	0.9167	Use Inputted Reach Travel Times	☐
Q30-10/Q7-10 Ratio	1.25	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
05C	27623	FISHING 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
22.380	Benton Mun. WS	9.51	50	9.51	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
22.380	Benton Mun. WS	1.89	25	1.89	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)		
22.38	Benton Mun. WSA	25	25	25	25	3	3	0	0

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
05C	27623	FISHING CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
22.380	0.132	20.220	7.000
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
36.046	0.695	51.834	0.185
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
3.01	0.494	1.10	0.712
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
8.012	5.145	Tsivoglou	5
Reach Travel Time (days)			
0.215			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.021	2.98	1.08	8.01
0.043	2.95	1.07	8.01
0.064	2.92	1.05	8.01
0.086	2.89	1.04	8.01
0.107	2.86	1.02	8.02
0.129	2.83	1.01	8.02
0.150	2.80	0.99	8.03
0.172	2.77	0.97	8.04
0.193	2.74	0.96	8.04
0.215	2.71	0.95	8.05

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
05C	27623	FISHING 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)
22.380	Benton Mun. WSA	PA00115088	0.000	CBOD5	25		
				NH3-N	25	50	
				Dissolved Oxygen			3

APPENDIX C

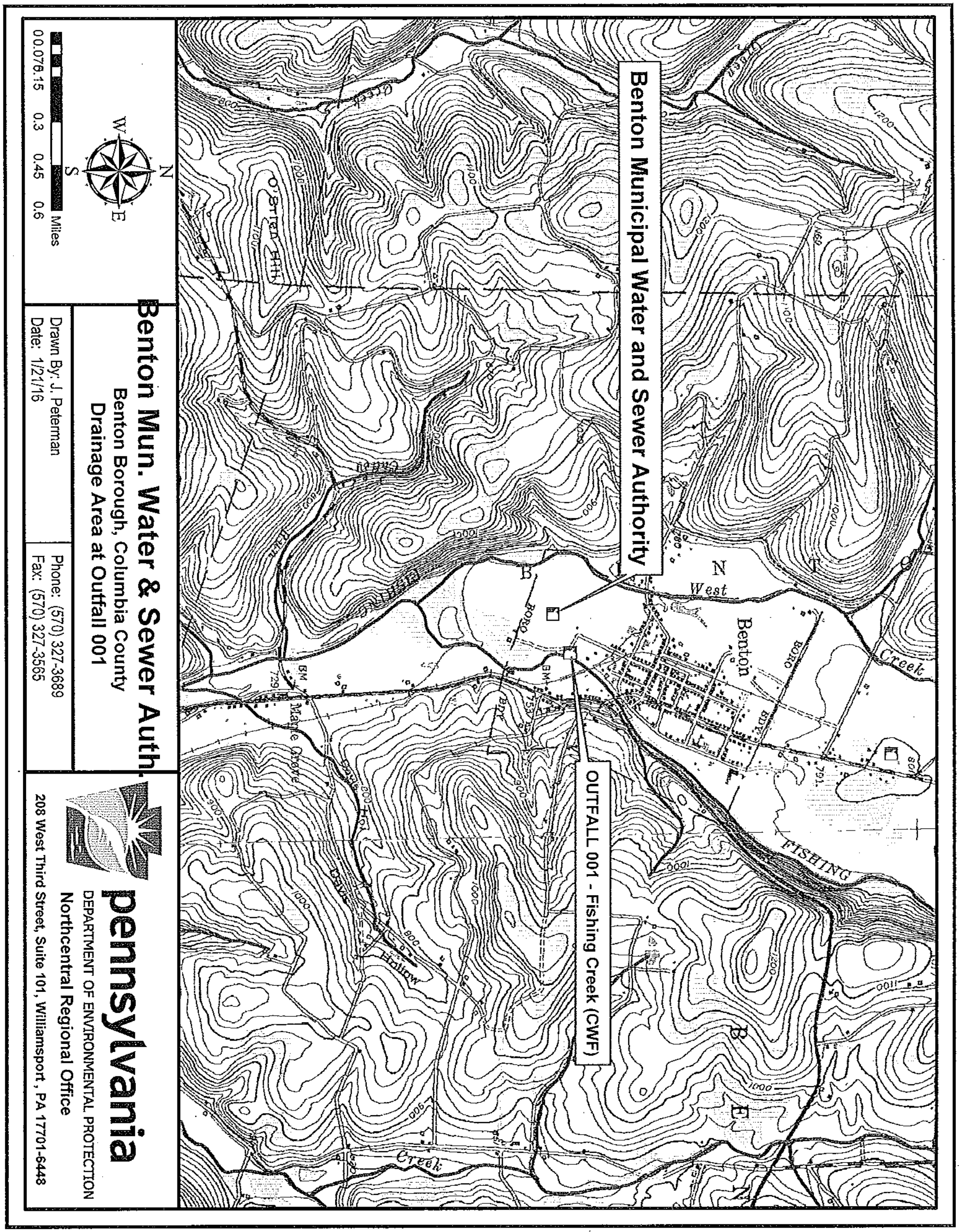
TRC ANALYSIS SPREADSHEET

1A	B	C	D	E	F	G
2	**TRC EVALUATION**	Benton PA0115088				
3	Input appropriate values in B4:B8 and E4:E7					
4	4.43	= Q stream (cfs)		0.5	= CV Daily	
5	0.132	= Q discharge (MGD)		0.5	= CV Hourly	
6	30	= no. samples		1	= AFC_Partial Mix Factor	
7	0.3	= Chlorine Demand of Stream		1	= CFC_Partial Mix Factor	
8	0	= Chlorine Demand of Discharge		15	= AFC_Criteria Compliance Time (min)	
9	0.5	= BAT/BPJ Value		720	= CFC_Criteria Compliance Time (min)	
	0	= % Factor of Safety (FOS)		0	=Decay Coefficient (K)	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	1.3.2.iii	WLA afc = 6.939		1.3.2.iii	WLA cfc = 6.758
12	PENTOXSD TRG	5.1a	LTAMULT afc = 0.373		5.1c	LTAMULT cfc = 0.581
13	PENTOXSD TRG	5.1b	LTA_afc= 2.586		5.1d	LTA_cfc = 3.929
14						
15	Source		Effluent Limit Calculations			
16	PENTOXSD TRG	5.1f	AML MULT = 1.231			
17	PENTOXSD TRG	5.1g	AVG MON LIMIT (mg/l) = 0.500		BAT/BPJ	
18			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)**

APPENDIX D

FACILITY MAP AND SCHEMATIC


Benton Municipal Water and Sewer Authority
OUTFALL 001 - Fishing Creek (CWF)
Benton
West
Creek
FISHING
Creek
Benton Mun. Water & Sewer Auth.
Benton Borough, Columbia County
Drainage Area at Outfall 001
Drawn By: J. Peterman
Date: 1/21/16
Phone: (570) 327-3689
Fax: (570) 327-3565
pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Northcentral Regional Office
208 West Third Street, Suite 101, Williamsport, PA 17701-6448
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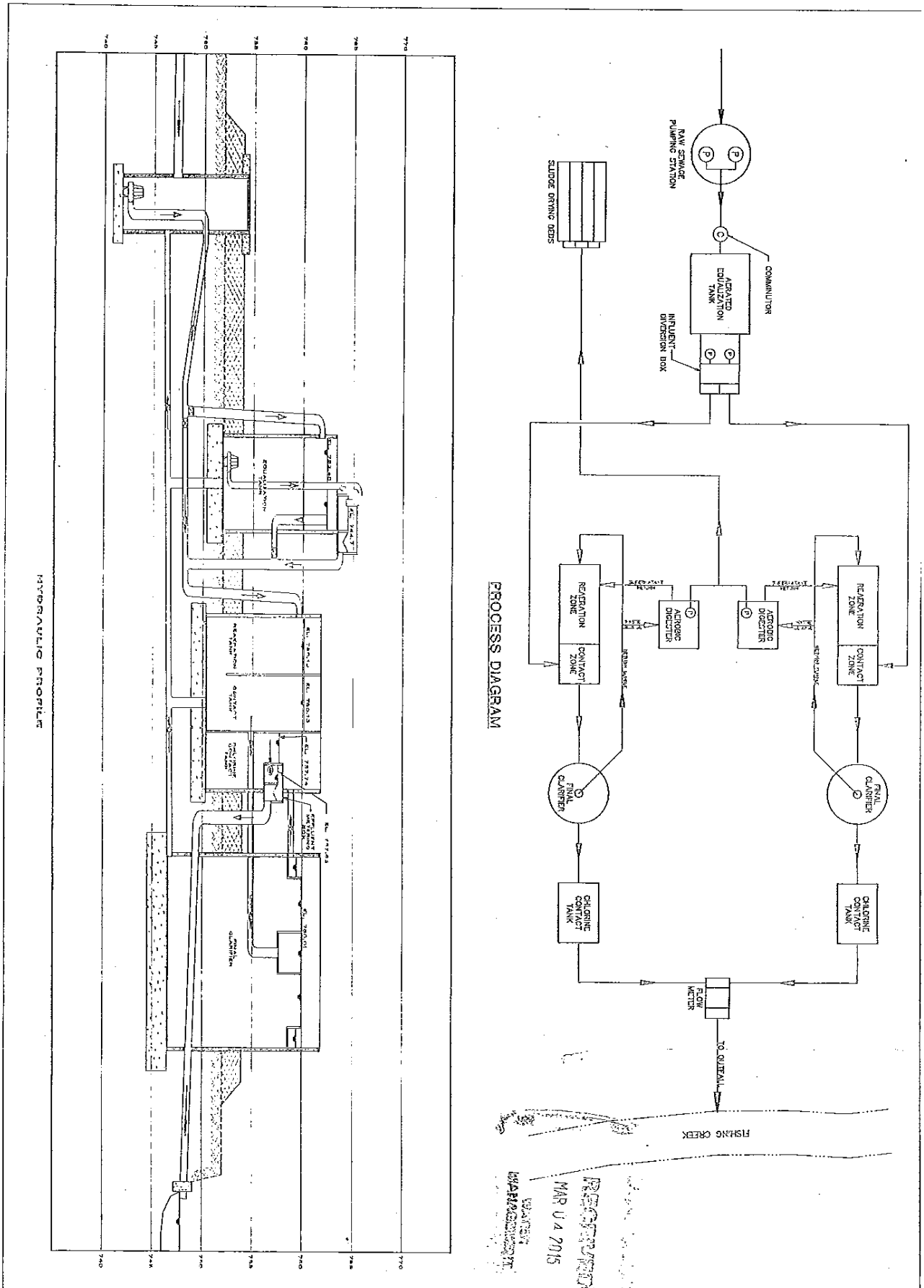
0 0.075 0.15 0.3 0.45 0.6
Miles


HYDRAULIC PROFILE
PROCESS DIAGRAM
RAW SEWAGE PUMPING STATION
SLUDGE DRYING BEDS
COMMINUTOR
AERATED EQUALIZATION TANK
INFLUENT DIVERSION BOX
REAERATION ZONE
CONTACT ZONE
AEROBIC DIGESTER
FINAL CLARIFIER
CHLORINE CONTACT TANK
FLOW METER
TO OUTFALL
FISHING CREEK
RECEIVED
MAR 04 2015
WATER MANAGEMENT
BENTON MUNICIPAL WATER AND SEWER AUTHORITY
BENTON BOROUGH, COLUMBIA COUNTY, PENNSYLVANIA
WASTEWATER TREATMENT PLANT
PROCESS DIAGRAM & HYDRAULIC PROFILE
Killam
GEORGE R. EVANS
3-17-83
SUPERNATANT RETURN TO AERATION ZONE