pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOUTHCENTRAL REGIONAL OFFICE
CLEAN WATER PROGRAM

Application Type	**Renewal**	Application No.	**PA0020893**
Facility Type	**Municipal**	APS ID	**18317**
Major / Minor	**Major**	Authorization ID	**937210**

NPDES PERMIT FACT SHEET
INDIVIDUAL SEWAGE

Applicant and Facility Information

Applicant Name	**Manheim Borough Authority**	Facility Name	**Manheim STP**
Applicant Address	18 E High Street	Facility Address	Rettew Lane
	Manheim, PA 17545-1505		Manheim, PA 17545
Applicant Contact	David Fenicle	Facility Contact	David Fenicle
Applicant Phone	(717) 665-2461	Facility Phone	(717) 665-2737
Client ID	36960	Site ID	451759
Ch 94 Load Status	Not Overloaded	Municipality	Manheim Borough
Connection Status	No Limitations	County	Lancaster
Date Application Received	August 2, 2012	EPA Waived?	No
Date Application Accepted	August 10, 2012	If No, Reason	Major Facility, Significant CB Discharge
Purpose of Application	NPDES Renewal.		

Summary of Review

- Certain effluent limitations are more stringent primarily due to increased annual design flow from 1.14 MGD to 2.3 MGD and reducing TRC discharge demand to 0.
- Monitoring requirement for copper, aluminum and zinc since effluent levels are > than 10% of WQBEL.
- Whole effluent toxicity units for *Ceriodaphnia dubia* and testing including *Pimephales promelas* starting upon issuance.
- Continued CBTS cap load at present levels while listing TN offsets separate from base cap load.
- Stormwater requirements including annual inspection.
- PART C condition for TRC compliance schedule.
- Added condition to Chesapeake Bay section limiting purchase of phosphorus credits for any phosphorus loading that is in excess of the Bay Cap Load up to the Chickies Creek TMDL annual load of 6,547.4 lbs/year.
- Offsets for hauled-in septage not granted.

Approve	Deny	Signatures	Date
X		Martin L. Ferry, P.E. / Environmental Engineer	September 26, 2013
		Jay E. Patel, P.E. / Environmental Engineer Manager	

Discharge, Receiving Waters and Water Supply Information			
Outfall No.	001	Design Flow (MGD)	2.3
Latitude	40° 9’ 9.61”	Longitude	76° 24’ 16.25”
Quad Name	Manheim	Quad Code	1734
Wastewater Description:	Treated Sewage		
Receiving Waters	Chickies Creek	Stream Code	07917
NHD Com ID	57462741	RMI	18
Drainage Area	34	Yield (cfs/mi^2)	0.1198
Q_{7-10} Flow (cfs)	4.07	Q_{7-10} Basis	USGS 01576500
Elevation (ft)	93.660 m	Slope (ft/ft)	
Watershed No.	7-G	Chapter 93 Class.	WWF, MF
Existing Use	WWF, MF	Existing Use Qualifier	
Exceptions to Use		Exceptions to Criteria	
Assessment Status	Impaired		
Cause(s) of Impairment	Siltation		
Source(s) of Impairment	Agriculture		
TMDL Status	Final, 04/09/2001	Name	Chickies Creek TMDL
Nearest Downstream Public Water Supply Intake	Columbia Borough		
PWS Waters	Susquehanna River	Flow at Intake (cfs)	2433
PWS RMI	42.83	Distance from Outfall (mi)	20

Changes Since Last Permit Issuance: Construction of BNR plant with annual average & maximum month design flow of 2.3 MGD.

Other Comments: None

Streamflow

USGS gage 01576500 on Conestoga River at Lancaster lists the following flows:

Q_{7-10} runoff rate = (38.56)/ 322 = .1198 cfs/sq.mi.

Q_{30-10}:Q_{7-10} = 49.13/38.56 = 1.274:1

Q_{1-10}:Q_{7-10} = 27.22/38.56 = 0.7059:1

Q_{7-10} = .0.1198 *34 = 4.073 cfs

Treatment Facility Summary

Treatment Facility Name: Manheim STP

WQM Permit No.	Issuance Date
3608408	2/20/09

Waste Type	Degree of Treatment	Process Type	Disinfection	Avg Annual Flow (MGD)
Sewage	Secondary With Total Nitrogen Reduction	Oxidation Ditch	Gas Chlorine	2.300000

Hydraulic Capacity (MGD)	Organic Capacity (lbs/day)	Load Status	Biosolids Treatment	Biosolids Use/Disposal
2.30000	6253.00	Not Overloaded	Combination	Combination of methods

A WQM amendment is in house for digester changes regarding mixing and aeration.

Changes Since Last Permit Issuance: BNR plant upgrade was placed in service in 2011 with:

1 – muffin monster
1 – barscreen
2 – oxidation ditches
4 – secondary clarifiers
2 – chlorine contact tanks
3 – facultative digesters
1 – belt filter press
1 – sludge storage pad

Ferric chloride for phosphorus removal, polymer for sludge thickening, gas chlorine for disinfection

Existing trickling filter, primary clarifiers and nitrification towers were abandoned in place.

Other Comments: None

Compliance History

DMR Data for Outfall 001 (from January 1, 2013 to July 31, 2013)

Parameter	Jan 13	Feb 13	Mar 13	Apr 13	May 13	Jun 13	Jul 13					
Flow (MGD) Average Monthly	1.2566	1.3652	1.3	.938	.7798	0.883	0.8078					
Flow (MGD) Daily Maximum	3.3475	2.3535	1.5	1.232	1.0508	1.3225	1.6716					
pH (S.U.) Maximum	8.23	7.81	7.66	7.79	7.6	7.52	7.69					
pH (S.U.) Minimum	7.41	7.33	7.26	7.21	7.3	7.27	7.25					
DO (mg/L) Minimum	9.67	10.02	9.33	5.98	5.8	7.42	7.00					
TRC (mg/L) Average Monthly	.32	.33	.32	.38	.34	0.31	0.28					
TRC (mg/L) IMAX	.62	.72	.68	.68	.81	0.79	0.65					
CBOD5 (lbs/day) Average Monthly	27	< 22	< 46	< 17	< 14	< 16	< 21					
CBOD5 (lbs/day) Weekly Average	37	< 24	< 114	< 26	< 16	< 22	< 14					
CBOD5 (mg/L) Average Monthly	2	< 2	< 4	< 2	< 2	< 2	< 2					
CBOD5 (mg/L) Weekly Average	3	< 2	< 9	< 3	< 2	< 2	< 2					
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	983	1073	1898	1369	841	877	943					
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	2291	163	3311	3766	2589	1951	2719					
BOD5 (mg/L) Raw Sewage Influent Average Monthly	91	102	161	169	120	113	124					
TSS (lbs/day) Average Monthly	238	< 108	< 103	76	< 164	< 103	< 54					
TSS (lbs/day) Raw Sewage Influent Average Monthly	1338	1524	2694	3008	1910	2351	2118					
TSS (lbs/day) Raw Sewage Influent Daily Maximum	3505	2147	5963	7850	4610	7121	7180					

Parameter	Jan 13	Feb 13	Mar 13	Apr 13	May 13	Jun 13	Jul 13					
TSS (lbs/day) Weekly Average	547	146	134	123	508	245	100					
TSS (mg/L) Average Monthly	17	< 10	< 9	< 10	< 25	< 13	< 7					
TSS (mg/L) Raw Sewage Influent Average Monthly	129	144	237	371	272	298	276					
TSS (mg/L) Weekly Average	23	12	12	< 18	78	28	9					
Fecal Coliform (CFU/100 ml) Geometric Mean	193	68	62	14	30	15	< 15					
Nitrate-Nitrite (mg/L) Average Monthly	8.1	8.8	6.1	< 5	< .61	2.4	6					
Nitrate-Nitrite (lbs) Total Monthly	2891	2628	2260	< 150	< 128	584	1266					
Total Nitrogen (mg/L) Average Monthly	9.2	< 11.2	< 11.1	< 2.2	2.09	< 3.81	< 7					
Total Nitrogen (lbs) Effluent Net Total Monthly	3366	< 3376	4036	< 514	< 437	918	1502					
Total Nitrogen (lbs) Total Monthly	3366	3376	4036	< 514	< 437	918	1502					
Ammonia (lbs/day) Average Monthly	0.9	< 4	< 4	< 1	< 1	0.9	< 1					
Ammonia (mg/L) Average Monthly	.085	< .378	< 0.349	< .136	< .211	< .11	< 0.139					
Ammonia (lbs) Total Monthly	28	< 114	< 118	< 31	< 42	< 26	< 30					
TKN (mg/L) Average Monthly	1.2	< 27	< 4.9	< 1.6	< 1.5	< 1.4	< 1.1					
TKN (lbs) Total Monthly	475	< 748	< 1776	< 364	< 309	< 334	< 236					
Total Phosphorus (lbs/day) Average Monthly	8	< 6	10	3	2	3	< 1					
Total Phosphorus (mg/L) Average Monthly	.58	< .59	0.87	.34	.36	0.42	< 0.22					
Total Phosphorus (lbs) Effluent Net Total Monthly	245	< 180	308	82	75	102	< 45					
Total Phosphorus (lbs) Total Monthly	245	< 180	308	82	75	102	< 45					

DMR Data for Outfall 001 (from January 1, 2012 to December 31, 2012)

Parameter	Jan 12	Feb 12	Mar 12	Apr 12	May 12	Jun 12	Jul 12	Aug 12	Sep 12	Oct 12	Nov 12	Dec 12
Flow (MGD) Average Monthly	1.132	1.012	0.939	.6827	0.8434	1.0879	.6369	0.6541	0.78	1.2988	1.2295	1.1505
Flow (MGD) Daily Maximum	2.52	2.52	1.38	1.0301	1.4706	2.4753	1.4655	0.9739	1.4	4.3553	2.8088	2.1813
pH (S.U.) Maximum	7.8	7.64	7.68	7.67	7.73	7.4	7.56	7.92	7.8	7.68	7.98	7.83
pH (S.U.) Minimum	7.31	7.18	7.09	7.18	7.38	7.28	7.2	7.32	7.3	7.28	7.17	7.35
DO (mg/L) Minimum	9.62	9.66	9.26	8.88	7.42	7.34	6.55	6.25	7.2	8.41	9.76	8.62
TRC (mg/L) Average Monthly	.32	.31	0.31	0.33	0.2	.24	0.26	0.11	.38	.36	.3	.11
TRC (mg/L) IMAX	.56	.43	.51	0.89	0.4	0.44	0.97	0.4	1.3	.68	0.5	.75
CBOD5 (lbs/day) Average Monthly	25	17	23	29	< 2	21	< 12	< 12	< 15	< 153	> 25	20
CBOD5 (lbs/day) Weekly Average	28	31	48	18	< 2	55	< 17	72	< 20	< 439	34	32
CBOD5 (mg/L) Average Monthly	3	2	3	3	< 16	2	< 2	< 2	< 2	< 14	> 2	< 2
CBOD5 (mg/L) Weekly Average	3.2	2.1	5.1	4.6	< 22	5.2	< 2	< 2.6	< 2	< 35	3	< 2
BOD5 (lbs/day) Raw Sewage Influent Average Monthly	1007	1351	1357	1627	563	1522	1188	1206	1230	1542	1265	1162
BOD5 (lbs/day) Raw Sewage Influent Daily Maximum	2718	3097	3821	3501	4178	2154	2506	2053	2670	4396	4620	3455
BOD5 (mg/L) Raw Sewage Influent Average Monthly	115	200	187	296	282	192	200	207	165	115	140	98
TSS (lbs/day) Average Monthly	99	64	54	81	10	105	88	55	101	536	< 159	165
TSS (lbs/day) Raw Sewage Influent Average Monthly	1676	2365	1574	2657	5434	1904	2208	2672	2222	3042	3438	1205
TSS (lbs/day) Raw Sewage Influent Daily Maximum	4601	5990	3783	4737	6682	3156	5515	6024	7651	7421	19250	4994
TSS (lbs/day) Weekly Average	171	119	72	98	14	128	173	99	130	1345	211	458

Parameter	Jan 12	Feb 12	Mar 12	Apr 12	May 12	Jun 12	Jul 12	Aug 12	Sep 12	Oct 12	Nov 12	Dec 12
TSS (mg/L) Average Monthly	11	8	7	15	82	13	14	< 10	14	43	< 11	14
TSS (mg/L) Raw Sewage Influent Average Monthly	194	337	222	503	681	254	402	471	280	261	417	100
TSS (mg/L) Weekly Average	22	9	12	18	144	17	28	18	18	107	17	27
Fecal Coliform (CFU/100 ml) Geometric Mean	18	12	4	18	21	15	23	895	9	92	190	41
Nitrate-Nitrite (mg/L) Average Monthly	8.4	10.6	9.8	10.3	1.7	4.4	4.8	5.1	4.6	8	7.9	8.32
Nitrate-Nitrite (lbs) Total Monthly	2554	2288	2310	1669	13	39	1017	3.1	< 45	88	83	2263
Total Nitrogen (mg/L) Average Monthly	10	11.7	11	11.9	< 2.8	< 49	6	6.3	5.9	< 10.3	< 9	< 9.75
Total Nitrogen (lbs) Effluent Net Total Monthly	3018	2537	2615	1939	< 685	1467	1257	1158	< 1359	< 3718	3005	2734
Total Nitrogen (lbs) Total Monthly	3018	2537	2615	1939	< 22	49	41	37	< 45	< 120	97	2734
Ammonia (lbs/day) Average Monthly	1	1	0.8	0.6	< 0.8	< 1	5	< 0.6	0.9	< 9	< 3	1
Ammonia (mg/L) Average Monthly	0.1	.142	0.1	0.111	.098	0.111	.818	< 0.1	.124	< .394	< 0.201	< .119
Ammonia (lbs) Total Monthly	32	32	24	18	< 0.8	< 1	158	< 18	< 0.9	< 9	< 3	< 35
TKN (mg/L) Average Monthly	1.6	1.1	1.2	1.6	< 1.1	1.2	1.2	< 1.1	1.3	< 1.4	< 1.2	< 1.4
TKN (lbs) Total Monthly	465	249	305	270	< 9	> 9	240	< 1.1	< 11	< 22	14	< 471
Total Phosphorus (lbs/day) Average Monthly	11	6	11	11	5	9	4	3	4	< 7	7	6
Total Phosphorus (mg/L) Average Monthly	1.11	.67	1.43	1.87	0.64	1.05	0.74	0.48	.59	< .48	.68	0.5
Total Phosphorus (lbs) Effluent Net Total Monthly	328	168	332	322	158	256	137	86	< 131	< 215	221	177
Total Phosphorus (lbs) Total Monthly	328	168	332	322	5	9	4	3	< 4	< 7	7	177

Compliance History

Effluent Violations for Outfall 001

Parameter	Date	SBC	DMR Value	Units	Limit Value	Units
TSS	08/13[13]	Wkly Avg	630	lbs/day	428	lbs/day
TSS	05/13[12]	Wkly Avg	508	lbs/day	428	lbs/day
TSS	05/13[12]	Wkly Avg	78	mg/L	45	mg/L
TSS	01/13	Wkly Avg	547	lbs/day	428	lbs/day
TSS	12/12	Wkly Avg	458	lbs/day	428	lbs/day
CBOD5	10/12	Wkly Avg	439	lbs/day	380	lbs/day
TSS	10/12	Avg Mo	536	lbs/day	285	lbs/day
TSS	10/12	Wkly Avg	1345	lbs/day	428	lbs/day
TSS	10/12	Avg Mo	43	mg/L	30	mg/L
TSS	10/12	Wkly Avg	107	mg/L	45	mg/L
Fecal Coliform	08/12[11]	Geo Mean	895	CFU/100 ml	200	CFU/100 ml
TSS	05/12	Avg Mo	82	mg/L	30	mg/L
TSS	05/12	Wkly Avg	144	mg/L	45	mg/L
TSS	1/11[1]	Avg Mo	39	mg/L	30	mg/L
TSS	1/11[1]	Wkly Avg	58	mg/L	45	mg/L
NH3-N	1/11[1]	Avg Mo	13.9	mg/L	12	mg/L
CBOD5	1/11[1]	Avg Mo	124	mg/L	25	mg/L
CBOD5	1/11[1]	Wkly Avg	267	mg/L	40	mg/L
CBOD5	1/11[1]	Avg Mo	650	lbs/day	238	lbs/day
CBOD5	1/11[1]	Wkly Avg	1385	lbs/day	380	lbs/day
Phosphorus	3/11[2]	Avg Mo	23	lbs/day	19	lbs/day
Phosphorus	4/11[3]	Avg Mo	20	lbs/day	19	lbs/day
Phosphorus	6/11[4]	Avg Mo	21	lbs/day	19	lbs/day
Phosphorus	6/11[4]	Avg Mo	2.2	mg/L	2.0	mg/L
TSS	7/11[5]	Avg Mo	3.85	mg/L	2.0	mg/L
Fecal Coliform	9/11[6]	Geo Mean	331	CFU/100 ml	200	CFU/100 ml
CBOD5	9/11[6]	Avg Mo	251	lbs	238	lbs
CBOD5	9/11[6]	Avg Mo	44	lbs	238	lbs
NH3-N	10/10[7]	Avg Mo	4.8	mg/l	4.0	mg/L
CBOD5	10/10[7]	Avg Mo	39	mg/L	25	mg/L
CBOD5	10/10[7]	Wkly Avg	63	mg/L	40	mg/L
TRC	10/10[7]	Avg Mo	.52	mg/L	.46	mg/L
CBOD5	11/10[8]	Wkly Avg	49	mg/L	40	mg/L
CBOD5	12/10[9]	Avg Mo	73	mg/L	25	mg/L
CBOD5	12/10[9]	Wkly Avg	214	mg/L	40	mg/L
CBOD5	12/10[9]	Avg Mo	537	lbs	238	lbs
CBOD5	12/10[9]	Wkly Avg	1521	lbs	380	lbs
TSS	3/09[10]	Avg Mo	32	mg/L	30	mg/L
TSS	3/09[10]	Wkly Avg	46	mg/L	45	mg/L

(1) Transition between old and new process (oxidation ditch)
(2) High flows 5.34” rain during month
(3) High flows 5.29” rain during month
(4) Mixers in ditch removed for repairs
(5) O_2 ditch mixers out for repair
(6) Flooding took out ditch mixers and rotors, pups down several hours
(7) Transition from old process to new, temporary flow path
(8) Dewatering O_2 ditch after testing
(9) Cold weather & construction changes
(10) Cleaning trickling filter released TSS
(11) Chlorination malfunction, Pump station t-6 float malfunction, sewage released, no stream impact
(12) Unkown
(13) High flow/rain

If a footnote is not listed for a violation date, the Non-Compliance Report Form was not submitted

Hauled-In Waste

August 2013 – 1.4 MG Municipal, 0.113 MG residual
July 2013 – 1.414 MG Municipal
May 2013 – 1.744 MG Municipal, 0.177 MG residual
January 2013 – 0.626 MG Municipal, 0.189 MG residual
December 2012 - ~1 MG Municipal

Summary of Inspections

4/3,4/2013 – A return line on a clarifier had clogged overnight causing plant upset & is now operable, noticed accumulation of solids around outfall, observed solids in stream along bank, recommended septage/hauled-in waste not be accepted until plant recovers and during future upsets, recommended solids be removed from stream ASAP. Sampling on 4/4/2013 resulted in TSS of 92 mg/l that exceeded field limit of 60 mg/l.
7/18/2012 – Operation looks good, effluent clear, compliance with field conditions
9/26/2011 – BNR upgrade complete, units operating properly, effluent clear, flood damage, operators able to get STP back on-line w/o major or permanent damage, compliance with field limits
8/11/2010 – Construction progressing, units operating properly, effluent clear, compliance with field conditions
4/8/2009 – Operation looks good; units appear to operate properly, effluent clear, compliance with field conditions

Notice of Violations

As a result of the April 3 & 4, 2013 inspection, a NOV dated 4/8/2013 was sent to Mr. David Fenicle reporting following violations:

- Discharge of inadequately treated wastewater to Waters of the Commonwealth
- Failure to immediately report treatment plant upset

Development of Effluent Limitations

Outfall No. 001 **Design Flow (MGD)** 2.3
Latitude 40° 9' 14" **Longitude** 76° 24' 18"
Wastewater Description: Treated Sewage

Technology-Based Limitations

The following technology-based limitations apply, subject to water quality analysis and BPJ where applicable:

Pollutant	Limit (mg/l)	SBC	Federal Regulation	State Regulation
$CBOD_5$	25	Average Monthly	133.102(a)(4)(i)	92a.47(a)(1)
	40	Average Weekly	133.102(a)(4)(ii)	92a.47(a)(2)
Total Suspended Solids	30	Average Monthly	133.102(b)(1)	92a.47(a)(1)
	45	Average Weekly	133.102(b)(2)	92a.47(a)(2)
pH	6.0 – 9.0 S.U.	Min – Max	133.102(c)	95.2(1)
Fecal Coliform (5/1 – 9/30)	200 / 100 ml	Geo Mean	-	92a.47(a)(4)
Fecal Coliform (5/1 – 9/30)	1,000 / 100 ml	IMAX	-	92a.47(a)(4)
Fecal Coliform (10/1 – 4/30)	2,000 / 100 ml	Geo Mean	-	92a.47(a)(5)
Fecal Coliform (10/1 – 4/30)	10,000 / 100 ml	IMAX	-	92a.47(a)(5)
Total Residual Chlorine	0.5	Average Monthly	-	92a.48(b)(2)

Comments: None

Water Quality-Based Limitations

The following limitations were determined through water quality modeling (output files attached):

Parameter	Limit (mg/l)	SBC	Model
$CBOD_5$ (5/1 – 10/31)	20	Average Monthly	WQM 7.0
NH_3-N (5/1 – 10/31)	2.8	Average Monthly	WQM 7.0
NH_3-N (11/1 – 4/30)	8.4	Average Monthly	WQM 7.0
TRC	0.17	Average Monthly	TRC Spreadsheet
TRC	0.57	IMAX	TRC Spreadsheet
Copper	Monitor	Average Monthly	Pentoxsd & SOP
Aluminum	Monitor	Average Monthly	Pentoxsd & SOP
Zinc	Monitor	Average Monthly	Pentoxsd & SOP
Ceriodaphnia dubia	2.13 (TU)	Each Test	WETT

Comments: None

Additional Considerations

WQM Modeling

WQM 7.0 was used to model effluent limitations for $CBOD_5$ and NH_3-N using following data:

STP pH (NW Lancaster)	7.2	(July – September)
STP PH (Manheim)	7.4	(July – September) 2011 & 2012 with new plant
STP Temperature	20° C	(default)
Stream Temperature	20° C	(WQN station on Chickies Creek, July – Sept)
Stream pH	7.85	(WQN station on Chickies Creek, July – Sept)

The attached printout of the WQM model results indicate limits of 20 mg/l $CBOD_5$ and 2.8 mg/l NH_3-N for Manheim Borough protect water quality standards during the summer season. The $CBOD_5$ limit may be written at 25 mg/l during winter season in accordance with DEP guidance for seasonal effluent limitations. Reaeration rates and travel times were applied from the previous renewal using data from stream surveys conducted by Jim Miller during 1991 and 1995. These limits are more stringent than the existing permit because the design flow at Manheim Borough increased from 1.14 MGD to 2.3 MGD. The 2012 eDMRs generally show compliance with these effluent limitations with exceptions listed under Compliance History.

Pentoxsd Modeling

Analysis results of Group 1 and Group 2 pollutants were used to determine metals of further concern based on the reported MDLs, effluent levels and the criteria following the SOP. The results are presented in the following screening table. Pollutants of further concern were modeled using Pentoxsd. And printouts are attached.

Screening Table

Pollutant	App. Level (max mg/l)	App. Level (avg mg/l)	Criterion (mg/l)	Further Concern	WQBEL (mg/l)	Max. App. Level >10% WQBEL
Copper	0.012	0.01	Ch 93 Equation	Yes	0.045	Yes
Zinc	0.051	0.048	Ch 93 Equation	Yes	0.370	Yes
Aluminum	0.15	0.096	0.75	Yes	1.03	Yes
Barium	0.02	0.017	2.4	No		
Boron	0.24	0.223	1.6	Yes	3.43	No
Iron, Dissolved	0.068	0.068	NA	No		
Iron, Total	0.94	0.59	NA	No		
Manganese	0.015	0.011	NA	No		

Most of the metal pollutants in in Groups 1 & 2 were reported at nondetect levels with MDLs low enough to be of no further concern.

The application levels for the four pollutants modeled are less than 50% of the WQBEL so effluent limits are not required. However, the application levels reported for copper, zinc and aluminum are greater than 10% of the WQBEL so monitoring requirements will be written following the SOP for Establishing Effluent Limitations for Individual Sewage Permits. Recommend a frequency of one/month as sufficient to provide long term data of effluent levels.

Fecal Coliform

Chapter 92a.47(a)(4) & (5) sets bacteria requirements at 200/100 ml as a geometric average and 1,000/100 ml as an instantaneous maximum from 5/1 – 9/30 and 2,000/100 ml as a geometric average and 10,000 as an instantaneous maximum from 10/1 – 4/30.

Total Residual Chlorine

The attached TRC computer printout utilizes the equations and calculations as presented in the Department's May 1, 2003 Implementation Guidance for Total Residual Chlorine (TRC) (ID No. 391-2000-015) for developing chlorine limitations. The attached printout indicates that a water quality limit of 0.17 mg/l monthly average and 0.57 mg/l instantaneous maximum are needed to prevent toxicity concerns using a Discharge Chlorine Demand of 0. The 2012 eDMRs show that Manheim Borough will not meet the TRC limit. Add PART C condition regarding TRC compliance schedule with options to do site specific studies.

Phosphorus & TMDL

Evaluations of phosphorus during previous permit renewals determined that Manheim Borough contributed greater than 0.25% of the phosphorus loading to the lower Susquehanna River and limits were required at 2.0 mg/l as a monthly average.

The 2001 Chickies Creek TMDL allocated 6,938 lbs/year of phosphorus to Manheim Borough. This allocation was reduced to 6,547.4 lbs/year in 2005 by a transfer of 390.6 lbs/year to the NW Lancaster discharge located upstream . The Bay cap load of 2,776 lbs/year is lower and controls the annual loading limit.

Chesapeake Bay Strategy

Most of the Chesapeake Bay and many of its tidal tributaries have been listed as impaired under Section 303(d) of the federal Water Pollution Control Act ("Clean Water Act"), 33 U.S.C. § 1313(d). For example, Maryland's portion of the Bay was listed in 1996 and 1998.

In 2000, Pennsylvania, EPA and other states (and Washington D.C.) entered into a cooperative agreement on a strategy for restoring the Bay's water quality by 2010. They have been working very closely to implement that strategy since then.

A key element of the strategy was the need to focus on water quality criteria. Maryland and other states with Bay tidal waters refined their water quality standards, and promulgated criteria for dissolved oxygen, water clarity and chlorophyll-a. The Maryland standards were finalized in 2005, and can be found at Code of Maryland Regulations (COMAR) §2608.02.03-3.

These changes followed EPA Guidelines issued in 2003, the *Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll-a for the Chesapeake Bay and its Tidal tributaries* (EPA 903-R-03-002) and a subsequent *Addendum* (EPA 903-R-04-005). These were issued pursuant to Section 117(b) of the Clean Water Act, 33 U.S.C. §1317(b), and 40 CFR Part 131**.** The guidelines relied in large part on water quality modeling performed by EPA.

In accordance with the federal Clean Water Act and Pennsylvania regulations, Maryland's changes to its water quality standards trigger the need for nutrient reductions in Pennsylvania to comply with the new standards. These reductions need to come from both point sources (e.g., sewage treatment plants, industrial dischargers) and non-point sources (e.g., farms).

To quantify the nutrient reduction needs, maximum nutrient and sediment loads ("cap loads") for each major watershed tributary to the Chesapeake Bay were established. This included allocation of cap loads for Total Nitrogen (TN) and Total Phosphorus (TP) in Pennsylvania for the Potomac and the Susquehanna watersheds. Pennsylvania's overall cap loads for TN and TP were further divided into cap loads for point and non-point sources.

DEP has developed a plan to meet these requirements. First, DEP issued its Chesapeake Bay Tributary Strategy in December 2004. This Strategy includes specific initiatives to address reductions from point sources and non-point sources. The Strategy does not prescribe mandatory requirements, but rather describes how the legal obligations can be met through a combination of actions, including changes to NPDES permits. The strategy describes the basis for calculating the total allowable loading from PA to the Chesapeake Bay.

Second, DEP conducted an extensive stakeholder process with sewage treatment plants in 2006, which led to the current method used to allocate the point source portion of the load. The workgroup recommendation made the allocation based on the design annual average daily flow, and concentrations of 6 mg/L total nitrogen and 0.8 mg/L total phosphorus (TP). The Department reviewed this recommendation and agrees that it meets the requirements described above.

Based on this methodology, the allocations for TN and TP based on 1.14 MGD for this facility are:

Design Annual Average Daily Flow	TN (lb/yr)	TP (lb/yr)
2.3 MGD (Present)	20,822	2,776

A list of 41 retired on-lot systems connected to the collection system were submitted and accepted by the Department during the previous renewal which increased the TN cap load at 25 lbs TN/year/offset for a total of 1025 lbs/year.

Design Annual Average Daily Flow	TN (lb/yr)	TP (lb/yr)
2.3 MGD (Present)	21,847	2776

These allocations are expressed in the permit as mass based annual loads. Since offsets are only for compliance purposes and are not available for trading/selling, the TN cap load is written at the base level including language indicating the offsets may be applied throughout the compliance year or during the truing period.

Manheim Borough Authority is included on the Chickies Creek TMDL, which has a phosphorus load allocation of 6547.4 lbs/year for the facility. The Chesapeake Bay Watershed Implementation Plan is requiring a more stringent Cap Load of 2776 lbs/year. Credits may be purchased for any phosphorus loading that is in excess of the Bay Cap Load – but only up to the Chickies Creek TMDL annual load of 6,547.4 lbs/year.

Hauled-in Septage

The Authority has requested offsets for the receipt of septage. The Department is now restricting the generation of offsets for the receipt of residential septage due to concerns about the Department's overall ability to meet its nutrient reduction requirements for the Chesapeake Bay TMDL. In light of the Authority's compliance history and the fact that it did not previously have offsets for the receipt of septage, the Authority is not eligible to use offsets to meet permit effluent limits under 25 Pa. Code 96.8.

Stormwater Outfalls

The application listed 5 stormwater outfalls that will be listed in the permit as outfalls 002 through 006. The stormwater outfalls were identified in the previous permit as S01 through S05.

The outfalls will be listed in Part C with stormwater requirements including an annual inspection.

002	S01	Lat 40 09 17	Long 76 24 12	Inlet near septic receiving station & pump station to Chickies Creek	Chickies Creek
003	S02	Lat 40 09 17	Long 76 24 11	Inlet north side of digesters to swale	Chickies Creek
004	S03	Lat 40 09 13	Long 76 24 10	Inlet near final clarifiers to wetland	Chickies Creek
005	S04	Lat 40 09 12	Long 76 24 11	Inlet near chlorine contact tank to wetland	Chickies Creek
006	S05	Lat 40 09 11	Long 76 24 12	Two inlets near entrance to plant wetlands	Chickies Creek

Whole Effluent Toxicity (WET)

For Outfall 001, ☐ **Acute** ☒ **Chronic** WET Testing was completed:

☒ For the permit renewal application (4 tests).
☐ Quarterly throughout the permit term.
☐ Quarterly throughout the permit term and a TIE/TRE was conducted.
☐ Other:

The dilution series used for the tests was: 100%, 63%, 39.7%, 25%, and 15.6%. The Instream Waste Concentration (IWC) to be used for analysis of the results is: 39.7.

Summary of Four Most Recent Test Results

(NOTE – Enter results into one table, depending on which data analysis method was used).

NOEC/LC50 Data Analysis

Test Date	*Ceriodaphnia* Results (% Effluent)			*Pimephales* Results (% Effluent)			Pass? *
	NOEC Survival	NOEC Reproduction	LC50	NOEC Survival	NOEC Growth	LC50	
3/26-30/2012	100	100	>100	100	100	>100	Yes
5/30-6/4/2012	100	100	>100	100	100	>100	Yes
8/13-17/2012	63	100	>100	100	100	>100	Yes
11/5-9/2012	15.8	15.8	19.9	39.7	39.7	49.8	No

***** *A "passing" result is that which is greater than or equal to the IWC value.*

Is there reasonable potential for an excursion above water quality standards based on the results of these tests? (*NOTE – In general, reasonable potential is determined anytime there is at least one test failure in the previous four tests).*

☒ **YES** ☐ **NO**

Comments: *Ceriodaphnia dubia* test failures.

Evaluation of Test Type, IWC and Dilution Series for Renewed Permit

Acute Partial Mix Factor (PMFa): **1** Chronic Partial Mix Factor (PMFc): **1**

1. Determine IWC – Acute (IWCa):

$(Q_d \times 1.547) / (Q_{7\text{-}10} \times PMFa) + (Q_d \times 1.547)$

[(2.3 MGD x 1.547) / ((4.07 cfs x 1) + (2.3 MGD x 1.547))] x 100 = **46.6%**

Is IWCa < 1%? ☐ **YES** ☒ **NO** **(YES - Acute Tests Required OR NO - Chronic Tests Required)**

If the discharge is to the tidal portion of the Delaware River, indicate how the type of test was determined:

NA

Type of Test for Permit Renewal: **Chronic**

2a. Determine Target IWCa (If Acute Tests Required)

TIWCa = IWCa / 0.3 = **%**

2b. Determine Target IWCc (If Chronic Tests Required)

(Q_d x 1.547) / (Q_{7-10} x PMFc) + (Q_d x 1.547)

(2.3 MGD x 1.547) / ((4.07 cfs x 1) + (2.3 MGD x 1.547)) = **46.6%**

3. Determine Dilution Series

(NOTE – check Attachment C of WET SOP for dilution series based on TIWCa or TIWCc, whichever applies).

Dilution Series = 100%, 74%, 47%, 24%, and 12%.

WET Limits

Will WET limits be established in the permit? ☒ YES ☐ NO

If YES, identify the species and the limit values for the permit (TU).

Ceriodaphnia dubia failed all end points in test #4 and a limit of 2.13 (1/0.47) is required for *Ceriodaphnia dubia*. Testing is required for both species starting with quarterly WET testing upon permit renewal.

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) and/or BPJ.

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

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)				Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	XXX	9.0	1/day	Grab
Dissolved Oxygen	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
Total Residual Chlorine (Interim)	XXX	XXX	XXX	0.46	XXX	1.5	1/day	Grab
Total Residual Chlorine (Final)	XXX	XXX	XXX	0.17	XXX	0.57	1/day	Grab
$CBOD_5$ (5/1 – 10/31)	383	613 Wkly Avg	XXX	20	32	40	2/week	24-Hr Composite
$CBOD_5$ (11/1 – 4/30)	479	767 Wkly Avg	XXX	25	40	50	2/week	24-Hr Composite
BOD5 Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Suspended Solids Raw Sewage Influent	Report	Report	XXX	Report	XXX	XXX	2/week	24-Hr Composite
Total Suspended Solids	575	863 Wkly Avg	XXX	30	45	60	2/week	24-Hr Composite
Fecal Coliform (CFU/100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1,000	2/week	Grab
Fecal Coliform (CFU/100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2,000 Geo Mean	XXX	10,000	2/week	Grab
Ammonia-Nitrogen May 1 - Oct 31	53	XXX	XXX	2.8	XXX	5.6	2/week	24-Hr Composite
Ammonia-Nitrogen Nov 1 - Apr 30	161	XXX	XXX	8.4	XXX	16	2/week	24-Hr Composite
Total Phosphorus	38	XXX	XXX	2.0	XXX	4.0	2/week	24-Hr Composite

Outfall 001, Continued (from Permit Effective Date through Permit Expiration Date)

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)				Minimum Measurement Frequency	Required Sample Type
	Average Monthly	Daily Maximum	Minimum	Average Monthly	Weekly Average	Instant. Maximum		
Copper	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Aluminum	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Zinc	XXX	XXX	XXX	Report	XXX	XXX	1/month	24-Hr Composite
Ceriodaphnia dubia Survival	XXX	XXX	XXX	2.13 TU Daily Max	XXX	XXX	See Permit	See Permit
Ceriodaphnia dubia Reproduction	XXX	XXX	XXX	2.13 TU Daily Max	XXX	XXX	See Permit	See Permit

Compliance Sampling Location: Outfall 001

Other Comments:

- Stormwater requirements in PART C listing outfalls, BMPs, PPC requirements and annual inspection requirements. Refer to stormwater narrative for outfall descriptions.
- Whole Effluent Toxicity test requirements in PART C with TU limit of 2.13 for *Ceriodaphnia dubia*, quarterly testing upon permit issuance and dilution series. Refer to WETT narrative for information.
- Request schedule for compliance with new TRC limit.

Proposed Effluent Limitations and Monitoring Requirements

The limitations and monitoring requirements specified below are proposed for the draft permit, to comply with Pennsylvania's Chesapeake Bay Tributary Strategy.

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

Parameter	Effluent Limitations					Monitoring Requirements	
	Mass Units (lbs/day)		Concentrations (mg/L)			Minimum Measurement Frequency	Required Sample Type
	Monthly	Annual	Minimum	Monthly Average	Maximum		
Ammonia---N	Report	Report		Report		2/week	24-Hr Composite
Kjeldahl---N	Report			Report		1/week	24-Hr Composite
Nitrate-Nitrite as N	Report			Report		1/week	24-Hr Composite
Total Nitrogen	Report	Report		Report		1/month	Calculation
Total Phosphorus	Report	Report		Report		2/week	24-Hr Composite
Net Total Nitrogen	Report	20,822				1/month	Calculation
Net Total Phosphorus	Report	2,776				1/month	Calculation

Add note to effluent page regarding additional 1,025 lbs/year from retired on-lot system listed in previous permit.

Tools and References Used to Develop Permit	
☒	WQM for Windows Model
☒	PENTOXSD for Windows Model
☒	TRC Model Spreadsheet
☐	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, 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.
☒	Other: SOP Establishing Effluent Limitations for Individual Sewage Permits
☒	Other: SOP New & Reissuance Sewage Individual NPDES Permit Applications

Manhem Borough.xls

1A	B	C	D	E	F	G
2	**TRC EVALUATION**			Enter Facility Name in E3		
3	Input appropriate values in B4:B8 and E4:E7			**Manheim Borough PA0020893**		
4	4.07	**= Q stream (cfs)**		0.5	**= CV Daily**	
5	2.3	**= 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 Discharg**		15	**= AFC_Criteria Compliance Time (min)**	
9	0.5	**= BAT/BPJ Value**		720	**= CFC_Criteria Compliance Time (min)**	
		= % Factor of Safety (FOS)			**=Decay Coefficient (K)**	
10	Source	Reference	AFC Calculations		Reference	CFC Calculations
11	TRC	**1.3.2.iii**	WLA afc = 0.384		**1.3.2.iii**	WLA cfc = 0.367
12	PENTOXSD TRG	**5.1a**	LTAMULT afc = 0.373		**5.1c**	LTAMULT cfc = 0.581
13	PENTOXSD TRG	**5.1b**	LTA_afc= 0.143		**5.1d**	LTA_cfc = 0.213
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) = 0.176		AFC	
18			INST MAX LIMIT (mg/l) = 0.576			

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)**

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
07G	7919	CHICKIES CREEK	19.700	400.00	20.00	0.00130	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	0.120	0.00	0.00	0.368	0.000	10.0	0.00	0.00	20.00	7.85	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
NW Lancaster	PA0084026	0.0000	0.6500	0.0000	0.000	20.00	7.50

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	5.00	8.24	0.00	5.60
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
07G	7919	CHICKIES CREEK	**18.000**	388.00	34.00	0.00120	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	0.120	0.00	0.00	0.766	0.000	10.0	0.00	0.00	20.00	7.85	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
Manheim	PA0020893	0.0000	2.3000	0.0000	0.000	20.00	7.40

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	5.00	8.24	0.00	4.20
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
07G	7919	CHICKIES CREEK	17.300	382.00	37.00	0.00120	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	0.120	0.00	0.00	0.000	0.000	10.0	0.00	0.00	20.00	7.85	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	0.00	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	5.00	8.24	0.00	4.20
NH3-N	25.00	0.00	0.00	0.70

WQM 7.0 Hydrodynamic Outputs

SWP Basin	Stream Code	Stream Name
07G	7919	CHICKIES 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												
19.700	2.40	0.00	2.40	1.0055	0.00130	1.098	10.98	10	0.28	0.368	20.00	7.71
18.000	4.07	0.00	4.07	4.5637	0.00120	3.933	39.33	10	0.06	0.766	20.00	7.57
Q1-10 Flow												
19.700	1.69	0.00	1.69	1.0055	0.00130	NA	NA	NA	0.17	0.613	20.00	7.69
18.000	2.88	0.00	2.88	4.5637	0.00120	NA	NA	NA	0.26	0.162	20.00	7.54
Q30-10 Flow												
19.700	3.05	0.00	3.05	1.0055	0.00130	NA	NA	NA	0.21	0.488	20.00	7.73
18.000	5.19	0.00	5.19	4.5637	0.00120	NA	NA	NA	0.31	0.139	20.00	7.60

WQM 7.0 D.O.Simulation

SWP Basin	Stream Code	Stream Name
07G	7919	CHICKIES CREEK

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
19.700	0.650	20.000	7.714
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
10.977	1.098	10.000	0.282
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
8.24	1.094	1.23	0.700
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
7.284	5.600	User Supplied	5
Reach Travel Time (days)			
0.368			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.037	7.92	1.20	7.06
0.074	7.60	1.17	6.90
0.110	7.30	1.14	6.80
0.147	7.02	1.11	6.73
0.184	6.74	1.08	6.69
0.221	6.47	1.06	6.67
0.258	6.22	1.03	6.68
0.294	5.97	1.00	6.70
0.331	5.74	0.98	6.73
0.368	5.51	0.95	6.78

RMI	Total Discharge Flow (mgd)	Analysis Temperature (°C)	Analysis pH
18.000	2.950	20.000	7.573
Reach Width (ft)	**Reach Depth (ft)**	**Reach WDRatio**	**Reach Velocity (fps)**
39.326	3.933	10.000	0.056
Reach CBOD5 (mg/L)	**Reach Kc (1/days)**	**Reach NH3-N (mg/L)**	**Reach Kn (1/days)**
10.87	1.070	1.56	0.700
Reach DO (mg/L)	**Reach Kr (1/days)**	**Kr Equation**	**Reach DO Goal (mg/L)**
6.329	4.200	User Supplied	5
Reach Travel Time (days)			
0.766			

Subreach Results

TravTime (days)	CBOD5 (mg/L)	NH3-N (mg/L)	D.O. (mg/L)
0.077	10.02	1.48	5.69
0.153	9.23	1.40	5.34
0.230	8.50	1.33	5.17
0.306	7.83	1.26	5.14
0.383	7.22	1.20	5.20
0.460	6.65	1.13	5.32
0.536	6.13	1.07	5.48
0.613	5.64	1.02	5.65
0.689	5.20	0.96	5.84
0.766	4.79	0.91	6.03

WQM 7.0 Effluent Limits

SWP Basin	Stream Code	Stream Name
07G	7919	CHICKIES 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)
19.700	NW Lancaster	PA0084026	0.000	CBOD5	23.11		
				NH3-N	4.17	8.34	
				Dissolved Oxygen			5

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)
18.000	Manheim	PA0020893	0.000	CBOD5	20.18		
				NH3-N	2.88	5.76	
				Dissolved Oxygen			5

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
7919	18.00	388.00	34.00	0.00120	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.1198	0	0	10	0	0	0	0	240	7.85	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
Manheim	PA0020893	0	2.3	0	0	0	0	0	0	284	7.4

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
ALUMINUM	150	0	0.5	0.5	0	0	0	0	1	0
BORON	240	0	0.5	0.5	0	0	0	0	1	0
COPPER	12	0	0.5	0.5	0	0	0	0	1	0
ZINC	51	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
7919	17.30	382.00	37.00	0.00120	0.00	☑

Stream Data

	LFY	Trib Flow	Stream Flow	WD Ratio	Rch Width	Rch Depth	Rch Velocity	Rch Trav Time	Tributary Hard	Tributary pH	Stream Hard	Stream pH	Analysis Hard	Analysis pH
	(cfsm)	(cfs)	(cfs)		(ft)	(ft)	(fps)	(days)	(mg/L)		(mg/L)		(mg/L)	
Q7-10	0.1198	0	0	10	0	0	0	0	240	7.85	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
		0	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
ALUMINUM	0	0	0.5	0.5	0	0	0	0	1	0
BORON	0	0	0.5	0.5	0	0	0	0	1	0
COPPER	0	0	0.5	0.5	0	0	0	0	1	0
ZINC	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
07G	7919	CHICKIES CREEK

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
18.000	4.0732	0	4.0732	3.55809	0.0012	1.6871	16.871	10	0.2681	0.1596	1.464
17.300	4.4326	0	4.4326	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
18.000	25.356	0	25.356	3.55809	0.0012	3.0317	16.871	5.5649	0.5653	0.0757	1.64
17.300	27.300	0	27.300	NA	0	0	0	0	0	0	NA

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
07G	7919	CHICKIES CREEK

RMI	Name	Permit Number	Disc Flow (mgd)
18.00	Manheim	PA0020893	2.3000

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
ALUMINUM	150	INPUT	234.024	1031.032	AFC
BORON	240	INPUT	374.439	3431.629	CFC
COPPER	12	INPUT	18.722	45.346	CFC
ZINC	51	INPUT	79.568	370.734	AFC

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
18.00	**Manheim**	**PA0020893**

AFC

Q7-10: **CCT (min)** 1.464 **PMF** 1 **Analysis pH** 7.583 **Analysis Hardness** 260.515

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	33.126	34.506	74.008
Dissolved WQC. Chemical translator of 0.96 applied.							
ZINC	0	0	0	0	263.749	269.682	578.405
Dissolved WQC. Chemical translator of 0.978 applied.							
ALUMINUM	0	0	0	0	750	750	1608.576
BORON	0	0	0	0	8100	8100	17372.63

CFC

Q7-10: **CCT (min)** 1.464 **PMF** 1 **Analysis pH** 7.583 **Analysis Hardness** 260.515

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	20.297	21.143	45.346
Dissolved WQC. Chemical translator of 0.96 applied.							
ZINC	0	0	0	0	265.906	269.682	578.405
Dissolved WQC. Chemical translator of 0.986 applied.							
ALUMINUM	0	0	0	0	NA	NA	NA
BORON	0	0	0	0	1600	1600	3431.629

THH

Q7-10: **CCT (min)** 1.464 **PMF** NA **Analysis pH** NA **Analysis Hardness** NA

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
COPPER	0	0	0	0	NA	NA	NA
ZINC	0	0	0	0	NA	NA	NA
ALUMINUM	0	0	0	0	NA	NA	NA
BORON	0	0	0	0	3100	3100	6648.782

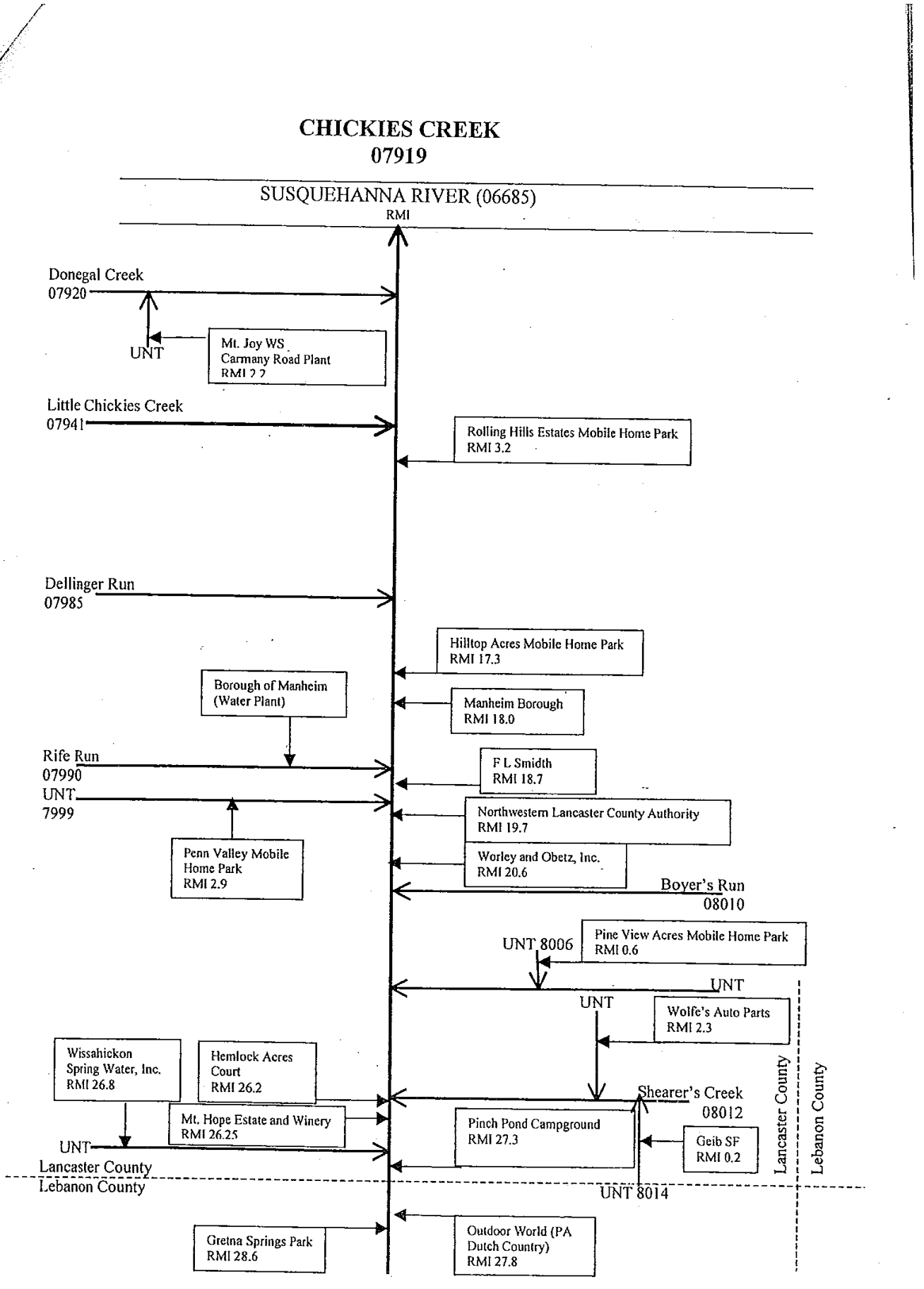
CRL

Qh: **CCT (min)** 1.64 **PMF** 1

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number							
18.00	Manheim	PA0020893							
	Parameter		Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
	COPPER		0	0	0	0	NA	NA	NA
	ZINC		0	0	0	0	NA	NA	NA
	ALUMINUM		0	0	0	0	NA	NA	NA
	BORON		0	0	0	0	NA	NA	NA


CHICKIES CREEK
07919
SUSQUEHANNA RIVER (06685)
RMI
Donegal Creek
07920
UNT
Mt. Joy WS
Carmany Road Plant
RMI 2.2
Little Chickies Creek
07941
Rolling Hills Estates Mobile Home Park
RMI 3.2
Dellinger Run
07985
Hilltop Acres Mobile Home Park
RMI 17.3
Borough of Manheim
(Water Plant)
Manheim Borough
RMI 18.0
Rife Run
07990
UNT
7999
F L Smidth
RMI 18.7
Northwestern Lancaster County Authority
RMI 19.7
Penn Valley Mobile
Home Park
RMI 2.9
Worley and Obetz, Inc.
RMI 20.6
Boyer's Run
08010
UNT 8006
Pine View Acres Mobile Home Park
RMI 0.6
UNT
UNT
Wolfe's Auto Parts
RMI 2.3
Wissahickon
Spring Water, Inc.
RMI 26.8
Hemlock Acres
Court
RMI 26.2
Shearer's Creek
08012
Mt. Hope Estate and Winery
RMI 26.25
Pinch Pond Campground
RMI 27.3
Geib SF
RMI 0.2
UNT
Lancaster County
Lebanon County
UNT 8014
Lancaster County
Lebanon County
Gretna Springs Park
RMI 28.6
Outdoor World (PA
Dutch Country)
RMI 27.8