pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southcentral Regional Office
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0080454**
Facility Type	**Industrial**	APS ID	**275414**
Major / Minor	**Minor**	Authorization ID	**1441215**

NPDES PERMIT FACT SHEET INDIVIDUAL INDUSTRIAL WASTE (IW) AND IW STORMWATER

Applicant and Facility Information

Applicant Name	**Borough of Carlisle**	Facility Name	**Carlisle Water Treatment Plant**
Applicant Address	53 W South Street	Facility Address	165 Longs Gap Road
	Carlisle, PA 17013-3458		Carlisle, PA 17013
Applicant Contact	Corey Flythe	Facility Contact	Jeffory Mckenzie
Applicant Phone	(717) 793-6625	Facility Phone	(717) 636-1592
Client ID	85896	Site ID	238252
SIC Code	4941	Municipality	North Middleton Township
SIC Description	Trans. & Utilities - Water Supply	County	Cumberland
Date Application Received	May 23, 2023	EPA Waived?	Yes
Date Application Accepted	June 1, 2023	If No, Reason	

Purpose of Application .

Summary of Review

The Borough of Carlisle (Carlisle) has applied to the Pennsylvania Department of Environmental Protection (DEP) for reissuance of its NPDES permit for discharges of treated industrial waste generated from its water treatment plant. The permit was last reissued on October 29, 2018 and became effective on November 1, 2018. The permit expired on October 31, 2023 but the terms and conditions of the permit have been extended since that time.

Based on the review, it is recommended that the permit be drafted.

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		Jinsu Kim Jinsu Kim / Environmental Engineering Specialist	April 4, 2024
X		Maria D. Bebenek for Daniel W. Martin, P.E. / Environmental Engineer Manager	April 15, 2024
X		Maria D. Bebenek Maria D. Bebenek, P.E. / Program Manager	April 15, 2024

Discharge, Receiving Waters and Water Supply Information

Outfall No.	001	Design Flow (MGD)	0.30
Latitude	40º 13' 32"	Longitude	-77º 11' 24"
Quad Name	Carlisle	Quad Code	1728
Wastewater Description:	IW Process Effluent without ELG		
Receiving Waters	Conodoguinet Creek	Stream Code	10194
NHD Com ID	56405955	RMI	35.95
Drainage Area	384 sq.mi.	Yield (cfs/mi^2)	0.126
Q_{7-10} Flow (cfs)	48.4	Q_{7-10} Basis	USGS StreamStats
Elevation (ft)	401	Slope (ft/ft)	
Watershed No.	7-B	Chapter 93 Class.	WWF
Existing Use	None	Existing Use Qualifier	N/A
Exceptions to Use	N/A	Exceptions to Criteria	N/A
Assessment Status	Attaining Use(s)		
Cause(s) of Impairment			
Source(s) of Impairment			
TMDL Status		Name	
Nearest Downstream Public Water Supply Intake	North Middleton Authority		
PWS Waters	Conodoguinet Creek	Flow at Intake (cfs)	
PWS RMI	33.85	Distance from Outfall (mi)	2.1

Drainage Area
The discharge is to Conodoguinet Creek at RMI 35.95. A drainage area upstream of the point of discharge is estimated to be 384 sq.mi. according to USGS StreamStats available at https://streamstats.usgs.gov/ss/.

Streamflow
USGS StreamStats produced a Q7-10 flow of 48.4 cfs at the point of discharge. This is slightly different from the previously-used Q7-10 flow which was 48.65 cfs.

Conodoguinet Creek
Conodoguinet Creek is a tributary of Susquehanna River. Under Pa Code §93.9o, the entire basin of Conodoguinet Creek from PA 997 at Roxbury to Mouth is designated as warm water and migratory fishes. No special protection waters are impacted by this discharge. DEP's latest integrated report prepared in 2016 indicates that Conodoguinet Creek is currently not identified as an impaired stream and the discharge is located in a stream segment listed as attaining uses.

Public Water Supply Intake
The nearest downstream public water supply intake is North Middleton Authority located on Conodoguinet Creek, approximately 2.1 miles from the point of discharge. Considering the distance, the discharge is not expected to significantly impact the intake. This was partly confirmed by a Source Water Assessment Summary indicating that "no contaminants are found in concentrations that require any of the water suppliers to significantly alter their treatment procedure".

Treatment Facility Summary				
Treatment Facility Name: Carlisle Water Treatment Plant				
Waste Type	**Degree of Treatment**	**Process Type**	**Disinfection**	**Avg Annual Flow (MGD)**
Industrial	Primary	Sedimentation	No Disinfection	0.30
Hydraulic Capacity (MGD)	**Organic Capacity (lbs/day)**	**Load Status**	**Biosolids Treatment**	**Biosolids Use/Disposal**
N/A	N/A	Not Overloaded	N/A	N/A

Carlisle operates a water treatment plant (or water filtration plant) to supply water to areas of its Borough, North Middleton Township, and South Middleton Township. About 3.41 MGD of Conodoguinet Creek is withdrawn and is first treated via a series of mixing, flocculation and sedimentation processes. During these process, chemicals including powdered activated carbon (PAC), potassium permanganate (KMnO4), chlorine, alum, sodium hydroxide (NaOH), and polymers are used to oxidize and disinfect the water prior to filtration. Once water is filtered, treated water is collected in clearwell and once again mixed with chlorine, sodium hydroxide and fluoride prior to pumped to the reservoir and then ultimately to the distribution tank at a rate of 2.92 MGD. Any waste generated during the flocculation/sedimentation process and backwash of filters are sent to two (2) backwash/sludge basins. Wastewater from these basins is mixed with a polymer and then sent to the thickener where supernatant from this thickener is discharged to a lagoon and then ultimately to Conodoguinet Creek via Outfall 001 and waste from the thickener is sent to a sludge holding basin prior to being hauled off-site via a private contractor. It is a batch discharge and the application reports there are three (3) discharge cycles per day with each cycle being last for 6 hours and rated at 0.357 MGD.

Compliance History	
Summary of DMRs:	A summary of past 12-month DMR is presented on the next page.
Summary of Inspections:	March 11, 2020: DEP conducted a routine inspection and determined that no violations have been identified at the time of inspection.
Other Comments:	There were two (2) effluent violations identified in December 2020 since the last permit reissuance. These were associated with Total Aluminum and TSS. DEP's database shows that there are no open violation associated with this permittee or facility.

Effluent Data

DMR Data for Outfall 001 (from March 1, 2023 to February 29, 2024)

Parameter	FEB-24	JAN-24	DEC-23	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23
Flow (MGD) Average Monthly	0.264	0.274	0.27	0.275	0.315	0.316	0.317	0.318	0.312	0.308	0.307	0.307
Flow (MGD) Daily Maximum	0.30	0.336	0.323	0.298	0.351	0.347	0.366	0.345	0.339	0.335	0.341	0.340
pH (S.U.) Daily Minimum	7.5	7.3	7.4	7.5	7.5	7.4	7.4	7.5	7.6	7.3	7.5	7.4
pH (S.U.) Daily Maximum	7.9	7.9	7.9	8.0	7.9	7.8	7.9	8.0	7.9	7.9	8.0	7.9
TRC (mg/L) Average Monthly	0.08	0.09	0.10	0.11	0.05	0.05	0.04	0.06	0.05	0.06	0.05	0.07
TRC (mg/L) Instantaneous Maximum	0.13	0.16	0.15	0.23	0.11	0.11	0.06	0.14	0.08	0.11	0.09	0.12
TSS (lbs/day) Average Monthly	8.0	5	2.6	6	10	8.0	9.0	11	7	6	9.0	7
TSS (lbs/day) Daily Maximum	15.0	7	5.0	7	15	10.0	16.0	19	8	9	15.0	11
TSS (mg/L) Average Monthly	3.5	2.4	6.0	2.5	3.8	3.1	3.5	4.0	0.26	2.2	3.8	3.0
TSS (mg/L) Daily Maximum	7.0	3.0	12.0	3.0	6.0	4.0	6.0	7.0	3.0	3.5	6.0	4.8
Total Aluminum (lbs/day) Average Monthly	0.6	0.5	0.3	0.6	0.7	0.7	0.9	0.8	0.9	0.6	0.6	0.4
Total Aluminum (lbs/day) Daily Maximum	0.7	1	0.33	0.8	1	1.0	1.0	1.0	0.9	0.9	0.7	0.5
Total Aluminum (mg/L) Average Monthly	0.3	0.2	0.7	0.3	0.3	0.3	0.3	0.30	0.3	0.2	0.2	0.1
Total Aluminum (mg/L) Daily Maximum	0.326	0.527	0.8	0.346	0.406	0.49	0.576	0.448	0.34	0.35	0.3	0.19
Total Iron (lbs/day) Average Monthly	< 0.2	< 0.2	< 0.1	0.2	0.3	< 0.2	< 0.2	0.3	0.3	0.3	0.3	0.48
Total Iron (lbs/day) Daily Maximum	< 0.2	< 0.3	< 0.1	0.2	0.3	< 0.3	< 0.3	0.3	0.3	0.3	0.4	0.95
Total Iron (mg/L) Average Monthly	< 0.1	< 0.1	< 0.2	0.1	0.1	< 0.1	< 0.1	0.1	0.1	0.1	0.1	0.1

Parameter	FEB-24	JAN-24	DEC-23	NOV-23	OCT-23	SEP-23	AUG-23	JUL-23	JUN-23	MAY-23	APR-23	MAR-23
Total Iron (mg/L) Daily Maximum	< 0.1	< 0.1	< 0.2	0.1	0.1	0.222	< 0.1	0.1	0.1	0.1	0.2	0.18
Total Manganese (lbs/day) Average Monthly	0.2	0.5	0.1	0.2	0.1	0.09	0.3	0.1	0.06	0.2	0.07	0.2
Total Manganese (lbs/day) Daily Maximum	0.2	1	0.22	0.3	0.09	0.10	0.7	0.2	0.07	0.8	0.1	0.08
Total Manganese (mg/L) Average Monthly	0.1	0.2	0.3	0.1	0.03	0.04	0.1	0.05	0.02	0.03	0.03	0.03
Total Manganese (mg/L) Daily Maximum	0.105	0.439	0.5	0.118	0.053	0.05	0.276	0.08	0.029	0.06	0.04	0.057

Existing Permit Requirements

A table below summarizes effluent limits and monitoring requirements specified in the existing permit renewal.

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) (1)		Concentrations (mg/L)				Minimum (2) Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	9.0	XXX	1/day	Grab
Total Residual Chlorine (TRC)	XXX	XXX	XXX	Report	XXX	Report	1/week	Grab
Total Suspended Solids	Report	Report	XXX	30.0	60.0	75	1/week	24-Hr Composite
Aluminum, Total	Report	Report	XXX	4.0	8.0	10	1/week	24-Hr Composite
Iron, Total	Report	Report	XXX	2.0	4.0	5	1/week	24-Hr Composite
Manganese, Total	Report	Report	XXX	1.0	2.0	2.5	1/week	24-Hr Composite

Development of Effluent Limitations and Monitoring Requirements

Outfall No. 001 **Design Flow (MGD)** 0.30
Latitude 40º 13' 34.98" **Longitude** -77º 11' 25.99"
Wastewater Description: IW Process Effluent without ELG

Technology-Based Limitations

DEP's technical guidance no. 362-2183-003 addresses technology-based control requirements along with the following recommended Best Practicable Control Technology Currently Available (BPT) effluent requirements for water treatment plant sludge and filter backwash:

Parameter	Limit (mg/l)	SBC
Suspended Solids	30	Average Monthly
	60	Daily Maximum
Iron, Total	2.0	Average Monthly
	4.0	Daily Maximum
Aluminum, Total	4.0	Average Monthly
	8.0	Daily Maximum
Manganese, Total	1.0	Average Monthly
	2.0	Daily Maximum
Flow	Monitor	Average Monthly
pH	6.0	Minimum
	9.0	Maximum
Total Residual Chlorine	0.5	Average Monthly
	1.0	Daily Maximum

These requirements apply, subject to water quality analysis and/or BPJ.

Water Quality-Based Limitations

DEP's SOP no. BPNPSM-PMT-032 recommends the average monthly flow as a design flow in water quality modeling unless a different flow is determined to be more representative of conditions. According to the application, the average flow discharged from this facility during operation is 0.291 MGD with maximum of 0.510 MGD. Based on additional flow data provided to DEP, the average of 0.294 MGD was determined for the last three (3) years with the maximum of 0.344 MGD. Based on the review, DEP determined that 0.30 MGD is a reasonable flow rate to be used.

WQM 7.0
CBOD5 and NH3-N are not pollutants of concern for the water treatment waste as the discharge of these pollutants is not resulting from the water treatment process. Therefore, WQM 7.0 modeling is not necessary and permit requirements for these pollutants are not recommended.

Total Residual Chlorine
See Additional Considerations Section of this fact sheet.

Toxics
Maximum concentrations of toxic pollutants reported on the application were entered into DEP's Toxics Management Spreadsheet (TMS). TMS output shows that there are no pollutants of concern and no water quality based effluent limits are required.

Additional Considerations

Flow Monitoring
Flow monitoring will remain in the permit and is required by 40 CFR § 122.44(i)(1)(ii).

Total Residual Chlorine
In the past, Total Residual Chlorine (TRC) requirement was not included in the permit as chlorine is not used within the wastewater treatment system. However, chlorine is still used prior to filtration process. As such, DEP determined that more data is needed to properly determine the presence of TRC in effluent for this facility. The application shows 0.005 mg/L in influent but 0.04 mg/L in effluent. Also, past DMR shows TRC has been consistently detected in the effluent. Therefore,

effluent limits for TRC are needed for water quality protection under 25 Pa Code §92a.48(b). 25 Pa Code §92a.48(b)(2) requires the average monthly of 0.5 mg/L as Best Available Technology TBEL. DEP's TRC_CALC spreadsheet shows that average monthly of 0.5 mg/L is adequate for water quality protection with instantaneous maximum of 1.6 mg/L. Based on the past DMR, Carlisle is able to meet these limits; therefore, no compliance schedule will be included in the permit. The sampling frequency has changed from 1/week to daily as daily monitoring is a standard monitoring frequency for TRC (if limits are placed in the permit).

Chesapeake Bay TMDL
DEP's Supplement to Phase II Watershed Implementation Plan (WIP) indicates that monitoring and reporting of TN and TP are necessary for non-significant IW facilities throughout the permit term anytime the facility has the potential to introduce a net TN or TP increase to the load contained within the intake water used in processing. The facility does not use any chemical products prior to filtration that contain nitrogen or phosphorus and no nutrients are expected to be generated from the water treatment process. Consequently, no nutrient monitoring requirement will be included in the permit.

Mass Loading Effluent Limitations
The current permit requires no monitoring of mass loadings for those pollutants that have technology based concentration limits. DEP's technical guidance no. 362-0400-001 recommends mass loading effluent limits for those pollutants that have water quality based limits and monitoring requirements for those that have technology based concentration limits. Accordingly, mass loading monitoring requirements are recommended for Total Suspended Solids, Total Iron, Total Manganese and Total Aluminum.

Instantaneous Maximum Effluent Limitations
In general, instantaneous maximum effluent limitations (IMAX) are not necessary for any parameters that are required to be measured through the collection of composite samples. NPDES permits include IMAX limits for compliance purpose(s) only, allowing DEP to collect a grab sample at the time of inspection to determine compliance. Accordingly, these limits will remain unchanged in the draft permit.

Anti-Degradation Requirements
The effluent limits for this discharge have been developed to ensure the existing in-stream uses and the level of water quality necessary to protect the existing uses are maintained and protected. No High Quality Waters are impacted by this discharge. No Exceptional Value Waters are impacted by this discharge.

Anti-Backsliding Requirements
Unless stated otherwise in this fact sheet, permit requirements proposed in this fact sheet are at least as stringent as existing permit requirements.

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	Daily Maximum	Minimum	Average Monthly	Daily Maximum	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0 Daily Min	XXX	9.0	XXX	1/day	Grab
TRC	XXX	XXX	XXX	0.5	XXX	1.6	1/day	Grab
TSS	Report	Report	XXX	30.0	60.0	75	1/week	24-Hr Composite
Total Aluminum	Report	Report	XXX	4.0	8.0	10	1/week	24-Hr Composite
Total Iron	Report	Report	XXX	2.0	4.0	5	1/week	24-Hr Composite
Total Manganese	Report	Report	XXX	1.0	2.0	2.5	1/week	24-Hr Composite

Tools and References Used to Develop Permit	
☐	WQM for Windows Model (see Attachment)
☐	Toxics Management Spreadsheet (see Attachment)
☐	TRC Model Spreadsheet (see Attachment)
☐	Temperature Model Spreadsheet (see Attachment)
☐	Water Quality Toxics Management Strategy, 361-0100-003, 4/06.
☐	Technical Guidance for the Development and Specification of Effluent Limitations, 386-0400-001, 10/97.
☐	Policy for Permitting Surface Water Diversions, 386-2000-019, 3/98.
☐	Policy for Conducting Technical Reviews of Minor NPDES Renewal Applications, 386-2000-018, 11/96.
☐	Technology-Based Control Requirements for Water Treatment Plant Wastes, 386-2183-001, 10/97.
☐	Technical Guidance for Development of NPDES Permit Requirements Steam Electric Industry, 386-2183-002, 12/97.
☐	Pennsylvania CSO Policy, 386-2000-002, 9/08.
☐	Water Quality Antidegradation Implementation Guidance, 391-0300-002, 11/03.
☐	Implementation Guidance Evaluation & Process Thermal Discharge (316(a)) Federal Water Pollution Act, 386-2000-008, 4/97.
☐	Determining Water Quality-Based Effluent Limits, 386-2000-004, 12/97.
☐	Implementation Guidance Design Conditions, 386-2000-007, 9/97.
☐	Technical Reference Guide (TRG) WQM 7.0 for Windows, Wasteload Allocation Program for Dissolved Oxygen and Ammonia Nitrogen, Version 1.0, 386-2000-016, 6/2004.
☐	Interim Method for the Sampling and Analysis of Osmotic Pressure on Streams, Brines, and Industrial Discharges, 386-2000-012, 10/1997.
☐	Implementation Guidance for Section 95.6 Management of Point Source Phosphorus Discharges to Lakes, Ponds, and Impoundments, 386-2000-009, 3/99.
☐	Technical Reference Guide (TRG) PENTOXSD for Windows, PA Single Discharge Wasteload Allocation Program for Toxics, Version 2.0, 386-2000-015, 5/2004.
☐	Implementation Guidance for Section 93.7 Ammonia Criteria, 386-2000-022, 11/97.
☐	Policy and Procedure for Evaluating Wastewater Discharges to Intermittent and Ephemeral Streams, Drainage Channels and Swales, and Storm Sewers, 386-2000-013, 4/2008.
☐	Implementation Guidance Total Residual Chlorine (TRC) Regulation, 386-2000-011, 11/1994.
☐	Implementation Guidance for Temperature Criteria, 386-2000-001, 4/09.
☐	Implementation Guidance for Section 95.9 Phosphorus Discharges to Free Flowing Streams, 386-2000-021, 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, 386-2000-020, 10/97.
☐	Field Data Collection and Evaluation Protocol for Determining Stream and Point Source Discharge Design Hardness, 386-2000-005, 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, 386-2000-010, 3/1999.
☐	Design Stream Flows, 386-2000-003, 9/98.
☐	Field Data Collection and Evaluation Protocol for Deriving Daily and Hourly Discharge Coefficients of Variation (CV) and Other Discharge Characteristics, 386-2000-006, 10/98.
☐	Evaluations of Phosphorus Discharges to Lakes, Ponds and Impoundments, 386-3200-001, 6/97.
☐	Pennsylvania's Chesapeake Bay Tributary Strategy Implementation Plan for NPDES Permitting, 4/07.
☐	SOP:
☐	Other:

TRC_CALC

	B	C	D	E	F	G
1A						
2	**TRC EVALUATION**					
3	Input appropriate values in B4:B8 and E4:E7					
4	48.4	**= Q stream (cfs)**		0.5	**= CV Daily**	
5	0.3	**= 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)**			**=Decay Coefficient (K)**	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	**1.3.2.iii**	WLA afc = 33.287		**1.3.2.iii**	WLA cfc = 32.445
12	PENTOXSD TRG	**5.1a**	LTAMULT afc = 0.373		**5.1c**	LTAMULT cfc = 0.581
13	PENTOXSD TRG	**5.1b**	LTA_afc= 12.403		**5.1d**	LTA_cfc = 18.862
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)**

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Toxics Management Spreadsheet
Version 1.4, May 2023

Discharge Information

Instructions | Discharge | Stream

Facility: **Carlisle WTP** NPDES Permit No.: **PA0080454** Outfall No.: **001**

Evaluation Type: **Major Sewage / Industrial Waste** Wastewater Description: **Water Treatment Plant Waste**

Discharge Characteristics								
Design Flow (MGD)*	Hardness (mg/l)*	pH (SU)*	Partial Mix Factors (PMFs)				Complete Mix Times (min)	
			AFC	CFC	THH	CRL	Q_{7-10}	Q_h
0.3	162	7.3						

					0 if left blank		*0.5 if left blank*		*0 if left blank*			*1 if left blank*	
	Discharge Pollutant	Units	Max Discharge Conc		Trib Conc	Stream Conc	Daily CV	Hourly CV	Stream CV	Fate Coeff	FOS	Criteria Mod	Chem Transl
Group 1	Total Dissolved Solids (PWS)	mg/L		254									
	Chloride (PWS)	mg/L		31.8									
	Bromide	mg/L		0.2									
	Sulfate (PWS)	mg/L		16.8									
	Fluoride (PWS)	mg/L		0.2									
Group 2	Total Aluminum	µg/L		268									
	Total Antimony	µg/L		0.4									
	Total Arsenic	µg/L		1									
	Total Barium	µg/L		39									
	Total Beryllium	µg/L		0.4									
	Total Boron	µg/L		50									
	Total Cadmium	µg/L		0.1									
	Total Chromium (III)	µg/L		1									
	Hexavalent Chromium	µg/L		10									
	Total Cobalt	µg/L		1									
	Total Copper	µg/L		14									
	Free Cyanide	µg/L											
	Total Cyanide	µg/L		5									
	Dissolved Iron	µg/L		10									
	Total Iron	µg/L		14									
	Total Lead	µg/L		1									
	Total Manganese	µg/L		28									
	Total Mercury	µg/L		0.2									
	Total Nickel	µg/L		1									
	Total Phenols (Phenolics) (PWS)	µg/L		6									
	Total Selenium	µg/L		2									
	Total Silver	µg/L		1									
	Total Thallium	µg/L		0.4									
	Total Zinc	µg/L		10									
	Total Molybdenum	µg/L		1									
	Acrolein	µg/L	<										
	Acrylamide	µg/L	<										
	Acrylonitrile	µg/L	<										
	Benzene	µg/L	<										
	Bromoform	µg/L	<										

Group 3	Carbon Tetrachloride	µg/L	<										
	Chlorobenzene	µg/L											
	Chlorodibromomethane	µg/L	<										
	Chloroethane	µg/L	<										
	2-Chloroethyl Vinyl Ether	µg/L	<										
	Chloroform	µg/L	<										
	Dichlorobromomethane	µg/L	<										
	1,1-Dichloroethane	µg/L	<										
	1,2-Dichloroethane	µg/L	<										
	1,1-Dichloroethylene	µg/L	<										
	1,2-Dichloropropane	µg/L	<										
	1,3-Dichloropropylene	µg/L	<										
	1,4-Dioxane	µg/L	<										
	Ethylbenzene	µg/L	<										
	Methyl Bromide	µg/L	<										
	Methyl Chloride	µg/L	<										
	Methylene Chloride	µg/L	<										
	1,1,2,2-Tetrachloroethane	µg/L	<										
	Tetrachloroethylene	µg/L	<										
	Toluene	µg/L	<										
	1,2-trans-Dichloroethylene	µg/L	<										
	1,1,1-Trichloroethane	µg/L	<										
	1,1,2-Trichloroethane	µg/L	<										
	Trichloroethylene	µg/L	<										
	Vinyl Chloride	µg/L	<										
Group 4	2-Chlorophenol	µg/L	<										
	2,4-Dichlorophenol	µg/L	<										
	2,4-Dimethylphenol	µg/L	<										
	4,6-Dinitro-o-Cresol	µg/L	<										
	2,4-Dinitrophenol	µg/L	<										
	2-Nitrophenol	µg/L	<										
	4-Nitrophenol	µg/L	<										
	p-Chloro-m-Cresol	µg/L	<										
	Pentachlorophenol	µg/L	<										
	Phenol	µg/L	<										
	2,4,6-Trichlorophenol	µg/L	<										
Group 5	Acenaphthene	µg/L	<										
	Acenaphthylene	µg/L	<										
	Anthracene	µg/L	<										
	Benzidine	µg/L	<										
	Benzo(a)Anthracene	µg/L	<										
	Benzo(a)Pyrene	µg/L	<										
	3,4-Benzofluoranthene	µg/L	<										
	Benzo(ghi)Perylene	µg/L	<										
	Benzo(k)Fluoranthene	µg/L	<										
	Bis(2-Chloroethoxy)Methane	µg/L	<										
	Bis(2-Chloroethyl)Ether	µg/L	<										
	Bis(2-Chloroisopropyl)Ether	µg/L	<										
	Bis(2-Ethylhexyl)Phthalate	µg/L	<										
	4-Bromophenyl Phenyl Ether	µg/L	<										
	Butyl Benzyl Phthalate	µg/L	<										
	2-Chloronaphthalene	µg/L	<										
	4-Chlorophenyl Phenyl Ether	µg/L	<										
	Chrysene	µg/L	<										
	Dibenzo(a,h)Anthrancene	µg/L	<										
	1,2-Dichlorobenzene	µg/L	<										
	1,3-Dichlorobenzene	µg/L	<										
	1,4-Dichlorobenzene	µg/L	<										
	3,3-Dichlorobenzidine	µg/L	<										
	Diethyl Phthalate	µg/L	<										
	Dimethyl Phthalate	µg/L	<										
	Di-n-Butyl Phthalate	µg/L	<										
	2,4-Dinitrotoluene	µg/L	<										

	2,6-Dinitrotoluene	µg/L	<										
	Di-n-Octyl Phthalate	µg/L	<										
	1,2-Diphenylhydrazine	µg/L	<										
	Fluoranthene	µg/L	<										
	Fluorene	µg/L	<										
	Hexachlorobenzene	µg/L	<										
	Hexachlorobutadiene	µg/L	<										
	Hexachlorocyclopentadiene	µg/L	<										
	Hexachloroethane	µg/L	<										
	Indeno(1,2,3-cd)Pyrene	µg/L	<										
	Isophorone	µg/L	<										
	Naphthalene	µg/L	<										
	Nitrobenzene	µg/L	<										
	n-Nitrosodimethylamine	µg/L	<										
	n-Nitrosodi-n-Propylamine	µg/L	<										
	n-Nitrosodiphenylamine	µg/L	<										
	Phenanthrene	µg/L	<										
	Pyrene	µg/L	<										
	1,2,4-Trichlorobenzene	µg/L	<										
Group 6	Aldrin	µg/L	<										
	alpha-BHC	µg/L	<										
	beta-BHC	µg/L	<										
	gamma-BHC	µg/L	<										
	delta BHC	µg/L	<										
	Chlordane	µg/L	<										
	4,4-DDT	µg/L	<										
	4,4-DDE	µg/L	<										
	4,4-DDD	µg/L	<										
	Dieldrin	µg/L	<										
	alpha-Endosulfan	µg/L	<										
	beta-Endosulfan	µg/L	<										
	Endosulfan Sulfate	µg/L	<										
	Endrin	µg/L	<										
	Endrin Aldehyde	µg/L	<										
	Heptachlor	µg/L	<										
	Heptachlor Epoxide	µg/L	<										
	PCB-1016	µg/L	<										
	PCB-1221	µg/L	<										
	PCB-1232	µg/L	<										
	PCB-1242	µg/L	<										
	PCB-1248	µg/L	<										
	PCB-1254	µg/L	<										
	PCB-1260	µg/L	<										
	PCBs, Total	µg/L	<										
	Toxaphene	µg/L	<										
	2,3,7,8-TCDD	ng/L	<										
Group 7	Gross Alpha	pCi/L											
	Total Beta	pCi/L	<										
	Radium 226/228	pCi/L	<										
	Total Strontium	µg/L	<										
	Total Uranium	µg/L	<										
	Osmotic Pressure	mOs/kg											

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Toxics Management Spreadsheet
Version 1.4, May 2023

Stream / Surface Water Information

Carlisle WTP, NPDES Permit No. PA0080454, Outfall 001

Instructions | Discharge | *Stream*

Receiving Surface Water Name: **Conodoguinek Creek**

No. Reaches to Model: **1**

- (●) Statewide Criteria
- ( ) Great Lakes Criteria
- ( ) ORSANCO Criteria

Location	Stream Code*	RMI*	Elevation (ft)*	DA (mi^2)*	Slope (ft/ft)	PWS Withdrawal (MGD)	Apply Fish Criteria*
Point of Discharge	010194	35.95	401	384			Yes
End of Reach 1	010194	33.81	395	388			Yes

$Q_{7\text{-}10}$

Location	RMI	LFY (cfs/mi^2)*	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness*	pH*	Hardness	pH
Point of Discharge	35.95	0.1										210	7		
End of Reach 1	33.81	0.1													

Q_h

Location	RMI	LFY (cfs/mi^2)	Flow (cfs)		W/D Ratio	Width (ft)	Depth (ft)	Velocity (fps)	Travel Time (days)	Tributary		Stream		Analysis	
			Stream	Tributary						Hardness	pH	Hardness	pH	Hardness	pH
Point of Discharge	35.95														
End of Reach 1	33.81														

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Toxics Management Spreadsheet
Version 1.4, May 2023

Model Results

Carlisle WTP, NPDES Permit No. PA0080454, Outfall 001

Instructions | Results | RETURN TO INPUTS | SAVE AS PDF | PRINT | ◉ All ○ Inputs ○ Results ○ Limits

☐ ***Hydrodynamics***

☑ ***Wasteload Allocations***

☑ ***AFC*** CCT (min): 15 PMF: 0.150 Analysis Hardness (mg/l): 206.42 Analysis pH: 7.02

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	750	750	10,053	
Total Antimony	0	0		0	1,100	1,100	14,745	
Total Arsenic	0	0		0	340	340	4,557	Chem Translator of 1 applied
Total Barium	0	0		0	21,000	21,000	281,490	
Total Boron	0	0		0	8,100	8,100	108,575	
Total Cadmium	0	0		0	4.072	4.46	59.7	Chem Translator of 0.914 applied
Total Chromium (III)	0	0		0	1031.513	3,264	43,755	Chem Translator of 0.316 applied
Hexavalent Chromium	0	0		0	16	16.3	218	Chem Translator of 0.982 applied
Total Cobalt	0	0		0	95	95.0	1,273	
Total Copper	0	0		0	26.603	27.7	371	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	140.783	205	2,753	Chem Translator of 0.685 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	1.400	1.65	22.1	Chem Translator of 0.85 applied
Total Nickel	0	0		0	864.456	866	11,611	Chem Translator of 0.998 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	Chem Translator of 0.922 applied
Total Silver	0	0		0	11.189	13.2	176	Chem Translator of 0.85 applied
Total Thallium	0	0		0	65	65.0	871	
Total Zinc	0	0		0	216.542	221	2,968	Chem Translator of 0.978 applied

☑ ***CFC*** CCT (min): ###### PMF: 1 Analysis Hardness (mg/l): 209.43 Analysis pH: 7.00

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	220	220	18,423	
Total Arsenic	0	0		0	150	150	12,561	Chem Translator of 1 applied
Total Barium	0	0		0	4,100	4,100	343,337	
Total Boron	0	0		0	1,600	1,600	133,985	
Total Cadmium	0	0		0	0.411	0.47	39.2	Chem Translator of 0.878 applied
Total Chromium (III)	0	0		0	135.778	158	13,221	Chem Translator of 0.86 applied
Hexavalent Chromium	0	0		0	10	10.4	870	Chem Translator of 0.962 applied
Total Cobalt	0	0		0	19	19.0	1,591	
Total Copper	0	0		0	16.843	17.5	1,469	Chem Translator of 0.96 applied
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	1,500	1,500	125,611	WQC = 30 day average; PMF = 1
Total Lead	0	0		0	5.571	8.15	683	Chem Translator of 0.683 applied
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	0.770	0.91	75.9	Chem Translator of 0.85 applied
Total Nickel	0	0		0	97.197	97.5	8,164	Chem Translator of 0.997 applied
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	4.600	4.99	418	Chem Translator of 0.922 applied
Total Silver	0	0		0	N/A	N/A	N/A	Chem Translator of 1 applied
Total Thallium	0	0		0	13	13.0	1,089	
Total Zinc	0	0		0	221.006	224	18,770	Chem Translator of 0.986 applied

☑ ***THH*** CCT (min): ###### PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	500,000	500,000	N/A	
Chloride (PWS)	0	0		0	250,000	250,000	N/A	
Sulfate (PWS)	0	0		0	250,000	250,000	N/A	
Fluoride (PWS)	0	0		0	2,000	2,000	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	5.6	5.6	469	
Total Arsenic	0	0		0	10	10.0	837	
Total Barium	0	0		0	2,400	2,400	200,978	
Total Boron	0	0		0	3,100	3,100	259,596	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	0	0		0	N/A	N/A	N/A	

Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	300	300	25,122	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	1,000	1,000	83,741	
Total Mercury	0	0		0	0.050	0.05	4.19	
Total Nickel	0	0		0	610	610	51,082	
Total Phenols (Phenolics) (PWS)	0	0		0	5	5.0	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	N/A	N/A	N/A	
Total Thallium	0	0		0	0.24	0.24	20.1	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***CRL*** CCT (min): ###### PMF: 1 Analysis Hardness (mg/l): N/A Analysis pH: N/A

Pollutants	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)	Comments
Total Dissolved Solids (PWS)	0	0		0	N/A	N/A	N/A	
Chloride (PWS)	0	0		0	N/A	N/A	N/A	
Sulfate (PWS)	0	0		0	N/A	N/A	N/A	
Fluoride (PWS)	0	0		0	N/A	N/A	N/A	
Total Aluminum	0	0		0	N/A	N/A	N/A	
Total Antimony	0	0		0	N/A	N/A	N/A	
Total Arsenic	0	0		0	N/A	N/A	N/A	
Total Barium	0	0		0	N/A	N/A	N/A	
Total Boron	0	0		0	N/A	N/A	N/A	
Total Cadmium	0	0		0	N/A	N/A	N/A	
Total Chromium (III)	0	0		0	N/A	N/A	N/A	
Hexavalent Chromium	0	0		0	N/A	N/A	N/A	
Total Cobalt	0	0		0	N/A	N/A	N/A	
Total Copper	0	0		0	N/A	N/A	N/A	
Dissolved Iron	0	0		0	N/A	N/A	N/A	
Total Iron	0	0		0	N/A	N/A	N/A	
Total Lead	0	0		0	N/A	N/A	N/A	
Total Manganese	0	0		0	N/A	N/A	N/A	
Total Mercury	0	0		0	N/A	N/A	N/A	
Total Nickel	0	0		0	N/A	N/A	N/A	
Total Phenols (Phenolics) (PWS)	0	0		0	N/A	N/A	N/A	
Total Selenium	0	0		0	N/A	N/A	N/A	
Total Silver	0	0		0	N/A	N/A	N/A	
Total Thallium	0	0		0	N/A	N/A	N/A	
Total Zinc	0	0		0	N/A	N/A	N/A	

☑ ***Recommended WQBELs & Monitoring Requirements***

No. Samples/Month: 4

Pollutants	*Mass Limits*		*Concentration Limits*				Governing WQBEL	WQBEL Basis	Comments
	AML (lbs/day)	MDL (lbs/day)	AML	MDL	IMAX	Units			

☑ ***Other Pollutants without Limits or Monitoring***

The following pollutants do not require effluent limits or monitoring based on water quality because reasonable potential to exceed water quality criteria was not determined and the discharge concentration was less than thresholds for monitoring, or the pollutant was not detected and a sufficiently sensitive analytical method was used (e.g., <= Target QL).

Pollutants	Governing WQBEL	Units	Comments
Total Dissolved Solids (PWS)	N/A	N/A	PWS Not Applicable
Chloride (PWS)	N/A	N/A	PWS Not Applicable
Bromide	N/A	N/A	No WQS
Sulfate (PWS)	N/A	N/A	PWS Not Applicable
Fluoride (PWS)	N/A	N/A	PWS Not Applicable
Total Aluminum	6,444	µg/L	Discharge Conc ≤ 10% WQBEL
Total Antimony	469	µg/L	Discharge Conc ≤ 10% WQBEL
Total Arsenic	837	µg/L	Discharge Conc ≤ 10% WQBEL
Total Barium	180,424	µg/L	Discharge Conc ≤ 10% WQBEL
Total Beryllium	N/A	N/A	No WQS
Total Boron	69,592	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cadmium	38.3	µg/L	Discharge Conc ≤ 10% WQBEL
Total Chromium (III)	13,221	µg/L	Discharge Conc ≤ 10% WQBEL
Hexavalent Chromium	140	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cobalt	816	µg/L	Discharge Conc ≤ 10% WQBEL
Total Copper	238	µg/L	Discharge Conc ≤ 10% WQBEL
Total Cyanide	N/A	N/A	No WQS
Dissolved Iron	25,122	µg/L	Discharge Conc ≤ 10% WQBEL
Total Iron	125,611	µg/L	Discharge Conc ≤ 10% WQBEL
Total Lead	683	µg/L	Discharge Conc ≤ 10% WQBEL
Total Manganese	83,741	µg/L	Discharge Conc ≤ 10% WQBEL
Total Mercury	4.19	µg/L	Discharge Conc ≤ 10% WQBEL
Total Nickel	7,442	µg/L	Discharge Conc ≤ 10% WQBEL
Total Phenols (Phenolics) (PWS)		µg/L	PWS Not Applicable
Total Selenium	418	µg/L	Discharge Conc ≤ 10% WQBEL
Total Silver	113	µg/L	Discharge Conc ≤ 10% WQBEL
Total Thallium	20.1	µg/L	Discharge Conc ≤ 10% WQBEL
Total Zinc	1,902	µg/L	Discharge Conc ≤ 10% WQBEL

Total Molybdenum	N/A	N/A		No WQS