312 W Whitewater Street | Whitewater, WI 53190

Wastewater Facility Plan

Technical Memorandum 2

Flows, Loadings, and Existing Conditions

City of Whitewater

July 2014

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WASTEWATER FACILITY PLAN
TM 2 FLOWS, LOADINGS, AND EXISTING CONDITIONS
CITY OF WHITEWATER

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CHAPTER I – PURPOSE AND BACKGROUND INFORMATION

1.1 PURPOSE

The purpose of this Technical Memorandum (TM 2) is to document the items listed below for the City of Whitewater Wastewater Treatment Plant (WWTP).

- Summarize existing physical collection and treatment facilities information.
- Summarize flow and loading data from 2010 through 2013.
- Summarize existing permit requirements.
- Project expected design flows and loadings.
- Evaluate future potential regulatory requirements.
- Evaluate the existing facility's performance related to operational needs, expected performance and permit requirements.

CHAPTER II –EXISTING COLLECTION SYSTEM

2.1 COLLECTION SYSTEM OVERVIEW

The City of Whitewater presently operates and maintains a sanitary sewer collection system that serves the residential, industrial, and commercial water users in the City. This section provides a brief overview of the existing wastewater collection system, reviews inflow and infiltration (I/I), and describes current operations. Tables 1-3 summarize the major components in the existing collection system. Figure 1 in Appendix TM2-A shows sewers, force mains, pumping stations, and the WWTP within the City of Whitewater sewer service area.

Table 1: Gravity Sewer Components

Diameter (inches)	Approximate Lineal Feet	Approximate (in-dia-miles)
4	60	0.05
6	3,300	4
8	166,000	252
10	16,700	32
12	10,800	25
14	500	1
15	12,600	36
18	11,700	40
21	6,000	24
24	6,600	30
27	3,600	18
30	700	4
36	3,200	22
42	1,700	14
48	2,600	24
Total	**246,100**	**524**

Table 2: Force Mains

Diameter (inches)	Approximate Lineal Feet
4	1,280
6	1,362
8	5,838
Total	**8,480**

Table 3: Lift Stations

Name	Type	Capacity (gpm)
Park Crest Lift Station	Submersible	230
Vanderlip Lift Station	Submersible	470
Fraternity Lift Station	Submersible	300
Fremont Road Lift Station	Submersible	360
North Street Lift Station	Submersible	225
Oak Street Lift Station	Submersible	210
Milwaukee Street Lift Station	Submersible	320
Beach Lift Station	Submersible	230
Clay Street Lift Station	Submersible	290

2.2 INFLOW AND INFILTRATION

Like all cities, Whitewater has inflow and infiltration (I/I) entering its sanitary sewer system. This section estimates the amount of I/I. The I/I components for this report are based on flow records from 2004 through 2013.

The estimated infiltration was obtained by subtracting the industrial and commercial flows (water sales) from the metered annual average WWTP flow. The estimated inflow was obtained by subtracting the industrial and commercial flows (water sales) from the metered maximum weekly WWTP flow. Tables 4 and 5 summarize the estimated infiltration and inflow rates. For 2004-2013, the estimated annual average residential per capita infiltration flow of 92 gallons per capita per day (gcd) is less than the United States Environmental Protection Agency (USEPA) criteria of 120 gcd for excessive infiltration during dry weather. Inflow has been more troublesome, the total average flow including inflow based on maximum weekly flow is estimated to be 219 gcd which is under the USEPA's identified excessive inflow guidance value of 275 gcd for average wet weather flows but this guideline was exceeded in 30% of the years considered.

Table 4: Estimated Infiltration

Year	Estimated Population	Industrial Flow (mgd)	Commercial Flow (mgd)	WWTP Average Flow (mgd)	Estimated Residential Flow (mgd)	Estimated Per Capita Flows (gpd/person)
2004	13,855	0.04	0.28	1.59	1.27	92
2005	13,937	0.05	0.27	1.35	1.03	74
2006	14,044	0.04	0.26	1.67	1.37	98
2007	14,139	0.03	0.25	1.85	1.57	111
2008	14,234	0.03	0.22	1.88	1.63	115
2009	14,329	0.04	0.19	1.76	1.53	107
2010	14,390	0.04	0.25	1.71	1.43	99
2011	14,622	0.04	0.24	1.39	1.11	76
2012	14757	0.04	0.23	1.18	0.91	62
2013	14,977	0.05	0.24	1.61	1.32	88
Average		0.04	0.24	1.60	1.32	92

Table 5: Estimated Inflow

Year	Estimated Population	Industrial Flow (mgd)	Commercial Flow (mgd)	WWTP Max Week Flow (mgd)	Estimated Residential Flow (mgd)	Estimated Per Capita Flows (gpd/person)
2004	13,855	0.04	0.28	4.47	4.15	300
2005	13,937	0.05	0.27	1.84	1.52	109
2006	14,044	0.04	0.26	2.7	2.4	171
2007	14,139	0.03	0.25	4.84	4.56	323
2008	14,234	0.03	0.22	5.64	5.39	379
2009	14,329	0.04	0.19	3.4	3.17	221
2010	14,390	0.04	0.25	3.1	2.82	196
2011	14,622	0.04	0.24	2.2	1.92	133
2012	14,757	0.04	0.23	1.7	1.43	98
2013	14,977	0.05	0.24	4.16	3.87	258
Average		0.04	0.24	3.41	3.12	219

2.3 CURRENT OPERATIONS

While it is currently not an overwhelming concern, the City recognizes that I/I needs to be reduced where cost effective and investigate, track, and prioritize problem areas in the collection system. In 2007, the City rehabilitated manholes by raising manhole lids to reduce I/I. In collaboration with the Water Utility, the WWTP began inspecting sump pump connections in September 2008 with approximately 340 inspections conducted annually. Any sump pumps that are found to be connected to the sanitary sewer system are required to be disconnected. In addition, 50,000 lineal feet of sewer was smoke tested in 2013. The City is replacing manhole seals and boots in the sewer system. Lateral installations are being inspected. New sewers are mandrel-tested. The City has also implemented stricter manhole and sewer standards. The City will continue to implement I/I reduction measures as part of an ongoing sanitary sewer maintenance program.

CHAPTER III – CURRENT FLOWS AND LOADINGS

3.1 CURRENT INFLUENT FLOWS AND LOADINGS

WWTP data from 2010 through 2013 was analyzed to determine the current influent flows and loadings to the facility. It should be noted that filter backwash wastewater is pumped to the plant influent sewer. Digester supernatant is also discharged to the plant influent sewer. The plant sewer discharges to the influent pumping station wet well along with the hauled waste from the receiving station. These streams are not independently metered or sampled, and all of them are combined with raw wastewater and included in the total plant influent metering and sampling.

Figure 2 shows daily influent flow rates measured during 2010 – 2013, including filter backwash and digester supernatant. Figure 3 presents a probability distribution of these daily flows; the horizontal red line indicates the original design criteria for the facility. Average daily flows are less than the original design flow of 3.65 mgd due to closure of a large food processing industry. Figure 4 shows a probability distribution of the peak instantaneous flow rates measured during each day. Table 6 summarizes relevant influent flow data recorded during the same time period.

Figure 2: Historical Total Daily Influent Flows

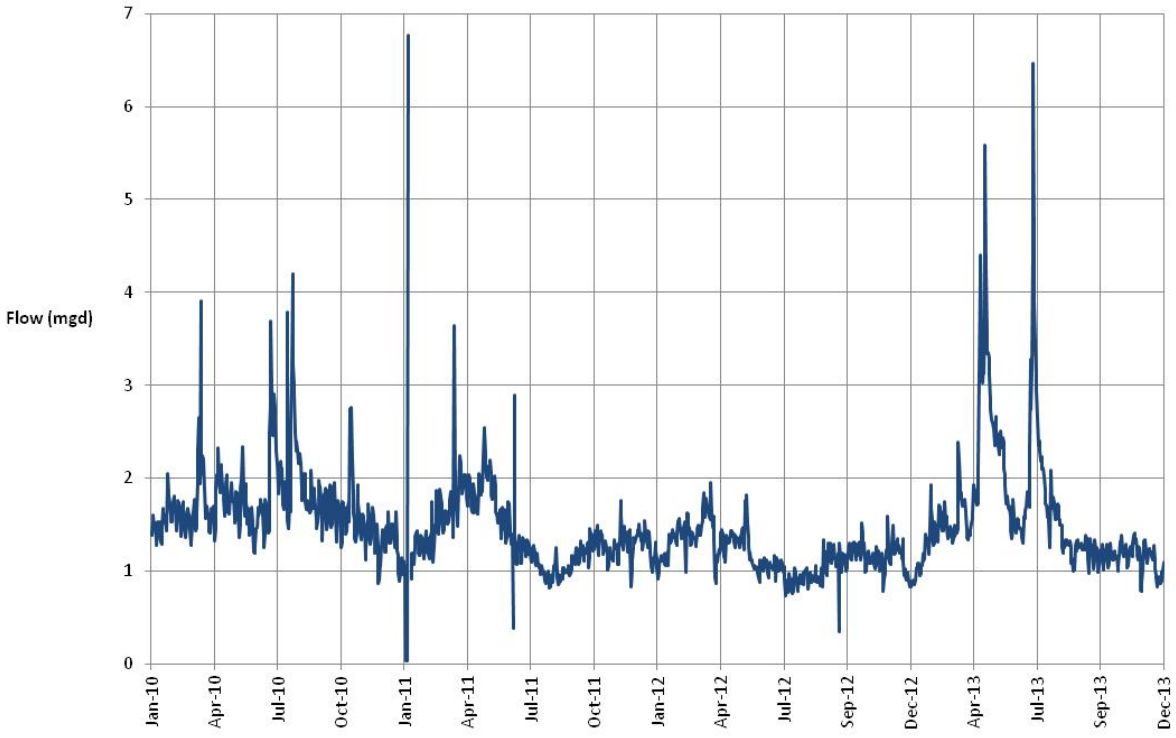


Figure 3: Daily Influent Flow Probability Distribution

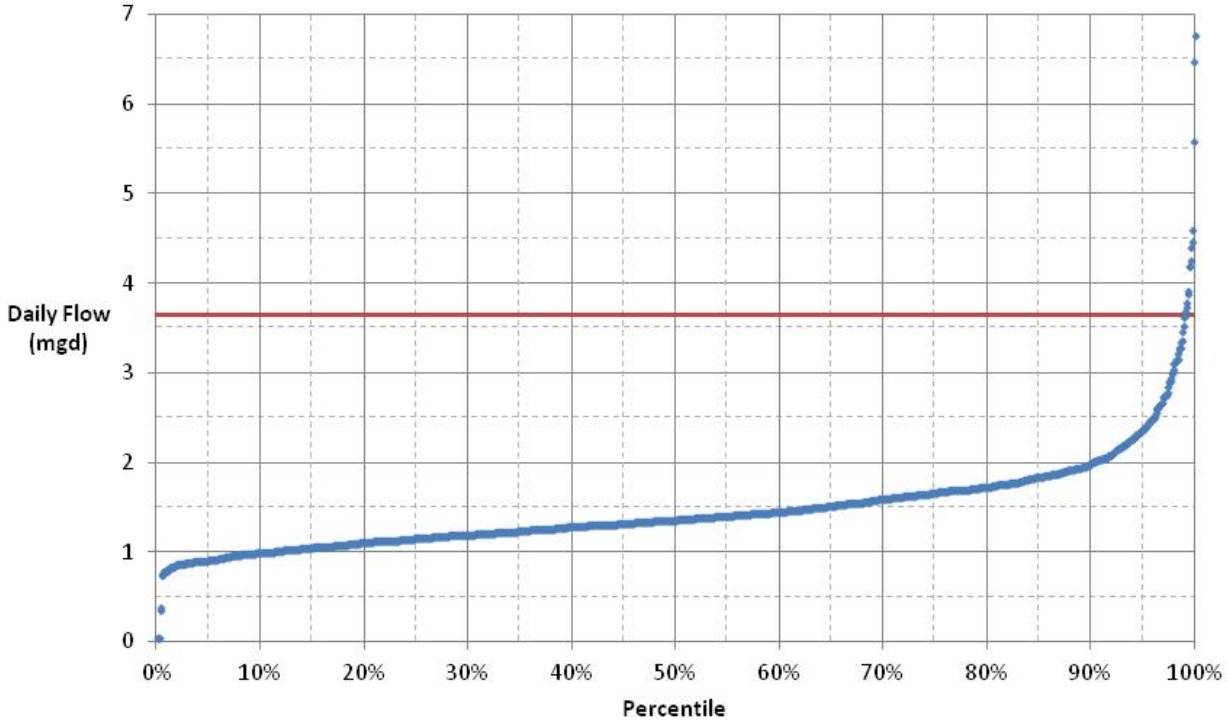


Figure 4: Peak Influent Flow Probability Distribution

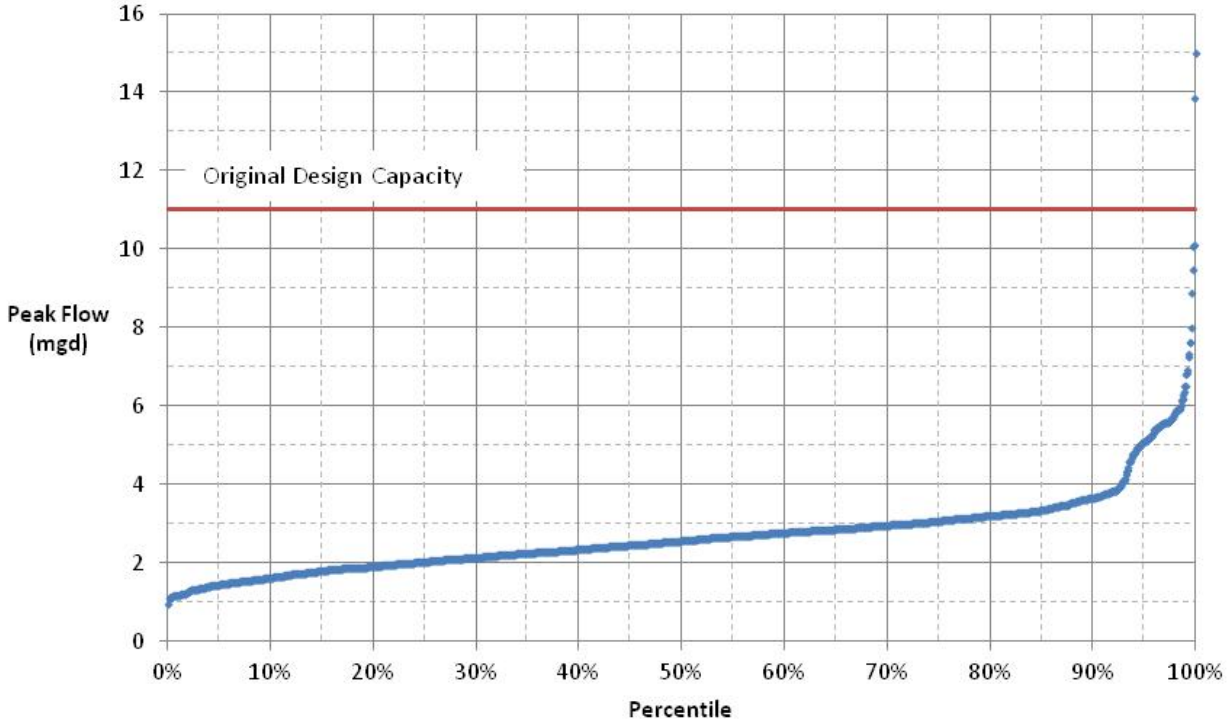


Table 6: Influent Flow Data

	Daily Flow (mgd)	7-Day Average (mgd)	30-Day Average (mgd)
2010-2013 Ave	1.5		
2010-2013 Max	6.8	4.2	3.1
98th Percentile	3.1	2.9	2.6
2nd Percentile	0.86	0.90	0.93
Peak Instantaneous	15.0	-	-

The distribution of historical data for 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), ammonia-nitrogen($N\text{-}NH_3$), total phosphorous (TP) and BOD_5:TP ratio are shown in Figures 5 - 9. Tables 7 - 11 summarize the influent data collected during the 2010–2013 period for BOD_5, TSS, $N\text{-}NH_3$, and TP in pounds per day (ppd).

Figure 5: Daily BOD_5 Load Probability Distribution

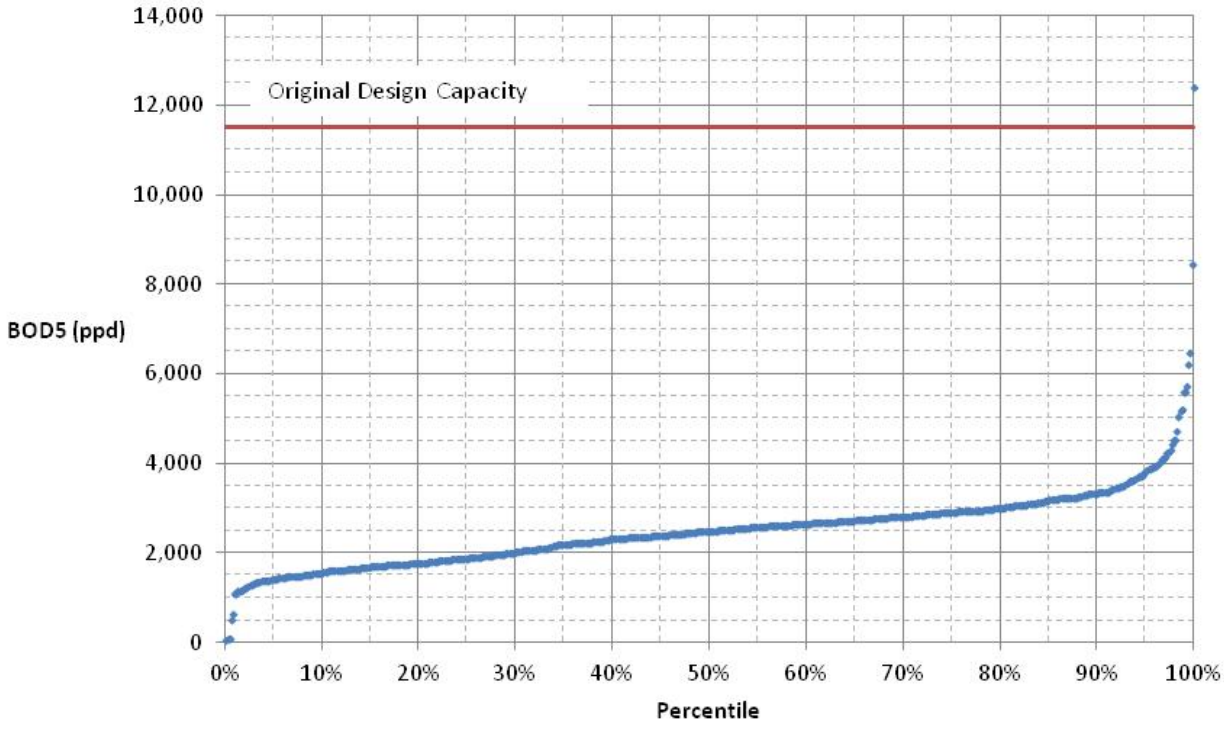


Figure 6: Daily TSS Load Probability Distribution

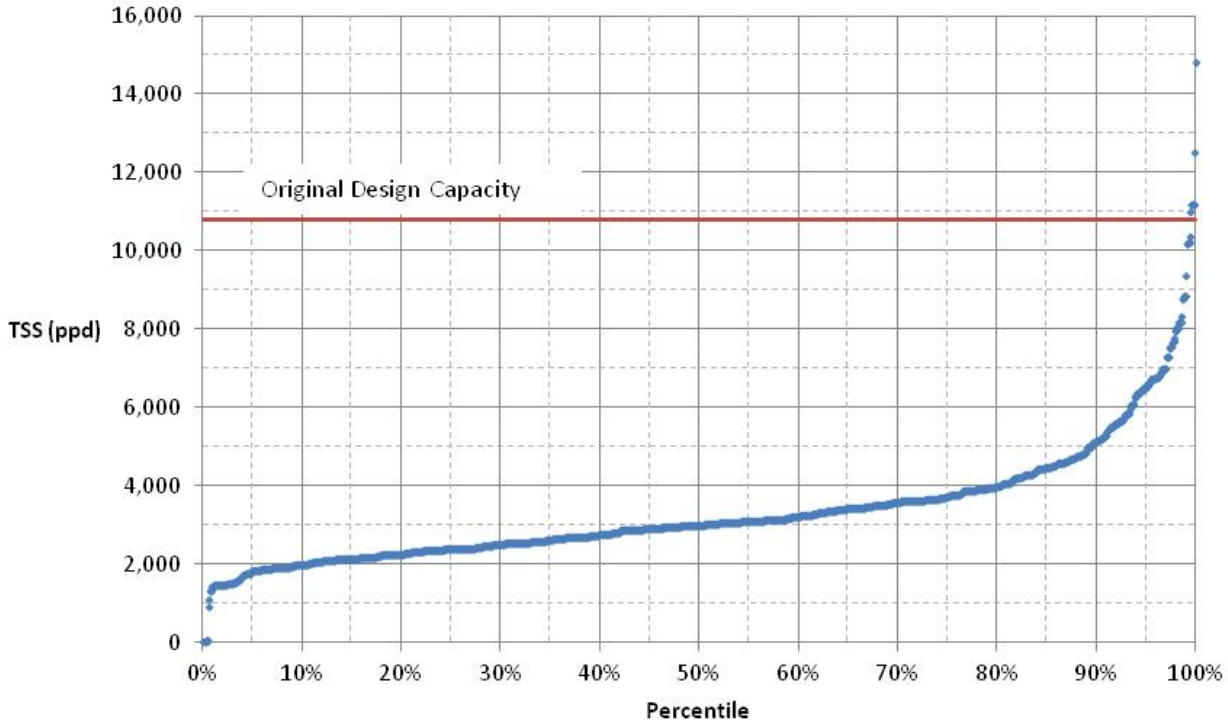


Figure 7: Daily NH_3-N Load Probability Distribution

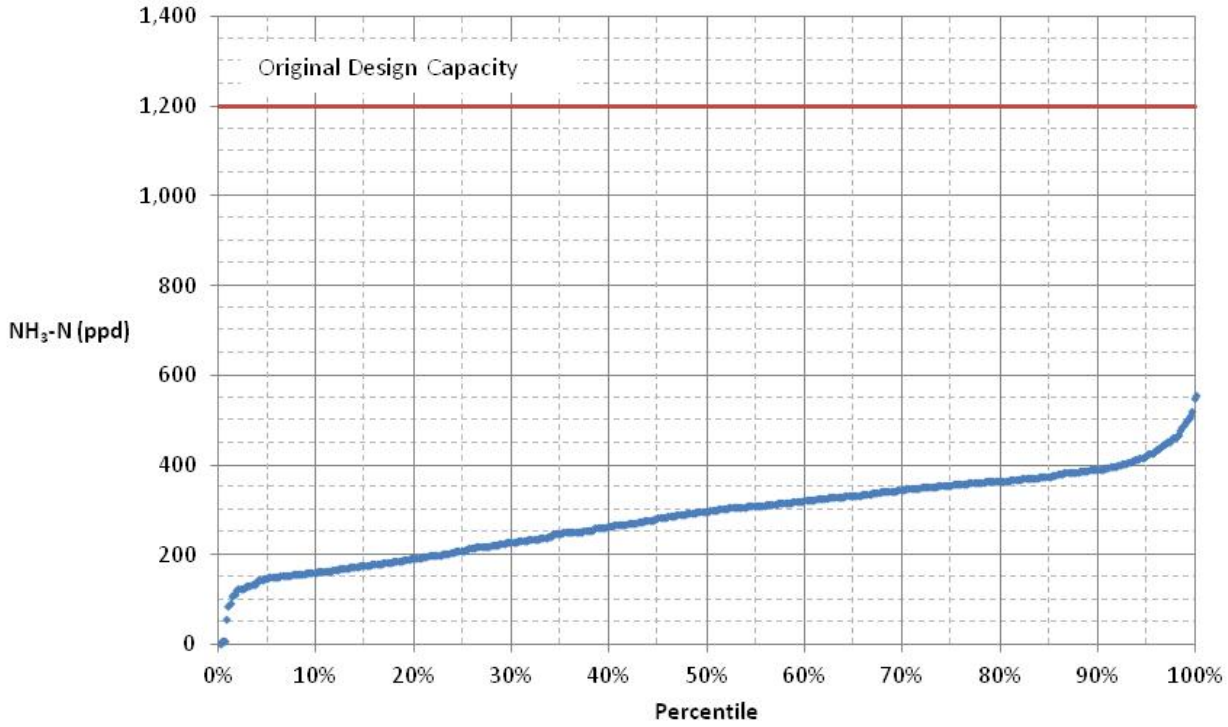


Figure 8: Daily TP Load Probability Distribution

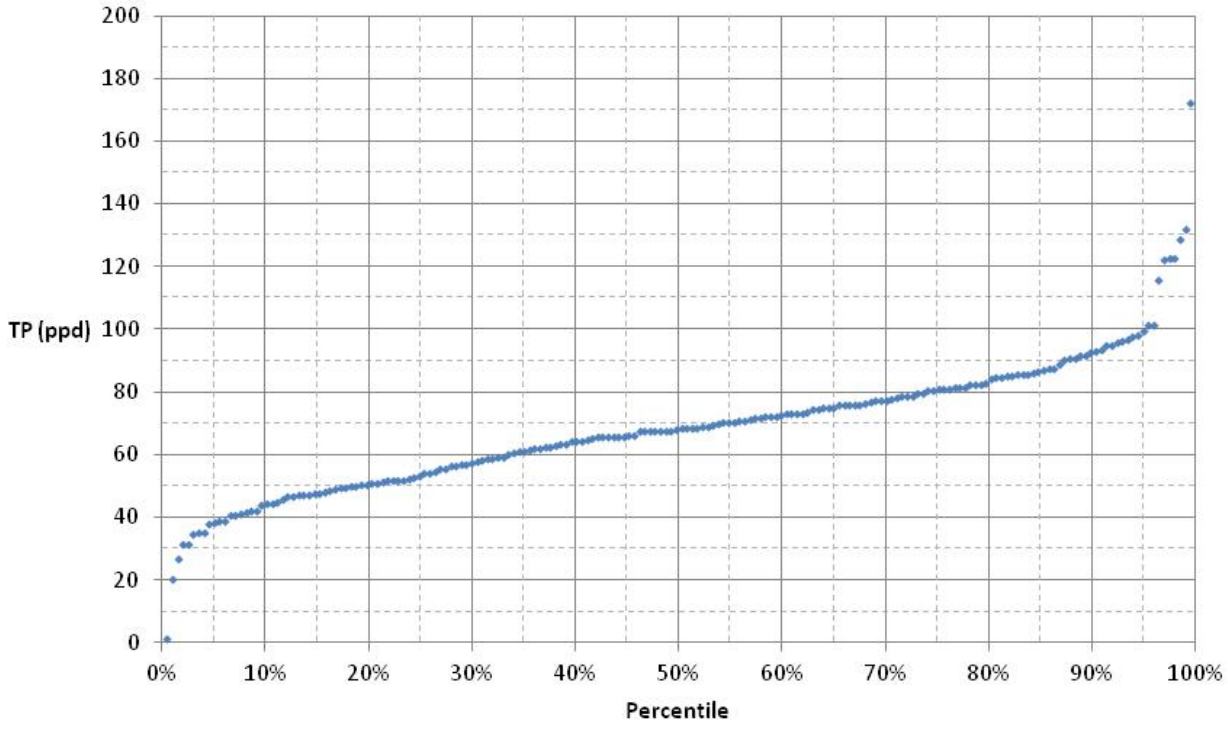


Figure 9: Daily BOD_5:TP Probability Distribution

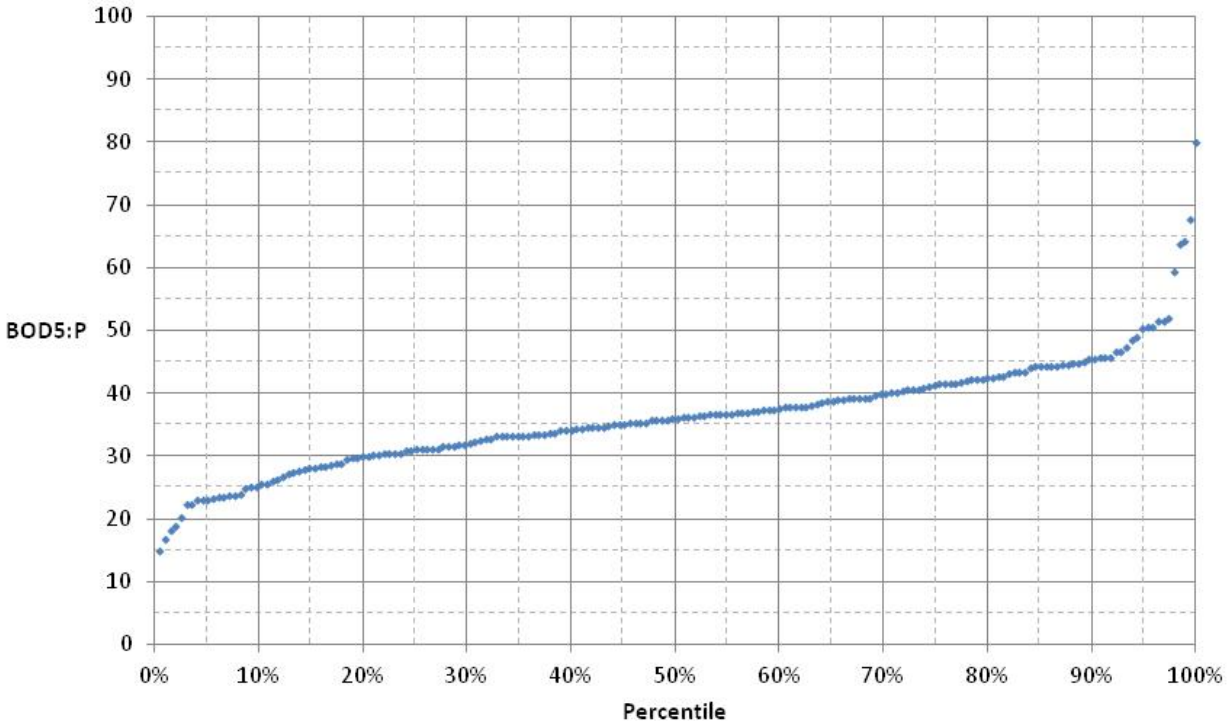


Table 7: Influent BOD_5 Data

	Daily BOD_5 (ppd)	7-Day Average (ppd)	30-Day Average (ppd)
2010-2013 Ave	2,492		
2010-2013 Max	12,398	5,213	3,432
98th Percentile	4,522	3,772	3,264
2nd Percentile	1,176	1,404	1,581

Table 8: Influent TSS Data

	Daily TSS (ppd)	7-Day Average (ppd)	30-Day Average (ppd)
2010-2013 Ave	3,343		
2010-2013 Max	27,669	7,742	5,885
98th Percentile	9,427	6,529	5,188
2nd Percentile	1,136	1,791	2,199

Table 9: Influent Ammonia Nitrogen Data

	Daily NH_3-N (ppd)	7-Day Average (ppd)	30-Day Average (ppd)
2010-2013 Ave	283		
2010-2013 Max	555	464	388
98th Percentile	462	428	372
2nd Percentile	100	134	178

Table 10: Influent Total Phosphorous Data

	Daily TP (ppd)	7-Day Average (ppd)	30-Day Average (ppd)
2010-2013 Ave	70		
2010-2013 Max	200	130	110
98th Percentile	124	120	107
2nd Percentile	32	40	51

Table 11: Influent BOD_5:TP Data

	Daily BOD_5:TP	7-Day Average	30-Day Average
2010-2013 Ave	36		
2010-2013 Max	80	66	48
98th Percentile	60	55	47
2nd Percentile	20	24	27

Daily, weekly, and monthly pollutant loading averages, maximums, and percentiles will be useful when evaluating treatment alternatives to characterize the range of loadings proposed alternatives must be able to reliably treat.

3.2 CURRENT WPDES PERMIT LIMITS

The City of Whitewater's Wisconsin Pollutant Discharge Elimination System (WPDES) Permit, No. WI-00210001-08-0 expired at the end of 2013. The WWTP is continuing to operate per the expired permit's effluent limits. A new permit is expected to be issued in the fall of 2014 with the major change being a new low level phosphorous limit of 0.075 mg/L. In January 2014, the Department calculated Water Quality-Based Effluent Limitations for the City of Whitewater. A copy of the Department Memo outlining these limits is included in Appendix TM2-B. A copy of the existing WPDES Permit is also included in Appendix TM2-B. Effluent limits required by the expired discharge permit are listed in Table 12.

Table 12: WWTP Effluent Limits

Parameter	Time Period	Monthly Average	Weekly Average	Daily Minimum	Daily Maximum
BOD_5	May – October	10 mg/L	10 mg/L	-	-
	November – April	20 mg/L	20 mg/L		
TSS	May – October	10 mg/L	10 mg/L	-	-
	November – April	20 mg/L	20 mg/L		
Total N-NH_3	January	4.4 mg/L	10.5 mg/L	-	16.8 mg/L
	February	4.4 mg/L	10.6 mg/L		
	March	4.8 mg/L	11.3 mg/L		
	April	4.3 mg/L	9.8 mg/L		
	May	4.0 mg/L	9.2 mg/L		
	June	3.2 mg/L	6.3 mg/L		
	July	3.0 mg/L	6.3 mg/L		
	August	3.0 mg/L	6.3 mg/L		
	September	3.0 mg/L	6.3 mg/L		
	October	4.1 mg/L	9.6 mg/L		
	November	4.5 mg/L	10.7 mg/L		
	December	4.4 mg/L	10.6 mg/L		
TP	Year Round	1.0 mg/L	-	-	-
pH	Year Round	-	-	6.0 s.u.	9.0 s.u.
Dissolved Oxygen	Year Round	-	-	6.0 mg/L	-
Fecal Coliform	May – September	400 cu/100 mL Geometric Mean		-	-
Mercury, Total Recoverable	-	-	-	-	3.89 ng/L
Cyanide, Amendable	-	-	17 µg/L	-	-

3.3 WWTP PERFORMANCE

Figures 10 - 17 show WWTP performance over the 2010 – 2013 period for BOD_5, TSS, NH_3-N, and TP. Overall, the plant was successful at meeting its permit limits during this time. The distribution of effluent phosphorus over 2010 through 2013 is shown in Figure 18.

Figure 10: Weekly Effluent BOD_5

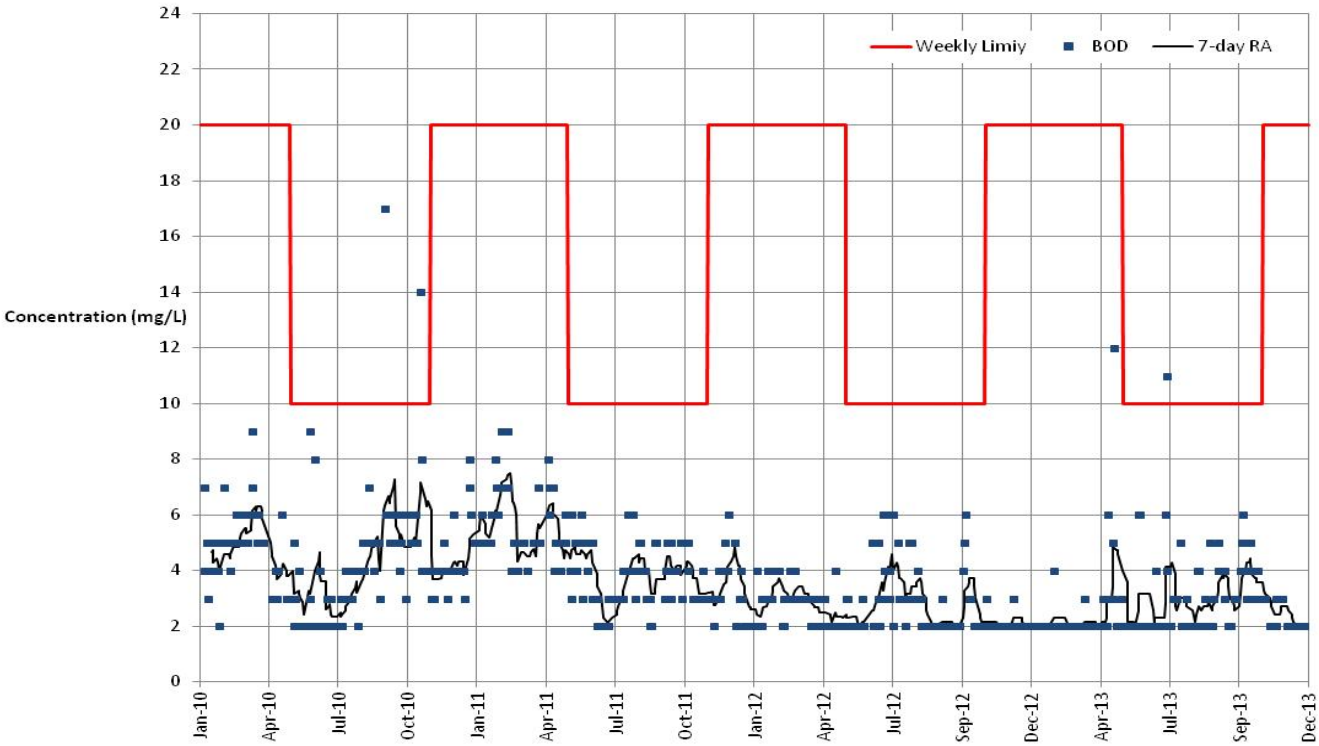


Figure 11: Monthly Effluent BOD_5

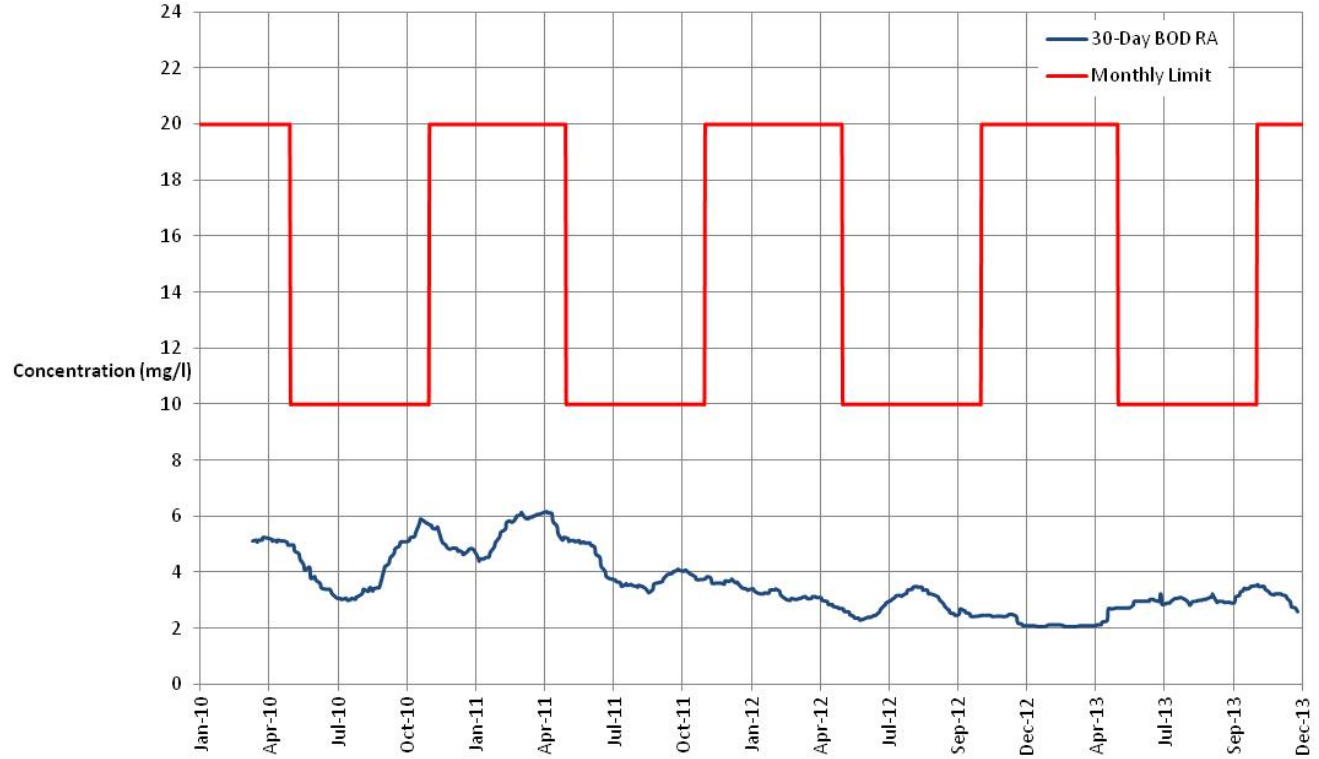


Figure 12: Weekly Effluent TSS

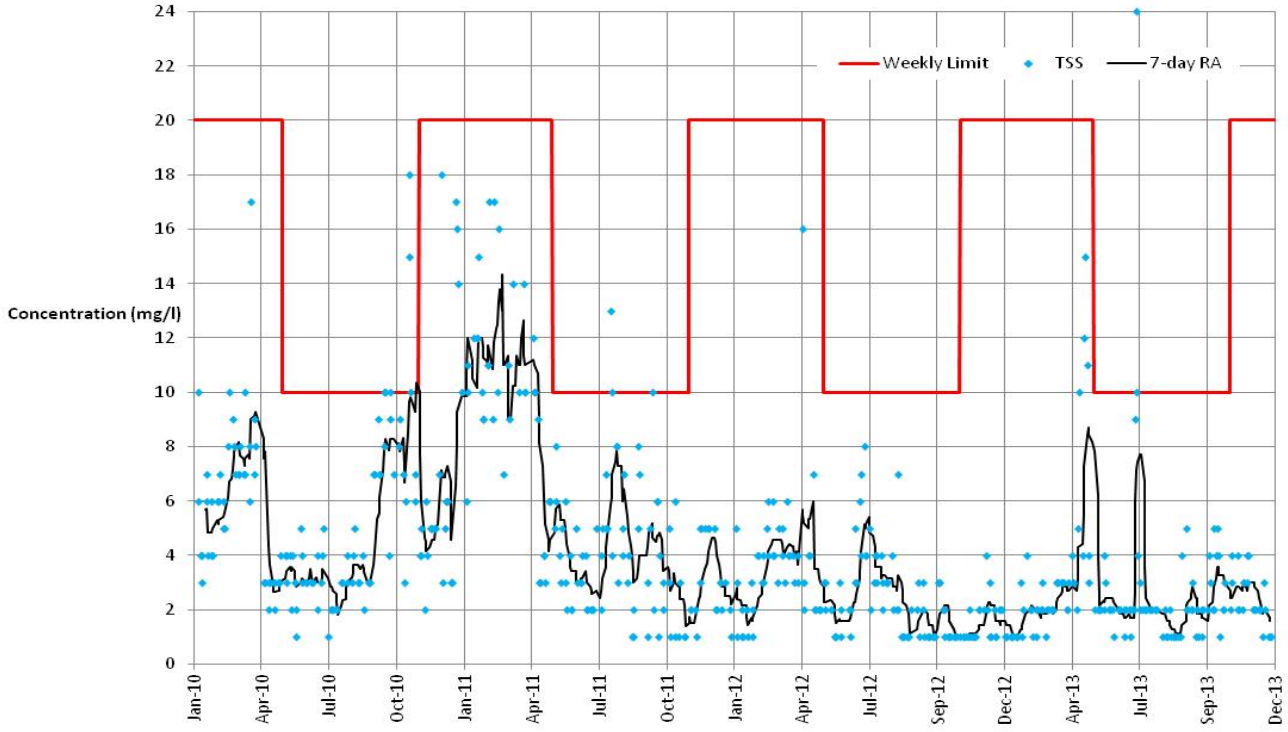


Figure 13: Monthly Effluent TSS

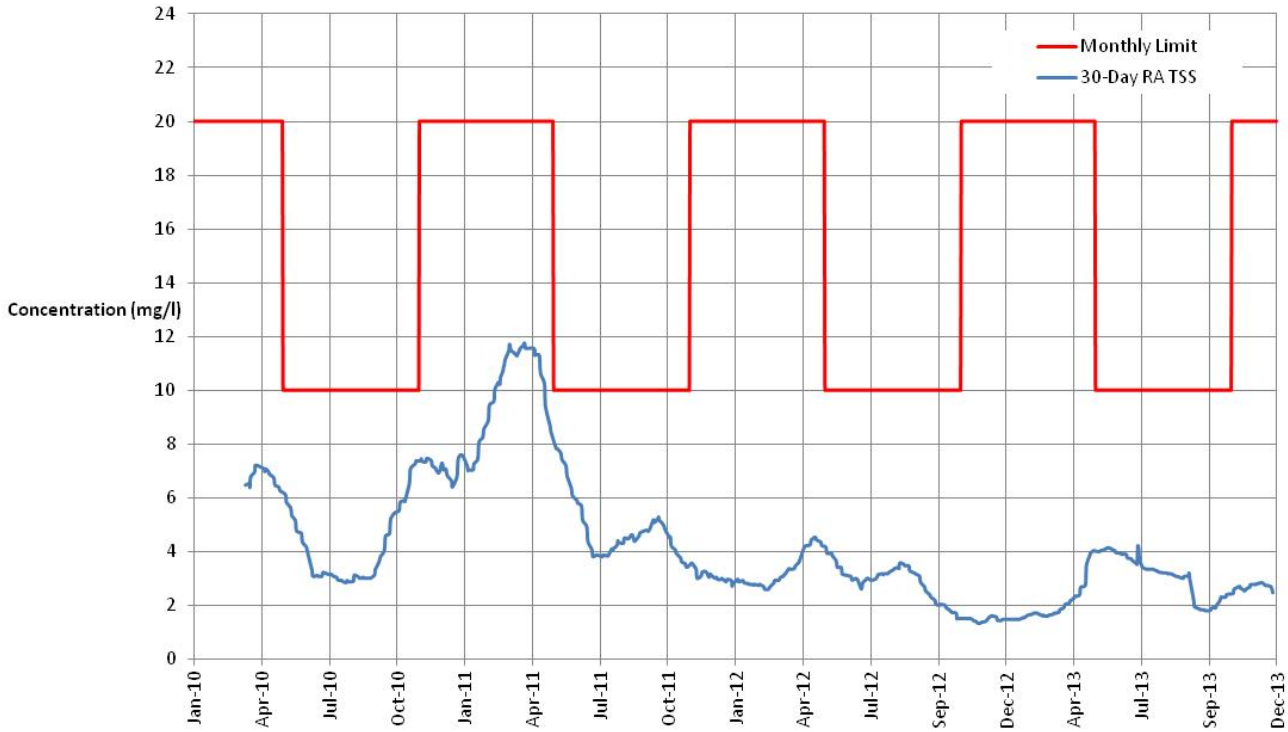


Figure 14: Weekly Effluent TP

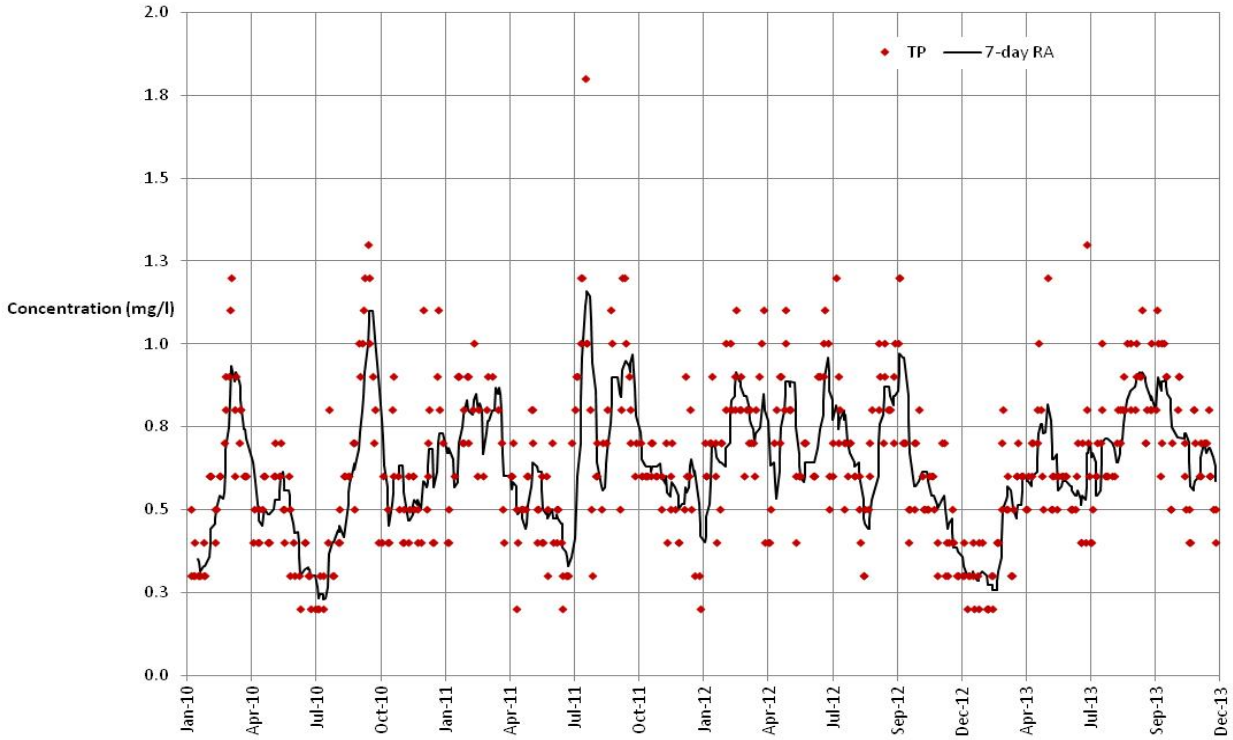


Figure 15: Monthly Effluent TP

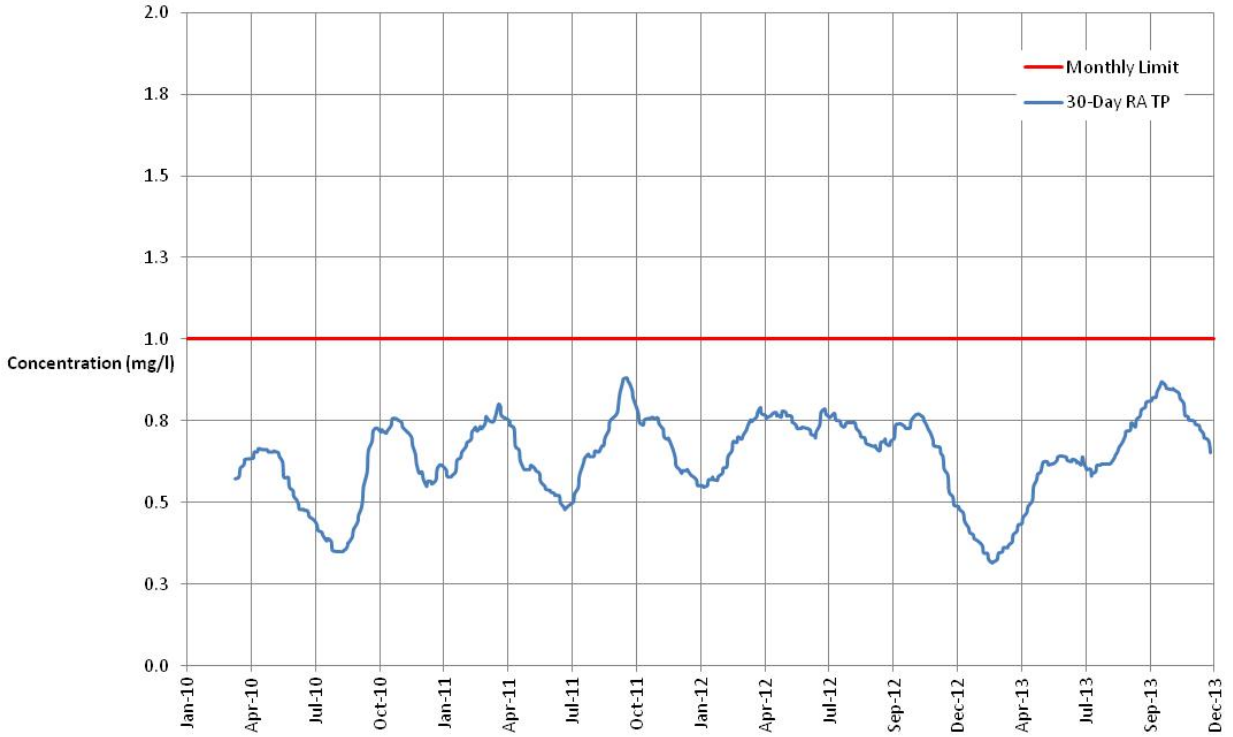


Figure 16: Weekly Effluent N-NH_3

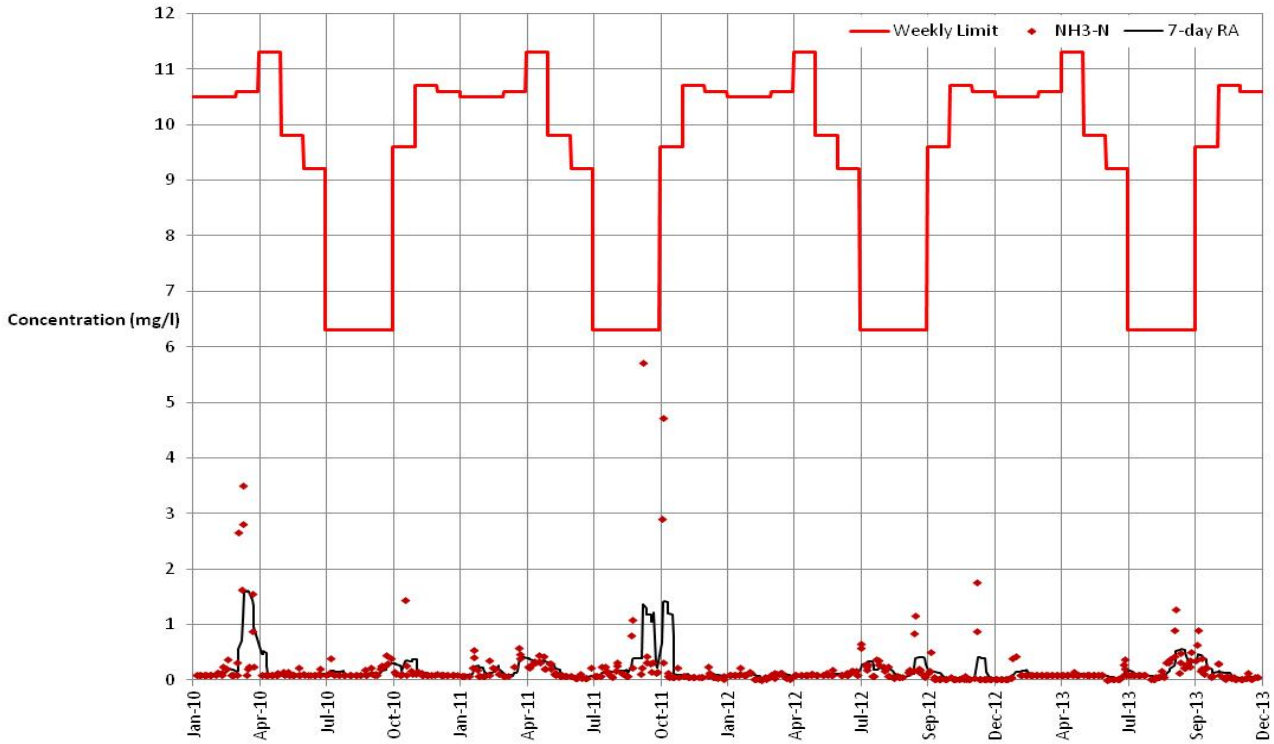


Figure 17: Monthly Effluent N-NH_3

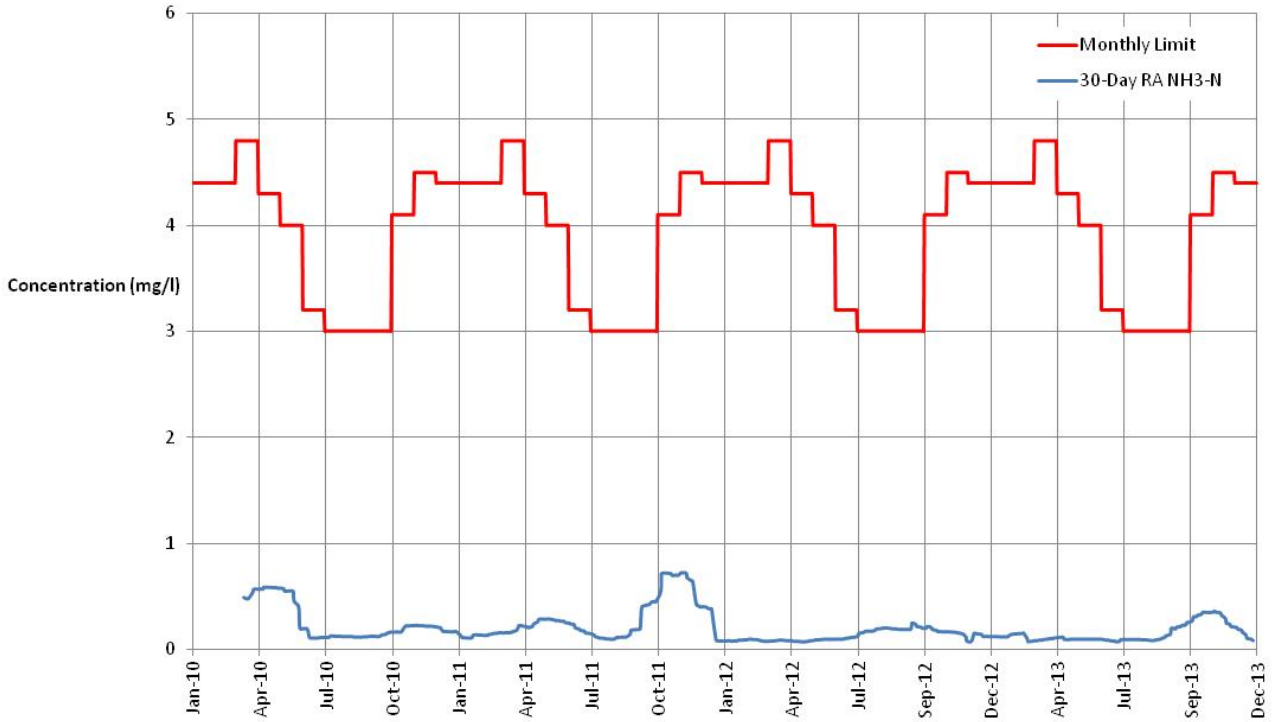
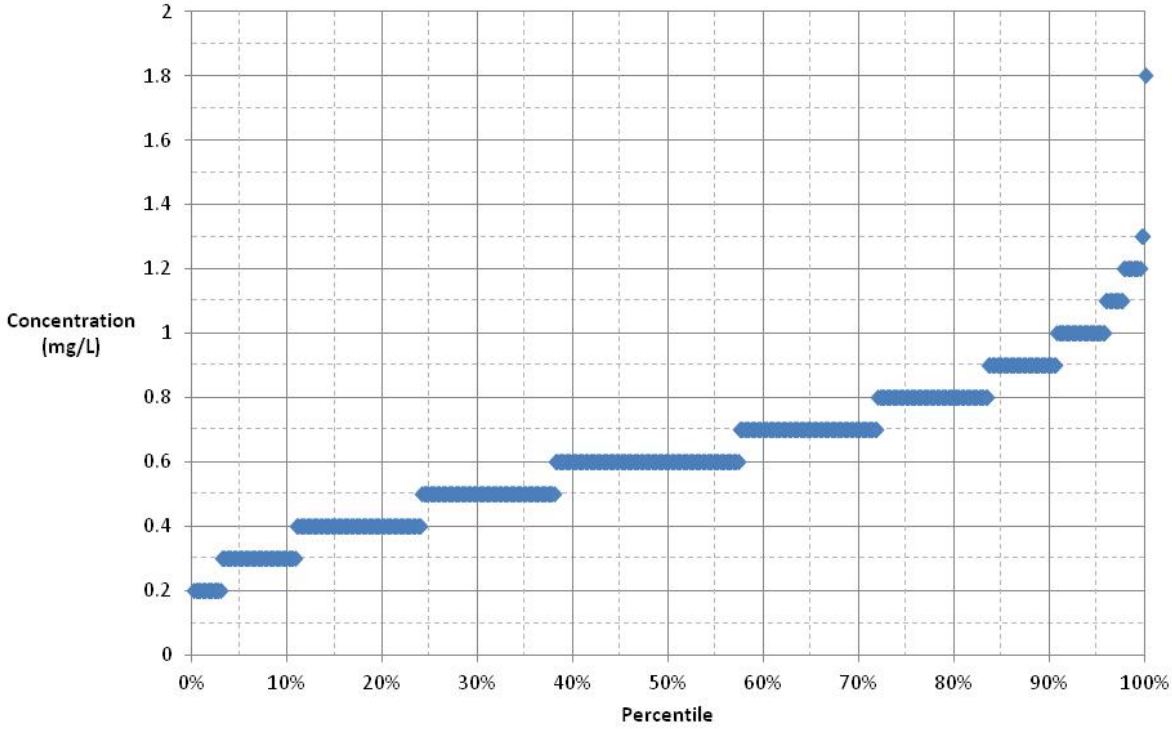


Figure 18: Effluent TP Distribution



3.4 SOLIDS HANDLING

Biosolids produced by the RBC process are co-settled in the primary clarifiers with primary sludge. On average 8,150 gpd of primary sludge is removed from the clarifiers at 4.2% solids. The combined sludge flow is anaerobically digested. Following digestion, the liquid biosolids are transferred via gravity to the secondary digester for supernatant withdrawal and storage. The City uses its own truck and personnel for land application of stabilized, liquid biosolids onto agricultural fields. Table 13 summarizes the quantities of biosolids that were land-applied from 2008 - 2012. Metals concentrations in the biosolids have historically met regulatory values for land application as listed in WAC Chapter NR 204. Biosolids fecal coliform densities range from 72,000 to 230,000, which is well under the 2,000,000 cfu/g required of a Class B product. Based on this data, the biosolids from the Whitewater WWTP meet all requirements for Class B land application.

Table 13: Biosolids Land Applied

Year	Biosolids (gallons)
2008	1,461,600
2009	1,685,097
2010	1,385,663
2011	949,200
2012	1,531,600

CHAPTER IV – EXPECTED FUTURE CONDITIONS

4.1 GROWTH PROJECTIONS

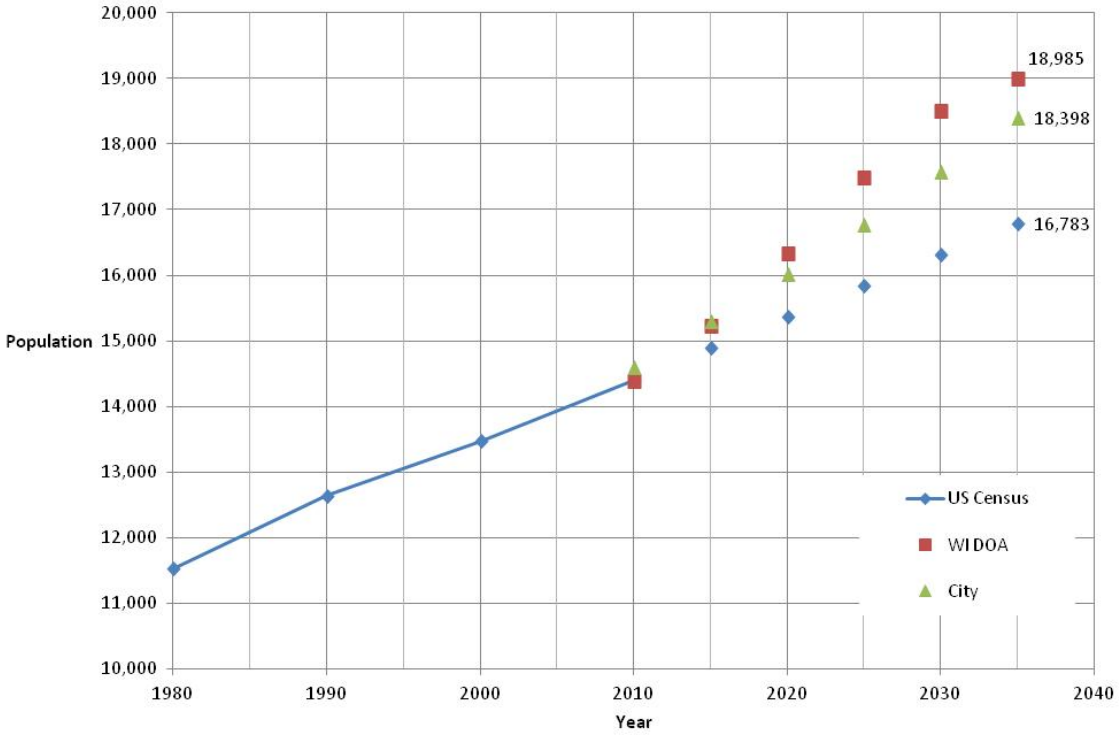
Different projections were developed based on information from the US Census, Wisconsin Department of Administration (DOA), and the City of Whitewater These population projections are presented in Table 14 and Figure 19.

Table 14: City of Whitewater Population Projections

Year	US Census[1]	DOA Projections[2]	City Projections[3]
1980	11,520	-	-
1990	12,636	-	-
2000	13,437	-	-
2010	14,390	14,390	14,597
2015	14,894	15,225	15,289
2020	15,366	16,325	16,013
2025	15,839	17,480	16,771
2030	16,311	18,505	17,566
2035	16,783	18,985	18,398

1. Future years based on linear extrapolation of 1980-2010 data.
2. Wisconsin Department of Administration.
3. Based on an annual growth of 0.93% provided by the City of Whitewater.

Figure 19: City of Whitewater Population Projections



The population of the City of Whitewater has steadily increased for several decades. However, the City is anticipating significant growth through the year 2035. The census population for the City was 14,390 in 2010. The City-led growth study predicted a growth rate of 0.93 percent annually for 2008 to 2013, and the City has adopted this growth rate for long-range planning purposes. Based on this data, the year 2035 (design year) population is projected to be 18,398.

4.2 FUTURE FLOWS AND LOADINGS

A questionnaire was sent to approximately 12 industries in the City of Whitewater primarily to gauge their plans for future expansion. The questionnaire also requested information about use of phosphorus, chlorides, and other chemicals, and interest in sending high strength waste to the anaerobic digesters or accepting treated effluent for cooling or other purposes. Based on water use records and other information, only two Whitewater industries are significant in terms of flow and one of these responded to the survey. The survey responses indicate that no Whitewater industries are planning to expand or change in the foreseeable future. Most industries use commercial or residential water softeners with sodium chloride salt. None of the industries reported needing treatment or digestion of high strength wastes. One industry expressed some interest in treated WWTP effluent to replace approximately 3,200 gpd of makeup process water.

Without any significant planned industrial expansion, future flows and loadings will be assumed to be directly proportional to population growth. The City expects to grow from a population of approximately 15,000 in 2015 to 18,398 in 2035. Historical daily, 98th percentile daily, 98th percentile 7-day, and 98th percentile 30-day flows and loadings will be multiplied by the projected growth factor of 1.23 to

determine design flows and loadings for 2035. Peak instantaneous flows are expected to remain the same. These values will be used in evaluating treatment alternatives. Table 15 summarizes the design 2035 average, max month, and max week for various pollutants.

Table 15: 2035 Design Loadings

Parameter	Average Day	Max Day	Max Week	Max Month
Flow	1.85 mgd	8.4 / 11[1] / 15 mgd[2]	5.2 mgd	3.8 mgd
BOD_5	3,065 ppd	5,562 ppd	4,640 ppd	4,015 ppd
TSS	4,112 ppd	11,595 ppd	8,031 ppd	6,381 ppd
$N\text{-}NH_3$	348 ppd	568 ppd	526 ppd	458 ppd
TP	86.1 ppd	246 ppd	160 ppd	135 ppd

1. Peak Hour
2. Peak Instantaneous Flow

4.3 POTENTIAL REGULATORY ISSUES

This section will provide a discussion of the impact of current and future regulations on the Whitewater WWTP. Currently the WWTP is operating on an expired WPDES permit a new permit is expected to be released in fall of 2014.

4.3.1 PHOSPHORUS

Wisconsin, along with other states in USEPA Region 5, elected to develop its own nutrient criteria rather than using the USEPA's ecoregional criteria. Over the past several years, the WDNR has contracted the USGS to monitor various sizes of streams to determine the impact of nutrients on algal growth and aquatic life. Phosphorus criteria were developed based on these studies. Wisconsin's final phosphorus criteria were adopted by the Natural Resources Board in 2010 and went into effect on December 1, 2010. The following new water quality criteria from revised WAC Chapter NR 102 apply to Whitewater's discharge:

Rivers (e.g., Bark and Rock Rivers): 0.1 mg/L
Streams (e.g., Whitewater Creek): 0.075 mg/L

Revisions to NR 217 provide a method for calculating Water Quality-Based Effluent Limits (WQBELs) from the NR 102 criteria. This calculation allows for dilution with the receiving stream. However, if the receiving stream has growing season concentrations of phosphorus above the NR 102 criterion, the WQBEL would be set at the criterion. In Whitewater's case, this results in a WQBEL of 0.075 mg/L.

According to the Department Memo in Appendix TM2-B, the Whitewater WWTP will receive a revised phosphorus limit of 0.075 mg/L expressed as a six month average and a 0.225 mg/L monthly average in their next WPDES permit. In addition, it will also receive less restrictive monthly average mass limits. The next WPDES Permit will also include a compliance schedule for achieving these new limits, as well as interim limits in effect until WQBELs must be achieved. The Department Memo in Appendix TM2-B states "1.0 mg/L should be used as an interim limit."

4.3.2 EFFLUENT MERCURY LIMITATIONS

Mercury is a persistent and bioaccumulative pollutant. Found naturally, it can also be released from energy production and manmade products to cause health and environmental problems. Once released into the environment, mercury cycles and converts to the toxic form, methyl mercury, and can be difficult to remove.

The WDNR has adopted effluent mercury standards in NR 105 and NR 106. Quarterly effluent mercury sampling is required in Whitewater's recently expired permit. Through the Green Tier program, Whitewater voluntarily pledged to go beyond regulatory environmental compliance and implement a mercury pollutant minimization program, thereby being eligible for the higher alternative mercury limit of 3.89 nanograms per liter (ng/L) instead of the default water quality-based effluent limit of 1.3 ng/L. The expired permit requires mercury PMP annual reports be submitted annually in February. Whitewater is working to keep mercury out of the environment through recycling and promoting mercury-free alternatives.

It should be noted the current Whitewater biosolids mercury concentrations are significantly less than 17 milligrams per kilogram (mg/kg) stipulated for high quality sludges in NR 204 of the WAC.

4.3.3 CHLORIDE REGULATIONS IMPACT

The WDNR has adopted effluent chloride standards in NR 105 and NR 106. The next WPDES Permit will require chloride monitoring in the fourth year of the permit (Appendix TM2-B). Whitewater should remain aware of the sources of chlorides (for example, water softeners, deicing chemicals in I/I, and some industrial sources) and review any industrial or other proposed changes in the water supply or collection system that may affect chlorides.

4.3.4 COPPER REGULATIONS IMPACT

The WDNR has adopted effluent copper standards in NR 105 and NR 106. The next WPDES Permit will require copper monitoring in the fourth year of the permit (Appendix TM2-B). Whitewater should be aware of copper sources(i.e., water supply piping and some industrial sources) and review any industrial or other proposed changes in the water supply or collection system that may affect copper.

4.3.5 THERMAL REQUIREMENTS

Whether temperature limits are placed in permits depends on effluent temperatures, receiving stream dilution, and the health of the aquatic life in the stream. The WDNR has determined that new permit will not contain a thermal limit.

4.3.6 EMERGING NATIONAL ISSUES

According to the Water Environment Federation (WEF) Government Affairs Committee, three of the main issues emerging at the national level are sustainability, financing, and microconstituents. The WEF is supporting sustainability measures, particularly with respect to stormwater management or "green infrastructure" measures and energy conservation measures. In Wisconsin, funding is available for

certain stormwater management projects through various programs including the state revolving fund. Funding is available from Focus on Energy and some power and gas companies for studying and implementing energy conservation measures. This funding could be available to Whitewater for projects that increase energy efficiency (lighting, insulation, replacement of low-efficiency motors or equipment, installation of VFDs, automation and optimization of systems) or projects that more fully utilize digester biogas.

Microconstituents are also known as "compounds of emerging concern." They include pharmaceuticals, personal care products, and other compounds that are presently not specifically regulated in wastewater. The WDNR currently has the ability to regulate microconstituents from WWTPs only if a specific problem, such as a directly-linked adverse impact on aquatic life, is demonstrated. Eventually, advanced oxidation processes or membrane treatment may be required to treat microconstituents. Some communities have taken a pollution prevention approach and have implemented drug take-back programs to help reduce the concentrations of pharmaceuticals in wastewater. Successful drug take-back programs have been implemented in Marshfield, Madison, and several other Wisconsin communities. Whitewater could consider sponsoring a program such as this at the City or county level.

4.3.7 BIOSOLIDS REUSE

Biosolids disposal at the Whitewater WWTP follows the requirements of WAC Chapter NR 204, Domestic Sewage Sludge Management. The historical biosolids data show low metal content and therefore satisfy one of the requirements for "high quality" sludge. The Whitewater WWTP generates Class B biosolids based on the fecal coliform level in the solids being land spread.

Class B biosolids by definition have a higher level of pathogenic bacteria than Class A biosolids. Local farmers have accepted the Class B sludge for disposal on agricultural land. The majority of POTWs in Wisconsin produce Class B sludge.

Producing Class A sludge would provide the following advantages over Class B sludge:

1. The sludge would contain a lower level of pathogenic bacteria. Class A biosolids must have a fecal coliform concentration of less than 1,000 most probable number (MPN) per gram total solids.
2. Land application site evaluation reports would not be required and bulk sludge land application reports would not need to be filed with the WDNR.
3. Whitewater would not need to receive approval from the WDNR prior to applying sludge.
4. More sites would potentially be available to apply the sludge.
5. Since Class A biosolids have lower levels of pathogens, there is a lower threat to human health, and therefore, fewer measures are required to minimize human contact with the sludge.

To be considered "exceptional quality sludge" or Class A, the sludge must receive prescribed treatment to reduce pathogens and vector attraction. The prescribed treatment options available include lime stabilization, composting, heat drying, thermophilic aerobic digestion, temperature phased anaerobic digestion, heat treatment, pasteurization, or an equivalent process to further reduce pathogens. Based on the current acceptance of Class B biosolids for beneficial reuse and the increased costs necessary to comply with Class A biosolids regulations, it is assumed the Whitewater WWTP will continue to use the current methods of biosolids stabilization and disposal for the foreseeable future.

CHAPTER V – EXISTING WASTEWATER TREATMENT PLANT

5.1 HISTORY

The City of Whitewater operates an advanced secondary WWTP that discharges to Whitewater Creek. The majority of the WWTP facilities were constructed in 1982, with supplemental air blowers for the rotating biological contactors (RBCs) installed in 1989. In 1996, screening, grit removal, chemical phosphorus removal, and septage receiving facilities were constructed. A 2010 project replaced some aging equipment and added UV disinfection. A digester gas fueled boiler was installed during a 2012 project. This section presents a summary of the existing processes and equipment as well as a review of the condition of the facility.

5.2 WASTEWATER TREATMENT PLANT OVERVIEW

Figures 20 and 21 in Appendix TM2-A show a schematic diagram of the WWTP and an aerial photo. Appendix TM2-C contains detailed information regarding process capacity and basin sizes.

Wastewater is conveyed to the treatment plant from the City of Whitewater through a 48-inch-diameter influent sewer. Raw wastewater passes through a 2-inch manual bar screen as it enters the influent wet well. Four dry-pit, submersible influent pumps discharge wastewater from this wet well through a magnetic flow meter. The raw wastewater is sampled immediately downstream of the flow meter. The metered flow is conveyed to a mechanically cleaned bar screen with 3/8-inch openings. Screenings are washed, pressed, discharged to a dumpster, and landfilled. Screened wastewater flows to a vortex grit collector. This unit process removes grit from the influent before introduction to the primary clarifiers. Grit is dewatered in a classifier and landfilled. The influent wastewater is divided between two primary clarifiers. In these units, settleable solids are removed by providing an area of quiescent settling.

Primary clarifier effluent flows to the RBC units. Biological treatment occurs in the RBCs, which are housed in three buildings. Each building contains two trains of eight RBC units. Wastewater flows perpendicular to the shafts. The last four units in each train are high-density media RBCs. Staging is accomplished by using baffles between the RBC units. Supplemental air is provided by one of two blowers to increase dissolved oxygen (DO) levels and provide a means to strip the RBC shafts of excess biomass. Because of changes in industrial loadings, influent loadings are much lower than the original design and Whitewater currently uses only five of the six RBC trains for treatment.

RBC effluent flows are split between two secondary clarifiers at a division box. Phosphorus removal chemical (alum) is added to the primary clarifier splitter box and the RBC effluent upstream of the secondary clarifiers in the division box. Secondary clarifier effluent flows to a four-cell gravity filter. This unit serves to remove additional solids from the secondary effluent before entering the chlorine contact tank. The chlorine contact tank has been modified from its original purpose to house UV disinfection equipment. Disinfected effluent from the chlorine contact tank flows to the postaeration tank where air is added to increase DO levels above discharge permit requirements. Plant effluent is metered in a Parshall flume and discharged to Whitewater Creek.

Secondary sludge that has settled in the secondary clarifiers is pumped into the primary clarifier division box. This serves to co-thicken the secondary solids along with the primary solids in the primary clarifier. Primary and secondary sludge that settles in the primary sedimentation tanks is withdrawn and pumped directly to the primary anaerobic digester. Secondary sludge can also be pumped directly to the primary digesters without co-thickening, if desired. The primary anaerobic digester provides an environment where organic matter is digested and the solids stabilized. Digested sludge is transferred to the sludge storage tank (converted secondary digester) for storage. Sludge storage tank supernatant is returned to the influent wet well. Digested sludge is loaded onto trucks at the liquid sludge loading station. Digested sludge is field-applied directly in liquid form. Methane gas produced by the digesters is either used in boilers to heat the digesters or flared to a waste gas burner. Other utilization equipment, including a compressor and gas storage sphere, are no longer used.

5.3 UNIT PROCESS EVALUATION

This section evaluates the ability of the existing facilities to treat planned future flows and loadings and compliance of the current facilities with NR 110 of the Wisconsin Administrative Code (WAC) and other applicable design criteria. The review focuses on the rated capacity, age, reliability, and other factors related to operating and maintaining the existing facilities.

5.3.1 SITE

The site roadways are deteriorating and should be milled and overlaid at least if not entirely rebuilt depending on traffic changes and expected truck routes. When this is done, additional driveway access should be added to the UV area. Waste hauler access to new or relocated receiving facilities and to the digesters should also be considered. The roadway lights are nonfunctional and should be replaced with automatically controlled LED fixtures. At time times, trucks lined up for Jon's Disposal on the current access drive block plant access. An automated entrance gate should be considered to allow easy access for haulers and plant staff. Several areas of the perimeter fence are in need of repair.

5.3.2 SITE UTILITIES AND EMERGENCY POWER

The WWTP has a well on site to provide potable water. A local supplier provides jugs of laboratory quality water for use in testing. The high mineral content of the well water has made the water unsuitable for WWTP staff to drink; therefore, the staff drinks bottled water at the plant. The City would like to evaluate the extension of City water service to the WWTP.

Grounding for some buildings is poor. It appears the original ground for each of the buildings (except the Administration and Digester Buildings) was from the ground conductors run with the power feeds to each of the buildings. The Filter Building and the two sludge Pump Buildings grounding was improved in 2010. Three ground rods and associated ground conductor should be installed and tested for each Motor Control Center (MCC) in each of the remaining buildings. All MCCs in the plant are from the original construction in 1982, with the exception of the Preliminary Treatment Building MCC. The typical life expectancy for this type of equipment is 20 years and, therefore, this equipment is near the end of its useful life. Replacement parts have become difficult to find and expensive. Plant staff has indicated there are numerous broken conduits throughout the plant that have led to flooding of electrical vaults.

The broken conduits should be repaired and measures taken to avoid water entering electrical vaults as this creates a serious safety problem.

The emergency power to the plant is provided by two dual-fuel generators. The generators were installed in 2006 and can burn natural gas or diesel. A single generator has the capacity to power the entire plant. A single power feed serves the plant. The transformer and switchgear are at the end of their design lives and should be replaced.

The existing programmable logic controllers (PLCs) throughout the plant are currently interconnected using three-conductor shielded cable. Replacing this wiring with fiber-optic cable and setting up a self-healing ring-type configuration for communication between the PLCs is recommended. Fiber-optic cable is not susceptible to lightning strikes and electrical noise, which can damage the PLCs or cause operational issues. The self-healing ring provides redundancy in the fiber-optic communication loop such that if a fiber is damaged, the system automatically switches to a second pair of fibers to keep the communications functional.

5.3.3 SEPTAGE AND HAULED WASTE RECEIVING FACILITIES

The current septage receiving facilities are located inside the WWTP fenced area immediately next to an air intake for the Administration Building. When haulers unload, the Administration Building receives a strong dose of odors. Relocating the septage receiving outside the WWTP fence would allow haulers to discharge outside the hours when the gate is open, potentially improving Whitewater's ability to attract septage and holding waste haulers and increase revenue from hauling fees. Relocating the septage receiving facilities would also significantly reduce nuisance odors at the Administration Building. A key or card access sliding gate could be installed outside the current gate to continue hauler access to the septage receiving facilities.

The holding tank facilities allow the WWTP staff to slowly add high strength industrial wastes into the influent wet well. The current facilities adequately serve this function, although there is no flow monitoring downstream of the throttling valve, so it is difficult for staff to know the rate at which the wastes enter the influent wet well. A submersible grinder- or chopper-style pump with magnetic flow meter could be considered for the future.

5.3.4 INFLUENT PUMPING

Influent wastewater enters the influent pumping wet well through a 48-inch sewer. Solids settle in the influent sewer and wet well during low flows. Raw wastewater passes through a 2-inch manual bar screen that prevents large objects from damaging the influent pumps. Filter backwash is pumped from the clearwell to the plant sewer where it combines with digester supernatant. These recycle flows are returned to the influent pumping wet well. Septage receiving and other plant recycle loads are not metered or sampled separately from the influent flow. Four dry pit submersible pumps with a firm capacity of 11.0 mgd pump raw wastewater to the preliminary treatment building. A magnetic flow meter measures influent flow downstream of the pumps. The meter was replaced in 2005. The magnetic flow meter manufacturer recommends that the meter be installed at least two pipe diameters downstream of a bend in the pipeline and five pipe diameters upstream of a bend in a pipeline to achieve the rated accuracy of the unit of ±0.5 percent of actual flow. The meter has an elbow

immediately downstream. According to the meter manufacturer, this is a nonideal installation that could result in lower accuracy. Because there is effluent metering available at the plant as well, the somewhat lower accuracy should not be a primary concern.

Grease and scum accumulate in the wet well despite the installed mixer. The main influent gate to the plant cannot be completely closed. Staff suspect that that grit and stones along the bottom keep the gate from sealing and are concerned about the overall condition of the gate. If plant influent flow must be stopped to replace the gate, it would be advisable to consider dividing the wet well into two halves and coating the concrete to facilitate future maintenance and extend the life of the structure. The 30-inch force main to the preliminary treatment building has trouble with grit accumulations. The City may wish to consider modifying their control algorithm to include a periodic high flow flushing cycle to help minimize deposition.

5.3.5 PRELIMINARY TREATMENT

A 30-inch force main conveys raw wastewater to the preliminary treatment building which was constructed in 1996. An Infilco Degremont mechanical screen removes rags and debris that cannot pass through the 3/8-inch opening in the screen. The existing screen is rated for a capacity of 10.0 mgd according to the operation and maintenance manual. However, staff report that flows over 8.0 mgd overtop the bypass weir to the adjacent manual screen channel. Grit resuspended during peak flows contributes to problems with screen capacity. The screen is reaching the end of its mechanical life and with a design peak hour flow of 11 mgd and peak instantaneous flow of 15 mgd additional screening capacity should be considered. A smaller screen size should also be considered to maximize debris capture. Screen opening size versus hydraulic capacity should be considered carefully.

Stop gates used in the preliminary treatment building channels often become wedged in place and are difficult for staff to move by hand. The preliminary treatment building channel drain system is problematic.

A vortex grit unit, installed in 1996, has a nominal capacity of approximately 12 mgd, which is greater than the design peak hourly flow. Grit settles to the bottom of the basin and is pumped to a grit classifier by a recessed impeller vortex grit pump. During peak flow events, the grit pump needs to run continuously. Grit is dewatered in the classifier and discharged to a dumpster for landfilling along with screenings. The grit pump and classifier are now nearly 20 years old and showing signs of deterioration and should be replaced with new equipment. The City should consider moving from a grit classifier to washer to remove additional organic material from the grit collected.

The grit and screen container area is very odorous. Washing of grit and screenings would likely improve the situation. Consideration should be given to modifying ductwork system such that supply air is provided downward along the perimeter of the space and exhaust air is taken from directly over the storage vessel. Air is currently blown high across the storage vessel and also exhausted high on the opposite side of the space.

5.3.6 PRIMARY CLARIFICATION

Wastewater flows by gravity from the grit chamber to two 70-foot-diameter primary clarifiers. The clarifier drives and mechanisms were originally installed in 1982 with the mechanisms and bearings replaced in 2010. However, the clarifier mechanisms need to be rebalanced and the weirs re-leveled to improve performance. The sludge from the secondary clarifiers is fed into one side of the primary clarifier splitter box and does not divide evenly between the clarifiers. The clarifier drives were replaced in 1999 and continue to perform well. The yard valves around the primary clarifiers do not function well and are installed too close to the tank leading to potential undermining of the tank when excavated for replacement.

The clarifiers have a total surface area of 7,697 square feet, which provides a surface overflow rate (SOR) of 240 gpd/ft^2 at the design average daily flow rate of 1.85 mgd. WAC NR 110.18 sets the maximum hourly surface settling rate at 1,500 gpd/ft^2. The rated peak capacity of the clarifiers is 11.5 mgd at a SOR of 1,500 gpd/ft^2. However, primary and secondary sludge is currently cosettled in the primary clarifier. In such situations, 10 States Standards recommends that peak hour SORs be limited to 1,200 gpd/ft^2 which equates to peak hour flow capacity of 9.24 mgd.

Co-settled primary and secondary sludge from the clarifiers is removed using rotary lobe pumps installed in the 2010 project and pumped to the anaerobic digesters. The rotary lobe pumps are wearing prematurely, with rotors being replaced every 7 months. The excessive wear could be caused by grit in the sludge, cavitation, or positive suction issues and will need to be investigated further. If a solution cannot be found pump replacement maybe a consideration; however, the City would prefer to continue to use these pumps if they can be made to function without excessive wear.

Scum handling has been troublesome. The scum well is divided into two parts by a baffle wall with the rotary lobe sludge pumps drawing out of the inlet side and a small submersible pump on the subnatant side. Debris accumulates in the scum well and the sludge pumps do not do a good job removing grease and scum. A larger submersible pump with internal recycle to mix the scum well contents should be considered for this application.

The Primary Pump Building contains incandescent lighting. Consideration should be given to upgrading the lighting to more efficient lighting. An investigation would be required to determine the payback for a more efficient lighting system based on estimated annual hours of operation. The Primary Pump Building electrical equipment shows signs of hydrogen sulfide damage. The copper components inside the MCC and the exposed copper ground wire near the floor are black. Consideration should be given to providing additional ventilation with outside air to reduce the exposure of the electrical equipment to hydrogen sulfide.

5.3.7 ROTATING BIOLOGICAL CONTRACTORS

The RBC facilities were installed in 1982. The WWTP staff replaced one failed RBC shaft several years ago at the cost of $10,000. Two additional shafts broke recently and have not yet been replaced. The WWTP staff typically replaces six bearings a year at a cost of $18,000 a year. The RBCs are housed inside buildings to maintain a higher temperature to improve biological treatment. Sheltering the RBCs in buildings also gives operators the ability to more comfortably and easily maintain the units during

inclement weather. The high humidity environment has degraded the buildings' heating, ventilating, and air-conditioning (HVAC) systems. The HVAC system requires significant modifications. Apparent roof leakage has caused failure of a roof support beam in RBC building No. 3. A new column has been added to provide support of the beam and roof, and some HVAC equipment has been removed from all three buildings and openings capped to eliminate a possible route of precipitation entry. During this work, the roofing was inspected by a contractor and the insulation below the roofing was found to be saturated with moisture in several areas. A portion of the roofing no longer slopes properly to roof drains. If the City elects to keep the RBCs for future biological treatment, the building roofing, and a portion of the roofing support system should be replaced. Alternatively, the buildings that enclose the RBCs could be removed. However, the impact of this building removal on winter temperatures and treatment efficiencies should be evaluated before this alternative is selected.

Snails feed and accumulate on the RBC biomass and their shells cause wear on pumping equipment. Currently, operators manually remove the snails in a difficult and time-consuming process. An extension of the access road to the north side of the RBCs would allow easier Vactor truck access and reduce the time required to perform this routine maintenance item. The positive displacement blowers are due for replacement.

The RBC facilities were evaluated briefly to assess their capacity to treat future design loadings. The peak weekly average soluble BOD_5 ($SBOD_5$) and total kjeldahl nitrogen (TKN) loadings were determined based on the 2010 – 2013 data to estimate the RBC capacity available to meet weekly effluent limits. The BOD_5 removal in the primary clarifier was assumed to be similar to their 2010 – 2013 average performance of 37 percent removal. The projected 2035 influent BOD_5 average loading is 3,065 lb/day. At 37 percent BOD_5 removal, the primary effluent is projected to contain 1,931 lb/day BOD_5. Assuming a $SBOD_5$ to total BOD_5 ratio in the primary effluent of 0.655, the primary effluent would contain 1,265 lb/day $SBOD_5$. The 2035 weekly peak $SBOD_5$ loading rate is projected to be 2,036 lb/day (4,640 x 0.67 x 0.655). To meet weekly NH_3-N effluent limits, nitrification must occur in the RBC units. In order for nitrification to proceed rapidly, the $SBOD_5$ concentration must first be reduced to below 10 to 15 mg/L (WEF, MOP 8, 1992). The nitrification area requirements for RBC media at a given flow rate were determined on the basis of the area required to reduce the RBC influent NH_3-N level to the winter weekly average effluent requirements of 10 mg/L.

Generally, nitrification designs should use TKN as the basis for sizing RBCs because TKN is converted to NH_3-N in the RBCs. The 2035 design influent maximum week NH_3-N loading is 526 lb/day, assuming a typical NH_3-N to TKN ratio of 0.75 the peak weekly TKN loading rate expected is 701 lb/day. Conservatively assuming 10 percent removal of TKN in the primary clarifiers, the 2035 weekly peak TKN influent RBC loading rate is projected to be 631 lb/day. When ammonia nitrogen concentration in the wastewater exceeds 4 to 5 mg/L, design data published by WEF, MOP 8, indicate that 0.3 lb of TKN could be oxidized per 1,000 square feet (sq ft) of media at 55ºC. During the winter, wastewater temperatures can drop to around 45ºF. Consequently, the nitrification rate was adjusted by a temperature correction factor of 0.57, resulting in a nitrification rate of 0.17 lb TKN/1,000 sq ft at 45ºF. Using these conditions for sizing requirements, it was determined that approximately 2,806,000 sq ft of media would be required to remove weekly peak TKN influent RBC loading of 631 lb/day down to a winter weekly average NH_3-N effluent limit of 10 mg/L (154 lb/day).

The remaining effective media area is assumed to be utilized for BOD_5 removal. With 6,240,000 sq ft of total media area, this would leave 3,434,000 sq ft available BOD_5 capacity. Based on the USEPA study Review of Current RBC Performance and Design Procedures, with an adjustment for a winter wastewater temperature of 45ºF a soluble organic loading rate (SOLR) of 1.54 lb/day/1,000 sq ft of media area will be used to determine the area requirement for the removal of $SBOD_5$ down to 20 mg/L (309 lb/day). The media requirement would be 1,122,000 sq ft based on a 2035 $SBOD_5$ peak week loading rate of 2,036 lb/day to the RBCs and the SOLR of 1.54 lb/day/1,000 sq ft. The total media area requirement to meet the winter NH_3-N effluent standard of 10 mg/L at peak weekly 2035 conditions is estimated to be 3,928,000 sq ft. This is 63 percent of the current RBC surface area of 6,240,000 sq ft. Table 18 summarizes the area requirements for the RBC process.

Table 16: RBC Area Cold Weather Requirements at 2035 Max Week Loadings

Parameter	Area (square feet)
Nitrogen Removal	2,806,000
BOD_5 Removal	1,122,000
Total Required	3,298,000
Total Available	6,240,000
% Required	63%

It should be noted that BOD_5 removal in the primary clarifiers may decrease as flows and loads increase. It appears the RBCs will have adequate capacity as long as the primary clarifiers remove at least 37 percent of the 2035 influent BOD_5 load.

The electrical equipment for the three RBC Buildings is located in the hallways connecting the three RBC Buildings together. The RBC Buildings are very damp buildings. Additional investigation is needed and consideration should be given to use HVAC systems to provide a slight positive pressurize to the hallways to prevent the moist RBC Building environment from getting into the hallways. The Blower Room connected to RBC Building No. 1 contains incandescent lighting. Consideration should be given to upgrading the lighting to more efficient lighting. An investigation would be required to determine the payback for a more efficient lighting system based on estimated annual hours of operation.

5.3.8 SECONDARY CLARIFICATION

Wastewater flows by gravity from the RBCs to two 70-foot-diameter secondary clarifiers. The clarifier drives and mechanisms were originally installed in 1982 with the mechanisms and bearings replaced in 2010. However, the clarifier mechanisms need to be rebalanced and the weirs re-leveled to improve performance. The clarifier drives were replaced in 1999 and continue to perform well. Scum beach elevations were adjusted. Secondary sludge is pumped to the primary clarifier. It can also be pumped directly to the digesters. The secondary clarifiers have a shallow side water depth of 10 feet. Density current baffles were also installed in 2010 to reduce the chance for solids washout at peak flows. Algae tends to grow and accumulate on the clarifier troughs.

The two secondary clarifiers have a total surface area of 7,700 square feet, which provides an SOR of 1,429 gpd/ft^2 at the design peak hour flow rate of 11 mgd. The WAC NR 110.18 sets the maximum hourly surface overflow rate at 1,200 gpd/ft^2, which gives the clarifiers rated peak capacity of 9.2 mgd. The design peak hourly flow of 11 mgd is greater than the rated capacity; however, the WPDES permit allows bypassing a portion of the peak flow around the secondary clarifiers during wet weather. The final clarifier scum beaches have submerged at peak flows unless the bypass line is opened.

The Secondary Pump Building contains incandescent lighting. Consideration should be given to upgrading the lighting to more efficient lighting. An investigation would be required to determine the payback for a more efficient lighting system based on estimated annual hours of operation.

5.3.9 PHOSPHOROUS REMOVAL

Chemical phosphorus removal facilities were installed in 1996. The plant has consistently met effluent limits using the existing alum phosphorus removal system. The alum containment area is drained via a sump in the middle of the storage area sealed with a rubber stopper. If there is a leak in the storage area, staff have to reach across with a pole and dislodge the plug. A chemically resistant sump pump with a discharge running over the working area equipped with a quick connect hose fitting would be more useful in controlling potential spills. The existing alum feed pumps have no output signals to the existing control system. If a pump fails, it will not be noticed until the next walk-around check.

The ventilation system in the storage area is activated when a person enters the room and must be manually deactivated. This has caused past freezing problems with alum's relatively high freezing point when the ventilation system is inadvertently left running. A tempered supply air ventilation system or additional ventilation controls should be considered, such as motion sensor and timer to avoid the need for a manual shut off. The existing facilities have adequate capacity to meet current effluent limits through the planning period but with more stringent phosphorous limits forthcoming, the current system will be inadequate if the facility does not incorporate biological phosphorus removal. The emergency wash station appears to receive only a cold water supply. Consideration should be given to adding a source of heat to allow for a tempered supply.

5.3.10 EFFLUENT FILTRATION

At the future peak hourly design flow of 11 mgd, the effluent gravity filter would be loaded at a rate of 5.8 gpm/sf with one filter out of service. At the future maximum day flow of 8.4 mgd, the loading rate would be 4.4 gpm/sf with one filter out of service. These rates are within the typical range of 2 to 6 gpm/sf gravity filters. According to WAC NR 110, filtration rates may not exceed 5 gpm/sf with one filter out of service at peak hourly flows. The 5.8 gpm/sf value is above this. Therefore, the filters are not quite adequate for the future design flows, although the WPDES permit allows bypassing a portion of the flow around the filters during wet weather. The WAC also requires that backwash reservoirs be provided with the filters. The total backwash storage should equal or exceed the volume required for two complete backwash cycles. The storage volume required is 127,000 gallons. The existing facilities are provided with 150,000 gallons of storage underneath the filters. WAC NR 110 also requires that spent backwash water should be returned to the head of the treatment facility at a rate no greater than 15 percent of the average design flow rate. At the future design average flow rate of 1.85 mgd, 193 gpm can be returned to meet this requirement. The facility currently exceeds this flow rate.

The 2010 construction project included replacement of the anthracite media, nozzles, valves, and other worn components in the existing filters. Controls were provided to allow automatic timed or head loss-based backwashing of the filters. The backwash wastewater pumps were also replaced.

The filters are the primary hydraulic bottleneck at the WWTP with flows over 4.5 mgd being bypassed around the filters. Bypassing is currently a manual operation and switching to a passive overflow with metering should be considered. Steel joists support the roof of the filter building. The condition of the joists was not able to be evaluated at this time due the interior ceiling panels being in place but given the high humidity environment in the building the panels should be removed in several areas and the joists inspected before any further improvements are made in the building. The steel filter structure has several areas of noted corrosion and should be examined in more detail to determine the extent of required repairs. Staff report 10 to 12 inches of filter media present at the bottom of the waste backwash well. The air scour blower flow rate is suspected to be too high causing media loss, a flow meter should be installed on the discharge line to measure flow and the blower capacity reduced changing the shims or providing more adjustable control with a VFD. Additional and finer filtration capacity improvements may be required as a result of future more stringent phosphorus limits.

The Filter Building has a few incandescent lights remaining and consideration should be given to replacing these light fixtures to more efficient light fixtures. The Filter Building electrical room is located adjacent o the filters. Additional investigation is needed and consideration should be given to use HVAC systems to provide a slight positive pressurize to the electrical room to prevent the moist filter room environment from getting into the electrical room.

5.3.11 Final Effluent Nonpotable Water System

The final effluent system has been difficult to control with the pumps not equipped with variable frequency drives (VFDs). The compressor serving the system is undersized, the system requires an operating pressure of 100 psig and the compressor is only sized for 70 psig forcing the staff to run it outside the rated range. VFDs should be provided for the final effluent pumps and an adequately sized compressor installed to maintain the functionality of the plant effluent water system.

5.3.12 Effluent Disinfection, Postaeration, and Outfall

The WWTP switched gaseous chlorine addition to an open channel ultraviolet (UV) disinfection as part of the 2010 project. The new UV system was designed for peak flow of 11 mgd. The former chlorine contact tank was covered to reduce the growth of algae (affecting filter backwash quality and cleaning frequency). The existing chlorination system was maintained in case it is needed to reduce biomass growth in the filters or needed for future return activated sludge chlorination.

Maintaining dissolved oxygen levels in the postaeration tank has been difficult with the current constant speed positive displacement blowers. New adjustable speed blowers should be provided to maintain the required dissolved oxygen level. The post aeration tank is part of the original plant construction and has spalling concrete in the effluent channel that should be repaired as well.

The effluent flow is metered in an 18-inch Parshall flume that discharges to an outfall pipe to Whitewater Creek. The flume is large enough to measure the future peak hourly flow.

The effluent outfall sewer is a 24-inch-diameter followed by 48-inch-diameter. This sewer submerges at the 100-year flood elevation of 799.00 in Whitewater Creek. Plant hydraulics will be examined in greater detail in TM 5. The 48-inch line leaks in at least one location above ground. The pipe itself is over 30 years old and the City should consider lining, replacing, or requiring by the other means the outfall line before its condition deteriorates further.

5.3.13 ANAEROBIC DIGESTION

The WAC NR 110 Code requires a minimum detention time of 15 days and maximum system loading of 80 lbs volatile solids (VS) per 1,000 ft3 of volume per day in the primary anaerobic digesters. At the minimum detention time, the rated primary digestion total capacity is 78,000 gallons a day with a VS loading of 12,600 lbs VS/day. Over 2010 - 2013, a single primary digester treated an average of approximately 2,681 lb/day of suspended solids with an average flow rate of 8,150 gal/day. The VS concentration was approximately 73 percent, so the VS loading was approximately 1,957 lbs VS/day. This loading effectively used only 16 percent of the primary digester capacity.

Between 2008 and 2012, an average of 1.4 million gallons of digested biosolids were hauled to farmlands each year, or 3,800 gal/day. Supernatant is decanted from the secondary digester. At current biosolids production and supernating practices, there are 284 days of storage in the existing secondary digester or 158 percent of the required 180 days of storage. Since only one primary digester is required to digest the biosolids generated, the second primary digester could be converted to storage, providing an additional 140 days of storage. The City is also considering treating industrial or agricultural waste in the second primary digester. According to past plant data, digested sludge hauled to farmland had a total solids concentration of 4.4 percent, with approximately 45 percent VS content. The VS reduction through the digester was determined by the percent VS of the digester feed sludge and the digested sludge hauled to farmland. This data indicates a VS reduction of about 68 percent through the digesters and through loss in the supernatant. There was approximately 1,330 lbs VSS destroyed per day.

The existing digester gas storage sphere is inoperable. The current digestion facilities have adequate capacity to handle projected future growth. As part of the 2010 construction project, the digester gas safety equipment and waste gas burner were replaced, the primary digester covers were repainted, the sludge storage tank cover was removed and replaced with a new aluminum dome-style cover, the supernatant pump was replaced and supernatant flow metering added, new pumped mixing systems were provided for Primary Digester No. 1 and the sludge storage tank, a new recirculation pump was provided for Primary Digester No. 1, and the Primary Digester No. 2 recirculation pump was re-installed. As part of a 2011 project, a biogas combination boiler and heat exchanger was added to utilize biogas or blended biogas and natural gas to heat Primary Digester No. 1.

5.3.14 SIDESTREAM AND BYPASS FLOW METERING

Currently, filter backwash and digester supernatant flows are returned to the plant main influent sewer and are included in the influent flow measurement and sampling. These streams should be metered and sampled separately so their impact on raw influent readings can be subtracted properly.

The WDNR has requested the City have a reasonable means of estimating bypass flows. The City is able to use existing weirs to estimate flows at various points in the treatment train. Accuracy is questionable at the secondary clarifier splitter structure, because of flow surging. This issue should be addressed as part of any future biological treatment process. Another option would be to install a flow meter in the bypass piping.

5.3.15 SEWER CLEANING DEBRIS PAD

Currently, sewer cleaning crews use the WWTP site to store sewer cleaning/jetting debris. To improve dewatering and handling of such material, a drained concrete pad or drying bed should be included in a future project budget. The location of this pad is dependent on the hauled waste receiving alternative selection.

5.3.16 ADMINISTRATION BUILDING

The administration building houses staff offices, the laboratory, locker rooms, storage areas, meeting rooms, and related spaces. In general, only minor upgrades have been implemented for these facilities since the 1980s, and the existing space is in need of significant refurbishment and potential expansion. As part of the 2010 project, equipment bases for former emergency generators and belt filter presses were removed along with the former cooling tower in the Main Building. This provided additional space that may be used for storage or other purposes. Specific issues that should be addressed include:

<u>Structural/Architectural</u>

1. Existing laboratory and lab storage sizes are sufficient for current operations but laboratory and laboratory records storage remodeling may be required to address inefficiencies in the current layout and operation.
2. Windows should be replaced with high efficiency insulated windows. The existing windows create undesirable temperature gradients within the lab; plant staff attempt to compensate for by having lab temperature requirements dictate HVAC performance to the rest of the building.
3. Existing office space is limited; the addition of one office to provide workspace and records storage for two employees is recommended. Total additional square footage would equal approximately 250 square feet. In addition, conversion of the existing first floor SCADA room to an office is also recommended; see breakroom description below for additional conference room space.
4. SCADA room is sufficiently sized for SCADA operation. The addition of one Map/CMOM Room is recommended at a total of 300 square feet. This room could replace the existing room above the existing breakroom adjacent to the shop.
5. The existing breakroom was built into space originally designated as a welding booth. It is not adequately sized for current staff. Recommend creating new break/training room with square footage equal to approximately 600 square feet. Existing space will be returned to the shop to provide additional shop space.
6. Currently there is not a female locker room. The City should consider adding space to accommodate female locker and shower facilities totaling approximately 400 square feet.
7. Existing plant-wide vehicle storage is not sufficient. Recommend additional space for storage of at least two pickups and a semi tractor with drive through capability.

8. Existing material storage is limited and inadequate. The plant has built a mezzanine for pipe storage in the existing vehicle storage bays. The City should consider adding additional storage space such as a 4-bay pole barn and additional mezzanine space.
9. Stair between breakroom and map room may not meet current code because of 7 1/2-inch rise and 9-inch tread and headroom requirements. Recommend removal of break and map room and turning the space back into shop space.
10. Chemicals and oil are stored under stair to old belt filter press (BFP) room. This may not comply with current code and should be reviewed. Additional storage space may be required to meet current code.
11. Main switchgear room doors may be required by building code to swing outward.
12. Stairwells to the second floor may need to be enclosed in a rated shaft enclosure.
13. Barrier-free access to the second floor may be required. This requirement is contingent upon the use and occupancy of the second floor level and the total value of the improvements undertaken within the building.
14. Additional shop storage/small inventory space may be accommodated for in room currently occupied by the water well treatment system and hydropneumatic storage tank if the plant abandons the well and tank and used City water.
15. Existing restrooms and locker room are not accessible/barrier-free. Redesign to meet current code requirements and/or new facilities located within the building will be required.
16. Women's facilities (locker room and showers) must also be provided to meet the current building code.
17. Better means of chemical storage and isolation should be considered for the Laboratory.
18. Accessing the Garage requires passing through the main maintenance area where welding may be occurring, creating an unsafe condition. The situation may be improved if welding shop is returned to break room area. Otherwise, different travel paths should be considered.
19. Administration building is directly connected to the lower level of the Digester Complex through the tunnel system, creating an extension of the Digester Complexes hazardous environment into the Administration Building. Separation of the structures should be provided. National Fire Protection Association (NFPA) 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities defines the hazardous classifications associated with each process in wastewater treatment facilities and requires physical separation between hazardous and non-hazardous spaces. This tunnel is in need of coating and has several leaking joints along its length.
20. Raw Wastewater Drywell is directly connected to the main portion of the Administration Building, creating the need to ventilated the entire building continuously at a rate of 6 Air Changes per Hour to eliminate a hazardous environment. Physical separation of these spaces should be considered. National Fire Protection Association (NFPA) 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities defines the hazardous classifications associated with each process in wastewater treatment facilities and requires physical separation between hazardous and non-hazardous spaces.
21. Additional valves on the non potable water and the natural gas system are desired. Better metering of gas usage would be beneficial.
22. The unused sludge piping from the digester to the belt filter press room could be removed to free up some space.

<u>HVAC</u>

1. The pneumatic controls are original to the plant but have been repaired as needed over the years. They appear old but are in good working condition. Could upgrade to direct digital controls (DDC). Recommend this for central monitoring and control.
2. To assist in plant maintenance, operators routinely weld in their shop. A welding hood may be required as well as a thorough code review for the space.
3. Old BFP Room axial fan and associated gravity roof ventilator should be removed.
4. No heat is provided in the old BFP Room. An opening to the first floor below is kept open and heat rises.
5. Outside air intake louver is located right next to the septage receiving station and one or the other should be moved.
6. There are two existing Clever Brooks Model 4 boilers. CB M4W-4500 Series 200 MG. Serial No. G-12981-M4. 4,500 Thousand British Thermal Units Per Hour (MBH) input, 3,600 MBH output. Oil usage is 32.7 GPH. These boilers may need to be in a rated room or separated from a vehicle storage garage. There was no apparent means of combustion air intake into the space as the louver dampers are currently manually operated.
7. One of the expansion tanks is not operational. The expansion tanks in general have been experiencing pinholes and should be replaced. According to plant staff, a corrosion inhibitor has not been added in a long time. This is recommended to prevent degradation of the piping interior.
8. A duct and piping is located above the MCC in the influent lift station. This does not meet the National Electric Code (NEC) for dedicated space above electrical equipment. However, there is a drip shield below the piping that protects the electrical equipment from a leaking pipe.
9. The switch to activate the ventilation in the wet well is currently located in the room adjacent to the wet well. Recommend this switch be relocated to the stairs entering the wet well to help minimize staff entering the wet well without activating the ventilation system.
10. The breakroom is not ventilated. A window air conditioner is installed.
11. Standby power engines are dual fuel natural gas and diesel. They work fine on diesel, but the engines trip out on overtemp on natural gas.
12. Generator exhaust and silencer are uninsulated and there is no means to prevent exhaust condensate from running back to engines.
13. Engine radiators are not ducted to the exterior, which leads to high temperatures in the space and overheating of the generators. If the generators remain in their existing locations, remote radiators should be considered. Intake louver sizes appear to be too small to accommodate generator operation.
14. Switchgear room may need mechanical cooling. Currently it is just ventilated.
15. The boiler circulating pump control panel is powered from a different circuit than the associated boilers. If power is lost to the circulating pump control panel, the pumps shut down but the boilers do not. An alarm can be generated at SCADA to indicate boiler circulation pump fail.
16. According to plant staff, the boilers are oversized and constantly cycle on and off when in the Auto mode because they come up to temperature so fast. Because of this, the boilers are operated in the Manual mode, which makes their operation less efficient.
17. Consideration should be given to re-interconnecting the building heating loop with the process heating loop to allow for the digester gas generated heat to heat the Administration Building.
18. Toilet/Locker Room ventilation systems did not appear functional and radiant heating panels were providing only minimal heat.

19. Consideration should be given to isolating the air handling systems of the Laboratory and the rest of the administrative spaces to allow for continuous tight temperature control in the Laboratory while allowing occupancy based control for the rest of the spaces.

Electrical

1. There have been instances in the past where water has accumulated in the vault below the main switchgear in the Administration/Main Control Building. The source of this water needs to be determined and vault/conduit system fixed to reduce or eliminate the water in the vault.
2. There have been two instances where the plant main breaker tripped before the feeder breaker associated with the fault tripped. Consideration should be given to having a power system study completed on the electrical distribution system. The study would include a short circuit study (calculate fault current in the system during a fault) (a short circuit study was conducted in 2013), coordination study (determine settings of circuit breakers), and arc flash study (determine incident energy available and the proper PPE required). Consideration should also be given to performing electrical testing and maintenance on the main switchgear and main feeders to the buildings on the site. This testing will determine the condition of the equipment and determine any equipment that needs to be fixed or replaced.
3. MCC-3 located in the Generator/Boiler room has not been tied into the SCADA system yet.

Appendix TM2-A
Additional Figures

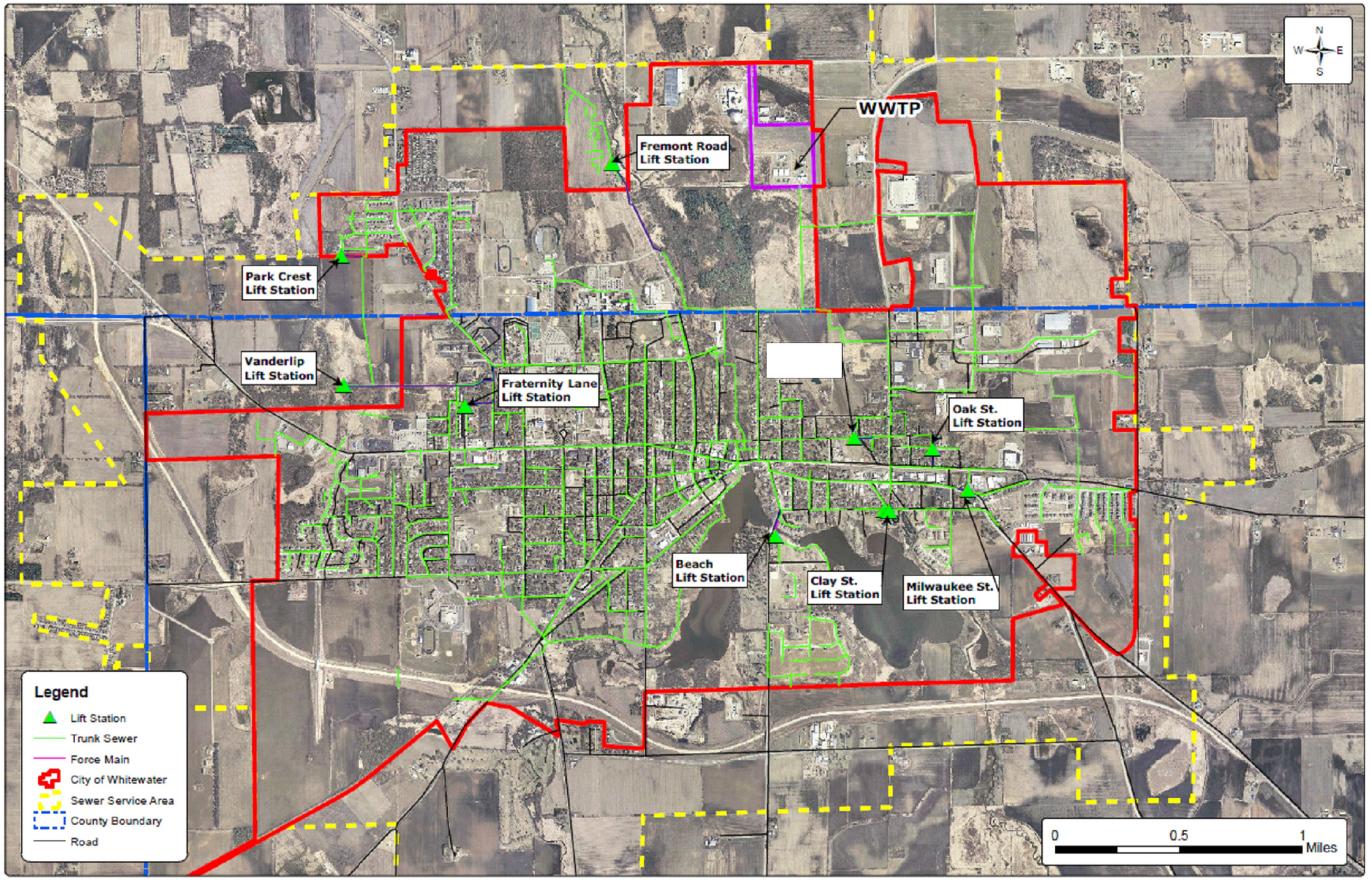


FIGURE 1
SANITARY COLLECTION SYSTEM
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

WHITEWATER, WISCONSIN

DONOHUE

JULY 2014

12600

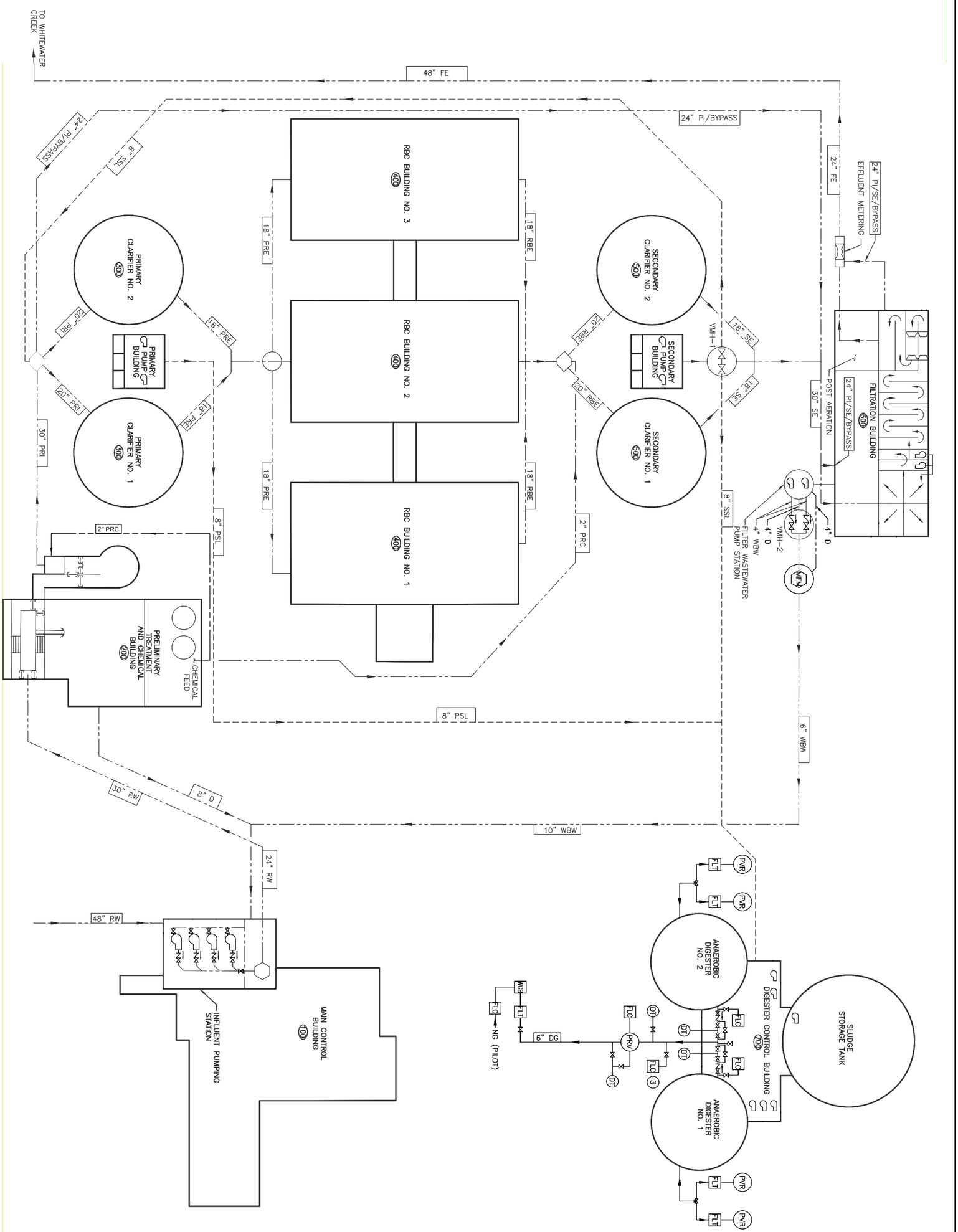


FIGURE 20
WWTP FLOW SCHEMATIC
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

DONOHUE

12600 JULY 2014 WHITEWATER, WISCONSIN

STRUCTURES:

1. INFLUENT PUMPING
2. PRELIMINARY TREATMENT AND CHEMICAL FEED BUILDING
3. PRIMARY CLARIFIER
4. PRIMARY PUMP BUILDING
5. ROTATING BIOLOGICAL CONTACTORS
6. SECONDARY CLARIFIER
7. SECONDARY PUMP BUILDING
8. FILTRATION BUILDING
9. UV DISINFECTION
10. POST AERATION
11. ADMINISTRATION BUILDING
12. DIGESTER CONTROL BUILDING
13. GAS STORAGE SPHERE
14. WASTE RECEIVING

FIGURE 21
WWTP SITE PLAN
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

WHITEWATER, WISCONSIN

DONOHUE

JULY 2014

12600

Appendix TM2-B
WDNR Water Quality Based-Effluent Limitations
Memo dated 1/16/14

Existing WPDES Permit

CORRESPONDENCE / MEMORANDUM _____ **State of Wisconsin**

DATE: **January 16th, 2014** FILE REF: 265004520

TO: Dale Rezabek – Milwaukee
Song Tran - Miwaukee

CC: Diane Figiel – WY/3

FROM: Jackie Fratrick - Waukesha

SUBJECT: Water Quality-Based Effluent Limitations for City of Whitewater WTP (WI-0020001-09)

This is in response to your request for an evaluation of water quality-based effluent limitations for toxic substances using chs. NR 102, 105, 106, and 207 of the Wisconsin Administrative Code (where applicable), for the City of Whitewater wastewater plant's discharge to Whitewater Creek in Jefferson County, just north of the Walworth County line. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations for toxicants are made on a chemical-specific basis:

Proposed Effluent Limitations for Whitewater	
Parameter	**Limitation**
BOD (May-October)	10 mg/l, weekly and monthly average; 304 lb/day, weekly average
BOD (November-April	20 mg/l, weekly and monthly average; 609 lb/day, weekly average
Suspended Solids (May-October)	10 mg/l, weekly and monthly average; 304 lb/day, weekly average
Suspended Solids (November-April)	20 mg/l, weekly and monthly average; 609 lb/day, weekly average
Fecal Coliform	400 colonies per 100 ml, monthly geometric mean; limit applies May-September
Dissolved Oxygen	6.0 mg/l, daily minimum
pH	6.0-9.0 s.u., daily range
Phosphorus, Total	1.0 mg/l, monthly average
Copper, Total	Monitor monthly in 2012
Chloride	Monitor monthly in 2012
Mercury, Total Recoverable	An alternative limit of 3.89 ng/l, daily maximum, is recommended, in accordance with a variance under ch. NR 106.145. See attached report for additional information.

Proposed Ammonia Limits for Whitewater			
Month	**Daily Maximum Limit (mg/l)**	**Weekly Average Limit (mg/l)**	**Monthly Average Limit (mg/l)**
January	16.8	10.5	4.4
February	16.8	10.6	4.4
March	16.8	11.3	4.8
April	16.8	9.8	4.3
May	16.8	9.2	4.0
June	16.8	6.3	3.2
July	16.8	6.3	3.0
August	16.8	6.3	3.0
September	16.8	6.3	3.0
October	16.8	9.6	4.1
November	16.8	10.7	4.5
December	16.8	10.6	4.4

Along with the chemical-specific recommendations mentioned above, acute and chronic whole effluent toxicity testing is recommended at Whitewater. Accordingly, following the guidance provided in the Department's July, 2008 Whole Effluent Toxicity Program Guidance Document - Revision #8, annual acute and annual chronic WET monitoring is recommended, in rotating quarters. The Instream Waste Concentration for the chronic WET test is 66%. The recommended chronic dilution series is 100, 75, 50, 25, and 12.5%. Please consult the attached report regarding relevant monitoring conditions that relate to this discharge.

No thermal limits are recommended for Whitewater. The discussion of thermal limits is included in a separate document.

If there are any questions or comments, please contact Jackie Fratrick at (262) 574-2135 or at Jackie.fratrick@wisocnsin.gov , or Diane Figiel at

Attachment

PREPARED BY:

Jackie Fratrick,
Effluent Limits Calculator, SER

Water Quality-Based Effluent Limitations for
City of Whitewater WTP (WI-0020001-09)

Prepared by:
Jackie Fratrick, SE Region
January, 2014

Existing Permit Limitations (WPDES Permit # WI-0020001-08, effective January 1st, 2009, 1998, and expired on December 31st, 2013:

Current Effluent Limitations for Whitewater	
Parameter	**Limitation**
BOD (May-October)	10 mg/l, weekly and monthly average; 304 lb/day, weekly average
BOD (November-April	20 mg/l, weekly and monthly average; 609 lb/day, weekly average
Suspended Solids (May-October)	10 mg/l, weekly and monthly average; 304 lb/day, weekly average
Suspended Solids (November-April)	20 mg/l, weekly and monthly average; 609 lb/day, weekly average
Ammonia (NH3-N	See table below
Chlorine Residual	38 ug/l and 2.9 lb/day, daily maximum; 11 ug/l and 0.33 lb/day, weekly average; 0.61 lb/day, alternative wet weather weekly average; disinfection is required from May through September
Fecal Coliform	400 colonies per 100 ml, monthly geometric mean; limit applies May-September
Dissolved Oxygen	6.0 mg/l, daily minimum
pH	6.0-9.0 s.u., daily range
Phosphorus, Total	1.0 mg/l, monthly average
Copper, Total	Quarterly monitoring
Chloride	Monthly monitoring in 2007
Mercury, Total Recoverable	Quarterly monitoring of influent, effluent, and field blanks
Cyanide, amenable to Chlorination	17 ug/l and 0.53 lb/day, weekly average

Current Ammonia Limits for Whitewater			
Month	**Daily Maximum Limit (mg/l)**	**Weekly Average Limit (mg/l)**	**Monthly Average Limit (mg/l)**
January	16.8	10.5	4.4
February	16.8	10.6	4.4
March	16.8	11.3	4.8
April	16.8	9.8	4.3
May	16.8	9.2	4.0
June	16.8	6.3	3.2
July	16.8	6.3	3.0
August	16.8	6.3	3.0
September	16.8	6.3	3.0
October	16.8	9.6	4.1
November	16.8	10.7	4.5
December	16.8	10.6	4.4

Information for Permit Reissuance Evaluation:

Receiving Water Information

Name: Whitewater Creek, Lower Rock River Basin, Jefferson County
Classification: Warm Water Sport Fishery
Flows:

Low Flow Frequency Statistic	Discharge (cfs)	Low Flow Frequency Statistic	Discharge (cfs)
Annual $Q_{7,10}$	11.5	Annual $Q_{7,2}$	14.0
Jan. $Q_{7,10}$	12.8	Jan. $Q_{7,2}$	16.7
Feb. $Q_{7,10}$	13.0	Feb. $Q_{7,2}$	16.9
Mar. $Q_{7,10}$	15.5	Mar. $Q_{7,2}$	21.3
Apr. $Q_{7,10}$	15.5	Apr. $Q_{7,2}$	21.0
May $Q_{7,10}$	13.9	May $Q_{7,2}$	18.8
Jun. $Q_{7,10}$	12.7	Jun. $Q_{7,2}$	16.5
Jul. $Q_{7,10}$	12.1	Jul. $Q_{7,2}$	15.4
Aug. $Q_{7,10}$	11.9	Aug. $Q_{7,2}$	15.0
Sep. $Q_{7,10}$	11.9	Sep. $Q_{7,2}$	15.2
Oct. $Q_{7,10}$	12.5	Oct. $Q_{7,2}$	16.6
Nov. $Q_{7,10}$	13.4	Nov. $Q_{7,2}$	17.7
Dec. $Q_{7,10}$	13.1	Dec. $Q_{7,2}$	17.1

Harmonic Mean = 21 cfs

Note on use of flows – annual 7Q10 or 7Q2 and/or harmonic mean flows are used for determining limitations for toxicants.

Source: USGS. Harmonic Mean was estimated from 7Q10 and basin area.

Hardness used = 346 PPM; this is the geometric mean of receiving water hardness taken as part of the whole effluent toxicity (WET) tests for Whitewater.

% of Flow used to calculate limits = 25%.

Effluent Information

Reported Design Flows:

Annual average = 3.65 MGD
Peak daily = 10.38 MGD
Peak weekly = 7.185 MGD
Peak monthly = 5.04 MGD

Hardness = 366 PPM (geometric mean of data from previous two applications)
Acute dilution factor used = Not applicable
Effluent Maximum pH (for daily maximum ammonia determination): 8.0 su. This maximum pH was based on the 99th percentile of effluent pH data from January of 2010 through November of 2013, and is the same maximum pH that was used to determine the current ammonia limits.

Evaluation of 'Conventional' Pollutants:

No changes are recommended at this time for BOD, dissolved oxygen, pH, or fecal coliform, since Whitewater has not expanded the wastewater treatment plant.

Ammonia: Acute criteria for ammonia are dependent on the classification of the receiving water and on the pH of the discharge. The additional data from January, 2010 through November of 2013 does not signify a change from the maximum effluent pH, so daily maximum limits will remain the same as the current permit. Chronic criteria for ammonia are dependent on the classification, temperature and pH of the receiving water. No additional stream data is available to change the criterion, nor has the classification changed for Whitewater Creek. Therefore, no changes to the current ammonia limits are proposed.

Total Suspended Solids: The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at: http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf. The TMDL addresses allowable wasteload allocations for Total Suspended Solids (TSS) and Total Phosphorus.

For a municipal facility, limits for TSS must be expressed as weekly and monthly averages. The following table is a summary calculations and proposed monthly and weekly mass limits. The multiplier used in the weekly average limit calculation was determined according to Page 25 of 'TMDL Development and Implementation Guidance' which may be accessed from http://dnr.wi.gov/topic/wastewater/guidance.html . A coefficient of variation was calculated, based on TSS mass monitoring data, to be 0.87. However, it is believed that the optimization of the wastewater treatment system to achieve the WLA-derived TSS and phosphorus permit limits will reduce effluent variability. Thus, the maximum anticipated coefficient of variation expected by any facility is 0.6. This value, along with monitoring frequency, is used to select the multiplier of 1.41. **Monitoring for TSS is specified as three times per week in the current permit and it is believed this monitoring frequency will remain the same.** Based on these two variables, Table 3 of the implementation guidance is used to select the multiplier of 1.41. **If there is a change in monitoring frequency, the stated limits should be reevaluated.**

Since the current permit for Whitewater already includes weekly average mass limits for TSS (609 lb/day for November-April and 304 lb/day for May-October), the **lower** of the weekly mass limits from either the TMDL-derived limits or current limits) would apply for each calendar month.

Total Suspended Solids Effluent Limitations						
Month	Monthly TSS WLA (Tons/Month)	Monthly TSS WLA (Lb/Month)	Days per Month	Monthly Avg TSS Limit (lb/day)	Weekly Avg TSS Limit from WLA (lb/day)	Current Weekly Mass Limit (lb/day)
Jan	4.61	9220	31	297	419	609
Feb	4.59	9180	28	328	462	609
Mar	4.61	9220	31	297	419	609
Apr	4.65	9300	30	310	437	609
May	4.61	9220	31	297	419	304
Jun	4.65	9300	30	310	437	304
Jul	4.14	8280	31	267	377	304
Aug	4.52	9040	31	292	411	304
Sep	4.55	9100	30	303	428	304
Oct	4.61	9220	31	297	419	304
Nov	4.65	9300	30	310	437	609
Dec	4.61	9220	31	297	419	609

Therefore, **the proposed limits for TSS are the monthly average TSS limits ,expressed as lb/day. The For November-April, the weekly average TSS limits from the wasteload allocation (WLA) would also apply. For May through October, the current weekly average mass limit of 304 lb/day would continue to apply (weekly limits are highlighted in the table above). In addition, the current weekly average concentration limits of 10 mg/l (May-October) and 20 mg/l (November-April) shall continue to apply.**

Limits based on a WLA should be given in a permit regardless of reasonable potential. However, for informational purposes, the following table lists the statistics for Total Suspended Solids discharge as both a concentration and a mass, from January of 2009 through November 2013.

Technology Based Limit (TBL) – Phosphorus

The Whitewater wastewater plant has a technology-based phosphorus limit of **1.0 mg/L as a monthly average** in their current permit. This limit remains applicable unless a more stringent water quality concentration limit is given.

Water Quality Based Limit – Phosphorus
Revisions to the administrative rules for phosphorus discharges took effect on December 1, 2010. These rule revisions include additions to ch. NR 102 (s. NR 102.05), which establish phosphorus standards for surface waters. Revisions to ch. NR 217 (s. NR 217, Subchapter III) establish procedures for determining water quality based effluent limits for phosphorus, based on the applicable standards in ch. NR 102.

The Department has developed a TMDL for the Upper and Lower Rock River Basins. The US EPA approved the Rock River TMDL on September 28, 2011. The document, along with the referenced appendices can be found at:
http://dnr.wi.gov/topic/TMDLs/RockRiver/Final_Rock_River_TMDL_Report_with_Tables.pdf

Section NR 217.16, Wis. Adm. Code, states that the Department may include a TMDL-derived water quality based effluent limit (WQBEL) for phosphorus **in addition to, or in lieu of**, a s. NR 217.13 WQBEL in a WPDES permit. The Rock River Basin TMDL was developed to protect and improve the water quality of phosphorus impaired waters within the basin.

In reference to the TMDL, wasteload allocations for phosphorus are determined based on the waterbody reach of the Bark River from the Rock River to Steel Brook and Spring Creek. The reveiving water – Whitewater Creek – is tributary to the Bark River. In addition, the wasteload allocations on this reach are determined for the protection of the Rock River, where a phosphorus water quality standard of 0.1 mg/l applies. Because of this**, the wasteload allocations of the TMDL are not considered to be protective of Whitewater Creek, and a phosphorus WQBEL in accordance with NR 217.13 is needed in addition to the TMDL allocations.**

Section NR 102.06(3)(a) specifically names reaches of rivers for which a phosphorus criterion of 0.1 mg/l applies. For other stream segments that are not specified in s. NR 102.06(3)(a), s. NR 102.06(3)(b) specifies a phosphorus criterion of 0.075 mg/l. The phosphorus criterion of 0.075 mg/l applies for Whitewater Creek.

The limit calculation formula is described in s. NR 217.13 (2)(a) for phosphorus water quality based effluent limitations (WQBELs).:

Limitation = [(WQC)(Qs+(1-f)Qe) – (Qs-fQe)(Cs)]/Qe

Where:

WQC = 0.075 mg/L for Whitewater Creek.
Qs = 100% of the 7Q2 of 14 cfs.
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d)
Qe = effluent flow rate (in mgd) = 3.65 MGD = 5.65 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

Background Concentration: No ambient phosphorus data exist directly upstream of the outfall. There is a DNR sampling point at a deep hole of Tripp Lake (SWIMs ID 283293) with a median phosphorus concentration of 0.0527 mg/l, but this background concentration is not considered representative, since the location is upstream of the discharge and the City of Whitewater itself, where nonpoint loadings of phosphorus are likely to occur.

An additional DNR sampling point is located at Fremont Road at Cold Spring (SWIMs ID 283293). This location is approximately two miles downstream of the discharge. The median phosphorus concentration is 0.131 mg/l, which is well above the criterion. Since the wastewater plant is a significant phosphorus source and since there appears to be impact to the downstream reach, A background concentration at the 0.075 mg/l criterion seems appropriate.

In cases where the background concentration is at or above the criterion, the proposed limit is set equal to the criterion. **Therefore, the recommended water quality-based limitation for phosphorus is 0.075 mg/l, expressed as a six month average (May-October and November-April). In conformance with NR 217.14(2), a monthly concentration limit equal to three times the water quality based limit, or 0.225 mg/l, is also recommended.**

TMDL Limits (Wasteload Allocations) – Phosphorus

The monthly average total phosphorus (Total P) effluent limits in lbs/day are calculated based on the monthly phosphorus wasteload allocation (WLA) given in pounds per month as indicated in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* dated April 15, 2013. The WLA for this facility is found in the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Rock River Basin* report dated July 2011. **Monthly average mass effluent limits in accordance with the following table are recommended for this discharge.**

Month	Monthly Total P WLA (lb/month)	Days per Month	Monthly Avg Total P Limit (lb/day)
Jan	291.5	31	9.40
Feb	347.71	28	12.42
Mar	384.97	31	12.42
Apr	383.06	30	12.77
May	386.31	31	12.46
Jun	371.84	30	12.39
Jul	303.46	31	9.79
Aug	257.21	31	8.30
Sep	210.66	30	7.02
Oct	238.91	31	7.71
Nov	233.92	30	7.80
Dec	276.37	31	8.92

$Q_{AAF} = 1.85$ mgd

$\frac{7.02}{1.85(8.34)} = 0.455$

Interim Limit - Phosphorus

The table below shows data from effluent monitoring at the facility that was reported from January of 2010 through October of 2013. The data indicates that a compliance schedule will be necessary in order for the facility to meet the given phosphorus limits.

An interim limit is needed when a compliance schedule is included in the permit. This limit should reflect a value which the facility is able to currently meet; however, it should also consider the receiving water quality, keeping the water from further impairment. Although the P99

statistics suggest that a limit less than the current limit of 1.0 might be applicable as an interim limit, approximately 30% of the monthly averages from January of 2010 through October of 2013 exceeded the 30-day P99. This pattern has been noted in a number of discharge situations. **Therefore, 1.0 mg/L, should be used as an interim limit** and should be expressed as a monthly average concentration. This interim limit is equal to the current phosphorus TBEL limit of 1.0 mg/L and therefore it is reasonable to expect that the facility will be able to meet this interim limit in the future.

Total Phosphorus Statistics, mg/L	
1-day P_{99}	1.37
4-day P_{99}	0.95
30-day P_{99}	0.73
Mean	0.62
Maximum Monthly Average	0.95
Std Dev	0.24
Sample Size	560
Range	0.15 – 1.83

Evaluation of Chemical-Specific Toxicants:

Effluent concentration data:

Substances tested: Whitewater was required as part of the reissuance application to perform a priority pollutant scan. The current permit required quarterly analyses of mercury during the permit term, and monthly analyses for chloride during 2012.

Results: Multiple test results above the levels of detection are available for chloride, copper, and mercury. Those results are summarized below.

Copper and Chloride Summary			
Date	**Cu (ug/l)**	**Date**	**Cl- (mg/l)**
01/11/2012	10	02/22/2012	280
02/01/2012	8.7	03/20/2012	250
03/20/2012	13	04/03/2012	240
04/03/2012	12	05/15/2012	240
05/15/2012	12	06/25/2012	250
06/19/2012	22	07/17/2012	270
07/17/2012	5.2	08/06/2012	220
08/06/2012	5.4	09/06/2012	260
09/06/2012	8.5	10/25/2012	260
10/25/2012	8.6	11/27/2012	250
11/26/2012	9.8	12/11/2012	250
12/11/2012	13		
01/15/2013	14		
04/29/2013	7.3		
Avg	**10.7**	**Avg**	**252**
Max	**22**	**Max**	**280**
1-day P99	**24**	**1-day P99**	**291**
4-day P99	**17**	**4-day P99**	**271**
30-day P99	**13**	**30-day P99**	**259**

Mercury Summary			
Date	Hg (ng/l)	Date	Hg (ng/l)
01/26/2009	0.53	08/15/2011	1
04/08/2009	0.61	11/18/2011	0.83
07/13/2009	0.36	01/12/2012	<0.25
10/28/2009	1.2	04/04/2012	1
01/25/2010	0.7	07/18/2012	0.82
04/20/2010	0.79	10/25/2012	0.82
07/14/2010	0.65	01/15/2013	0.54
10/14/2010	2.1	04/29/2013	1.6
02/17/2011	1.2	07/24/2013	1.4
05/05/2011	0.88	11/06/2013	1.2
1-day P99			**2.33**
4-day P99			**1.55**
30-day P99			**1.15**

There were also single test detects for arsenic (1.3 ug/l), selenium (3.8 ug/l), silver (1.2 ug/l) and zinc (15 ug/l). Whitewater uses ultraviolet disinfection, so chlorine is not evaluated as part of the effluent limits summary.

Effluent Limit Summary

Concentrations are indicated in units of ug/L except for hardness and chloride (mg/L)

CALCULATION OF EFFLUENT LIMITATIONS BASED ON ACUTE TOXICITY CRITERIA (ug/L)							
SUBSTANCE	REF. HARD. or pH	ATC		MAX. EFFL. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	1-day P99
Arsenic		339.80		679.60	135.92	1.3	
Copper	366	51.08		102.16			24
Mercury		0.83		1.66	0.33	0.00233	
Zinc	333	344.68		689.36	137.87	15	
Chloride		757		1514			291

*- The indicated hardness may differ from the effluent hardness because the effluent hardness exceeded the maximum range in ch. NR 105 over which the acute criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

** The values for mercury represent the 1-day P99 without subtraction of field blanks. Also see discussion of mercury, below.

CALCULATION OF EFFLUENT LIMITATIONS BASED ON CHRONIC TOXICITY CRITERIA (ug/L)							
RECEIVING WATER FLOW =		2.875 cfs					
SUBSTANCE	REF. HARD. or pH	CTC	MEAN BACK-GRD.	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	4-day P99
Arsenic		152.20		229.68	45.94	1.3	
Copper	341	34.05		51.38			17
Mercury		0.44		0.66	0.13	0.00155	
Zinc	333	344.68		520.15	104.03	15	
Chlorides		395		596			271

* The indicated hardness may differ from the receiving water hardness because the receiving water hardness exceeded the maximum range in ch. NR 105 over which the chronic criteria are applicable. In that case, the maximum of the range is used to calculate the criterion.

** The values for mercury represent the 1-day P99 without subtraction of field blanks. Also see discussion of mercury, below.

CALCULATION OF EFFLUENT LIMITATIONS BASED ON WILDLIFE CRITERIA							
RECEIVING WATER FLOW =		2.975 cfs					
SUBSTANCE		WC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P99
Mercury (ng/l)		1.3		1.3			1.15

*In accordance with s. NR 106.06(6)(a), when the background concentration of a toxicant exceeds the criterion, and the source of at least 90% of the wastewater is from groundwater, the effluent limitation is equal to the lowest criterion; or in the case of mercury, 1.3 ng/l, monthly average. Virtually all rivers in Wisconsin exceed the 1.3 ng/l criterion.

** The values for mercury represent the 1-day P99 without subtraction of field blanks. Also see discussion of mercury, below.

CALCULATION OF EFFLUENT LIMITATIONS BASED ON HUMAN THRESHOLD CRITERIA (ug/L)							
RECEIVING WATER FLOW =		5.25 cfs					
			MEAN	MO'LY	1/5 OF	MEAN	
			BACK-	AVE.	EFFL.	EFFL.	30-day
SUBSTANCE		HTC	GRD.	LIMIT	LIMIT	CONC.	P99
Mercury (ng/l)		1.5		1.3			1.15
Selenium		2600		5017	1003	3.8	
Silver		28000		54029	10806	1.2	

*In accordance with s. NR 106.06(6)(a), when the background concentration of a toxicant exceeds the criterion, and the source of at least 90% of the wastewater is from groundwater, the effluent limitation is equal to the lowest criterion; or in the case of mercury, 1.3 ng/l, monthly average. Virtually all rivers in Wisconsin exceed the 1.3 ng/l criterion.

** The values for mercury represent the 1-day P99 without subtraction of field blanks. Also see discussion of mercury, below.

CALCULATION OF EFFLUENT LIMITATIONS BASED ON HUMAN CANCER CRITERIA (ug/L)							
RECEIVING WATER FLOW =		5.25 cfs					
SUBSTANCE		HCC	MEAN BACK-GRD.	MO'LY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.	30-day P99
Arsenic		50		96	19	1.3	

Permit Recommendations for Toxicants:

Copper: The calculated limits for copper in the above tables assume that Whitewater is the only discharger. Whitewater Cogenerator Facility also discharges to the same outfall as the wastewater plant. Currently, the wastewater plant effluent constitutes a majority of the total flow from the two facilities. In addition, the levels of copper in the wastewater effluent are well below all criteria for copper. Therefore, no limit is recommended at this time. Monthly monitoring for copper is recommended during the fourth year of the permit term. These data will be used to satisfy the copper monitoring requirements of Whitewater's next permit reissuance application.

Chloride: The 1-day P99 of 291 mg/l was under the applicable ATC-based limit of 1514 mg/l, so no acute limit is recommended. The 4-day P99 of 271 mg/l is also well below the calculated weekly average limit of 596 mg/l, so no chronic (weekly average) limit is needed for the permit. Monthly monitoring for the fourth year of the permit term is recommended, and these data will be used to satisfy monitoring for chloride in Whitewater's next permit reissuance application.

Zinc, Selenium, and Silver: The single concentrations for each of these substances was below the levels of concern for all criteria, so no limits or monitoring are recommended for the proposed permit.

Mercury: The current permit included an alternative mercury limit of 3.89 ng/l, as a daily maximum, along with a compliance schedule for mercury pollutant minimization. Based on mercury data from 2009 through 2013, the 30 day P99 is 1.15 ng/l, which is less than the wildlife criterion of 1.3 ng/l. **Therefore no mercury limit is recommended.** Although the30-day P99 indicates that a limit is not required, Single concentrations still exceed the criterion; therefore,

continued monitoring may still be warranted, and the permittee may wish to continue pollutant minimization efforts.

Note on Cyanide, Amenable to Chlorination: A limit of cyanide amenable to chlorination was proposed for the current permit, subject to drop if additional data showed that there was not an overall pattern above a level of concern. This was determined during the term of the permit, and the limit, compliance schedule, and additional monitoring not applicable. No additional monitoring or limits are recommended.

Permit Recommendations for Whole Effluent Toxicity (WET) Testing/Limits:

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time. Acute tests predict the concentration that causes lethality of aquatic organisms during a 48-96 hour exposure. Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven day exposure.

It should be noted that the Whitewater wastewater plant effluent shares a common outfall with that of another permitted discharger (LSP – Whitewater). In the case of whole effluent toxicity, there can be additive or synergistic effects when two waste streams are combined.

Acute WET: In order to assure that the discharge from outfall 001 is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC_{50} greater than 100% effluent.

Chronic WET: In order to assure that the discharge from outfall 001 is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid IC_{25} greater than the instream waste concentration (IWC). The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of 66% shown in the WET Checklist summary below was calculated according to the following equation:

$$\text{IWC (as \%)} = 100 \times \frac{Qe}{(1-f)\,Qe + Qs}$$

Qe = annual average flow = 3.65 MGD (5.64 cubic feet per second)
f = fraction of the Q_e withdrawn from the receiving water = 0
Q_s = 1/4 of the annual 7-Q_{10} = 2.875 cubic feet per second.

(Note: This IWC reflects the direct discharge of Whitewater WTP to Whitewater Creek, and does not include the contribution from Whitewater Cogeneration Facility.)

Dilution Series: According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Wis. Adm. Code), the default acute dilution series is: 6.25, 12.5, 25, 50, 100%, and the default chronic dilution series is 100, 75, 50, 25, 12.5% . Other dilution series may be chosen by the permittee or Department staff, but alternate dilution series must be specified in the WPDES permit. For guidance on selecting an alternate dilution series, see Chapter 2.11 of the WET Guidance Document.

Receiving water: According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual* (s. NR 219.04, Wis. Adm. Code) receiving water must be used as the dilution water and

primary control in WET tests, unless the use of another dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on outfall 001 shall be a grab sample collected from Whitewater Creek. The receiving water location must be specified in the WPDES permit.

Historical WET Data: Below is a tabulation of available WET data for Whitewater from the current permit term, not including composite results with LSP - Whitewater:

WET Acute Test Results				
Date	**Species**	**Pass/Fail?**	**LC50**	**Used in Checklist?**
10/16/2012	FHM	Pass	>100	Yes
10/16/2012	*C. dubia*	Pass	>100	
05/07/2013	FHM	Pass	>100	Yes
05/07/2013	*C. dubia*	Pass	>100	
08/06/2013	FHM	Pass	>100	Yes
08/06/2013	*C. dubia*	Pass	>100	

WET Chronic Test Results				
Date	**Species**	**Pass/Fail?**	**IC25**	**Used in Checklist?**
10/16/2012	FHM	Pass	>100	Yes
10/16/2012	*C. dubia*	Pass	>100	
05/07/2013	FHM	Pass	>100	Yes
05/07/2013	*C. dubia*	Pass	>100	
08/06/2013	FHM	Pass	>100	Yes
08/06/2013	*C. dubia*	Pass	>100	

WET Checklist: Department staff use the WET Checklist when deciding whether WET limits and monitoring are needed. As toxicity potential increases, more points accumulate and more monitoring is needed to insure that toxicity is not occurring. The Checklist recommends acute and chronic WET limits (as needed) based on the Reasonable Potential Factor (RPF), as required by s. NR 106.08, Wis. Adm. Code, and monitoring frequencies based on points accumulated during the Checklist analysis. The completed WET Checklist and monitoring recommendations are summarized in the table below. (For more on the RPF and WET Checklist, see Chapter 1.3 of the WET Guidance Document, at: http://www.dnr.state.wi.us/org/water/wm/ww/biomon/biomon.htm).

WHOLE EFFLUENT TOXICITY (WET) CHECKLIST SUMMARY

	ACUTE	CHRONIC
1. INSTREAM WASTE CONCENTRATION	1A. Not Applicable **TOTAL POINTS = 0**	1B. IWC =66% **TOTAL POINTS = 15**
2. HISTORICAL DATA	2A 2 tests used in RPF, all passed; RPF = 0 **TOTAL POINTS = 0**	2B. 3 tests used in RPF, all passed; RPF = 0 **TOTAL POINTS = 0**
3. EFFLUENT VARIABILITY	3A. Consistent, high quality effluent **TOTAL POINTS = 0**	3B. Same as Acute **TOTAL POINTS = 0**
4. STREAM CLASSIFICATION	4A. Full Fish and Aquatic Life **TOTAL POINTS = 5**	4B. Same as Acute **TOTAL POINTS = 5**
5. CHEMICAL SPECIFIC DATA	5A. Detects of chloride, copper, selenium, silver, arsenic, zinc, and mercury. **TOTAL POINTS =5**	5B. Detects of chloride, copper, selenium, silver, arsenic, zinc, and mercury. **TOTAL POINTS = 5**
6. ADDITIVES	6A. Phosphorus removal chemical **TOTAL POINTS = 1**	6B. Same as Acute **TOTAL POINTS = 1**
7. DISCHARGE CATEGORY	7A. POTW with one significant industrial users (Generac) **TOTAL POINTS =5**	7B. Same as Acute **TOTAL POINTS =5**
8. WASTEWATER TREATMENT	8A. Better than secondary treatment **TOTAL POINTS = 0**	8B. Same as Acute **TOTAL POINTS = 0**
9. DOWNSTREAM IMPACTS	9A. None attributable to discharge **TOTAL POINTS =0**	9B. Same as Acute **TOTAL POINTS = 0**
TOTAL POINTS	**16**	**31**

WET Monitoring and Limit Recommendations: Based upon the point totals generated by the WET Checklist, other information given above, and Chapter 1.3 of the WET Guidance Document, **annual acute WET testing is recommended and annual chronic WET testing is recommended in the reissued permit**. Tests should be done in rotating quarters, in order to collect seasonal information about this discharge. When including recommended monitoring frequencies in the WPDES permit, staff should specify required quarters (e.g., Jan-Mar, Apr-Jun, Jul-Sep, or Oct-Dec). The IWC is 66%. The recommended chronic dilution series is 100, 75, 50, 25, and 12.5%.

Additional Note on whole effluent toxicity: The flows from the Whitewater wastewater plant and from LSP – Whitewater combine before entering the receiving water, WET testing should be performed on proportional contributions from each waste stream in lieu of, or in addition to WET testing for individual flows.

Act 70, which was signed in December of 2013, changed statute language to allow issuance of more than one WPDES permit to a publicly owned treatment works. Therefore, one option is to develop a single WPDES permit that would address whole effluent toxicity monitoring and other requirements for both the Whitewater wastewater plant and LSP – Whitewater. Regulation of these two facilities would also need to address requirements on further actions in the event of a WET failure for the combined waste streams.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Water Resources Discipline
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Middleton, WI 53562-3586
Phone: (608) 828-9901
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http://wi.water.usgs.gov

Mr. Jonathan Butt
Symbiont
6737 W. Washington St.
Suite 3440
Milwaukee, WI 53214

8/15/2013

Dear Mr. Butt,

The low flow statistics that you requested for Whitewater Creek just north of the Jefferson-Walworth County line, east of Burr Oak Tr. in Whitewater, WI (drainage area = 43.3 mi^2, approximate USGS station # 054270136) are listed in the table below. Please note that the annual low-flow statistics are less than the individual monthly low-flow statistics. This is a necessary result of the calculations; shorter periods examined will always have values equal to or greater than longer periods. Given this, you should be cautious how you use these statistics. The streamgage on Turtle Creek at Clinton (05431486) was used as the reference site when determining these low-flow estimates.

Low-flow statistic period	**7Q2** (in cfs)	**7Q10** (in cfs)
Annual	17	13
Jan	21	15
Feb	21	16
Mar	25	18
Apr	27	20
May	23	17
Jun	21	15
Jul	19	14
Aug	18	14
Sep	19	14
Oct	21	15
Nov	22	16
Dec	22	16

You will be billed $400 for these calculations. Please feel free to contact me if you have any questions.

Thanks,

Rob Waschbusch

US Geological Survey – Hydrologist
(608) 821-3868

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

Whitewater Wastewater Treatment Plant

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
109 County Hwy U, Whitewater, WI 53190
to

Whitewater Creek, a tributary to the Bark River in Jefferson County

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Timothy Thompson
Basin Engineer

12/16/2008
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - January 01, 2009 **EXPIRATION DATE - December 31, 2013**

TABLE OF CONTENTS

1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	Influent: 24-hour flow proportional composite sampler intake located in the influent wet well - includes sidestream flows (sludge decant and filter backwash).

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 701 - INFLUENT PLANT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Mercury, Total Recoverable		ng/L	Quarterly	24-Hr Flow Prop Comp	See 1.2.1.1

1.2.1.1 Mercury Monitoring

The permittee shall collect and analyze all mercury samples according to the data quality requirements of ss. NR 106.145(9) and (10), Wisconsin Administrative Code. The limit of quantitation (LOQ) used for the effluent and field blank shall be less than 1.3 ng/L, unless the samples are quantified at levels above 1.3 ng/L. The permittee shall collect at least one mercury field blank for each set of mercury samples (a set of samples may include combinations of intake, influent, effluent or other samples all collected on the same day). The permittee shall report results of samples and field blanks to the Department on Discharge Monitoring Reports.

2 In-Plant Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
102	Mercury field blanks shall be collected using standard sample handling procedures
103	Flow from the primary clarifiers that bypasses the RBC, the secondary clarifiers and the filters

2.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point 102 - Mercury Field Blanks

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Mercury, Total Recoverable		ng/L	Quarterly	Grab	See 3.2.1.4

2.2.2 Sampling Point 103 - In plant diversion

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Per Occurrence	Continuous	See 2.2.2.1

2.2.2.1 In-Plant Diversion Requirements

During wet weather flow conditions, when necessary to maintain the proper function of the wastewater treatment facility, the permittee may operate in-plant diversion and blending subject to the following conditions and monitoring:

- All flows shall receive treatment equivalent to primary treatment. Disinfection shall also be applied to all flows whenever in-plant diversion is carried out during the disinfection season.
- The flow rate of diverted flows shall be measured and reported on the monthly Discharge Monitoring Report (DMR) forms whenever in-plant diversion is carried out. Flow chart recordings of influent flows shall also be submitted.
- Final effluent monitoring and sampling shall include the portion of flows that is diverted and permit requirements and limitations contained in 3.2.1 shall remain in full force and effect during periods when in-plant diversion and blending occur.
- In-plant diversion and blending shall only be carried out during wet weather when peak flows at the treatment facility are in excess of secondary treatment capacity.

3 Surface Water Requirements

3.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	Effluent: 24-hour flow proportional composite sampler intake located in the post aeration tank. Grab sample also collected at the same location.

3.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total	Weekly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	May-Oct
BOD_5, Total	Weekly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	Nov-Apr
BOD_5, Total	Monthly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	May-Oct
BOD_5, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	Nov-Apr
BOD_5, Total	Weekly Avg	304 lbs/day	3/Week	24-Hr Flow Prop Comp	May-Oct
BOD_5, Total	Weekly Avg	609 lbs/day	3/Week	24-Hr Flow Prop Comp	Nov-Apr
Suspended Solids, Total	Weekly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	May-Oct
Suspended Solids, Total	Weekly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	Nov-Apr
Suspended Solids, Total	Monthly Avg	10 mg/L	3/Week	24-Hr Flow Prop Comp	May-Oct
Suspended Solids, Total	Monthly Avg	20 mg/L	3/Week	24-Hr Flow Prop Comp	Nov-Apr
Suspended Solids, Total	Weekly Avg	304 lbs/day	3/Week	24-Hr Flow Prop Comp	May-Oct
Suspended Solids, Total	Weekly Avg	609 lbs/day	3/Week	24-Hr Flow Prop Comp	Nov-Apr
Nitrogen, Ammonia (NH_3-N) Total	Daily Max	16.8 mg/L	3/Week	24-Hr Flow Prop Comp	Year round

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	10.5 mg/L	3/Week	24-Hr Flow Prop Comp	Jan
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	10.6 mg/L	3/Week	24-Hr Flow Prop Comp	Feb
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	11.3 mg/L	3/Week	24-Hr Flow Prop Comp	Mar
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	9.8 mg/L	3/Week	24-Hr Flow Prop Comp	Apr
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	9.2 mg/L	3/Week	24-Hr Flow Prop Comp	May
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	6.3 mg/L	3/Week	24-Hr Flow Prop Comp	Jun-Sep
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	9.6 mg/L	3/Week	24-Hr Flow Prop Comp	Oct
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	10.7 mg/L	3/Week	24-Hr Flow Prop Comp	Nov
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	4.4 mg/L	3/Week	24-Hr Flow Prop Comp	Jan, Feb, Dec
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	4.8 mg/L	3/Week	24-Hr Flow Prop Comp	Mar
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	4.3 mg/L	3/Week	24-Hr Flow Prop Comp	Apr
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	4.0 mg/L	3/Week	24-Hr Flow Prop Comp	May
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	3.2 mg/L	3/Week	24-Hr Flow Prop Comp	Jun
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	3.0 mg/L	3/Week	24-Hr Flow Prop Comp	Jul-Sep
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	4.1 mg/L	3/Week	24-Hr Flow Prop Comp	Oct
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	4.5 mg/L	3/Week	24-Hr Flow Prop Comp	Nov
pH Field	Daily Max	9.0 su	Daily	Grab	
pH Field	Daily Min	6.0 su	Daily	Grab	
Dissolved Oxygen	Daily Min	6.0 mg/L	Daily	Grab	
Chlorine, Total Residual	Daily Max	38 µg/L	Daily	Grab	May-Sept and whenever chlorinating. See 3.2.1.2
Chlorine, Total Residual	Weekly Avg	11 µg/L	Daily	Grab	May-Sept and whenever chlorinating. See 3.2.1.2
Fecal Coliform	Geometric Mean	400 #/100 ml	2/Week	Grab	May-Sept only
Phosphorus, Total	Monthly Avg	1.0 mg/L	2/Week	24-Hr Flow Prop Comp	
Copper, Total Recoverable		mg/L	Monthly	24-Hr Flow Prop Comp	2012 only

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	2012 only
Mercury, Total Recoverable	Daily Max	3.89 ng/L	Quarterly	Grab	See 3.2.1.4
Acute WET		TU_a	Quarterly	24-Hr Flow Prop Comp	Annual in rotating quarters. See 3.2.1.6
Chronic WET		rTU_c	Quarterly	24-Hr Flow Prop Comp	Annual in rotating quarters. See 3.2.1.6
Cyanide, Amenable	Weekly Avg	17 µg/L	Quarterly	24-Hr Flow Prop Comp	See 3.2.1.3, 3.2.1.5 and Compliance Schedule in 5.3
Cyanide, Amenable	Weekly Avg	0.53 lbs/day	Quarterly	24-Hr Flow Prop Comp	See 3.2.1.3, 3.2.1.5 and Compliance Schedule in 5.3

3.2.1.1 Sample Analyses

Samples shall be analyzed using a method which provides adequate sensitivity so that results can be quantified, unless not possible using the most sensitive approved method.

3.2.1.2 Applicable Mass Limits for Total Residual Chlorine

The applicable mass limits for Total Residual Chlorine are **2.9 pounds per day (daily maximum), 0.33 pounds per day (non-wet weather weekly average),** and **0.61 pounds per day (wet weather weekly average)**. See Standard Requirements for "Applicability of Alternative Wet Weather Limitations".

3.2.1.3 Potential Removal of Effluent Limitation(s)

The effluent limitations for Cyanide Amenable become effective on January 1, 2012 as specified in the Schedules of Compliance Section. Quarterly monitoring is required upon permit reissuance.

However, when 4 or more representative results for cyanide have been provided to the Department, the permittee may request that the Department make a determination of the need for a limit under section NR 106.05, Wisconsin Administrative Code. For this request, the samples shall be evenly spaced over the period or periods of discharge during at least 12 months time and must be tested according to the "Sampling and Testing Procedures" in the Standard Requirements section in this permit. Within 60 days of such request, the Department shall make that determination. If the Department determines that effluent limitations are unnecessary based on the procedures in NR 106.05, the Department shall notify the permittee that the limitations will not become effective, pursuant to NR106.04(4). The monitoring requirements and the compliance schedule for cyanide shall be discontinued at that time. This action shall take place without public notice thereof.

If, after reviewing the data, the Department determines that effluent limitations for cyanide are necessary based on the procedures in NR 106.05, the requirement to meet the effluent limitations according to the Schedules of Compliance will not be removed nor will the monitoring frequency be reduced.

3.2.1.4 Mercury Monitoring

The permittee shall collect and analyze all mercury samples according to the data quality requirements of ss. NR 106.145(9) and (10), Wisconsin Administrative Code. The limit of quantitation (LOQ) used for the effluent and field blank shall be less than 1.3 ng/L, unless the samples are quantified at levels above 1.3 ng/L. The permittee shall collect at least one mercury field blank for each set of mercury samples (a set of samples may include combinations of

intake, influent, effluent or other samples all collected on the same day). The permittee shall report results of samples and field blanks to the Department on Discharge Monitoring Reports.

3.2.1.5 Non-Wet Weather and Alternative Wet Weather Mass Limit

This parameter (Cyanide Amenable) has a mass limit based on weather conditions. The applicable non-wet weather mass limit is 0.53 pounds/day. The applicable wet weather mass limit is 1.0 pounds/day. Report the applicable mass limit on the Discharge Monitoring Report form in the variable limit column. See Standard Requirements for "Applicability of Alternative Wet Weather Mass Limitations" and "Appropriate Formulas for Effluent Calculations".

Note: 1000 ug/l = 1 mg/L (divide ug/L by 1000 to convert to mg/L).

3.2.1.6 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Whitewater Creek, upstream of the effluent and any other discharges

Instream Waste Concentration (IWC): 66%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 75, 50, 25, 12.5% and any additional selected by the permittee.

WET Testing Frequency: Tests are required during the following quarters.

- **Acute:** Apr-Jun 2009; Jan-Mar 2010; July-Sept 2011; Oct-Dec 2012; Apr-Jun 2013
- **Chronic:** Apr-Jun 2009; Jan-Mar 2010; July-Sept 2011; Oct-Dec 2012; Apr-Jun 2013

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Watershed Management, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The original Discharge Monitoring Report (DMR) form and one copy shall be sent to the contact and location provided on the DMR by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: If $LC_{50} \geq 100$, then $TU_a = 1.0$. If LC_{50} is < 100, then $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Relative Toxic Unit - Chronic (rTU_c) is greater than 1.0 for either species. The rTU_c shall be calculated as follows: If $IC_{25} \geq$ IWC, then $rTU_c = 1.0$. If $IC_{25} <$ IWC, then $rTU_c =$ IWC $\div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

4 Land Application Requirements

4.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
002	Anaerobic Liquid Sludge, sampled from the secondary digester (sludge storage tank), after mixing.

4.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

4.2.1 Sampling Point (Outfall) 002 - Liquid Sludge

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Grab Comp	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Grab Comp	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Grab Comp	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Grab Comp	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Grab Comp	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Grab Comp	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Grab Comp	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Grab Comp	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Grab Comp	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Grab Comp	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Grab Comp	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Grab Comp	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Grab Comp	
Nitrogen, Ammonium (NH_4-N) Total		Percent	Annual	Grab Comp	
Nitrogen, Total Kjeldahl		Percent	Annual	Grab Comp	
Phosphorus, Total		Percent	Annual	Grab Comp	
Phosphorus, Water Extractable		Percent	Annual	Grab Comp	
Potassium, Total Recoverable		Percent	Annual	Grab Comp	
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Grab Comp	See 4.2.1.5
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Grab Comp	See 4.2.1.5
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Grab Comp	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Grab Comp	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Solids, Total		Percent	Annual	Grab Comp	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Grab Comp	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Grab Comp	
Radium 226 Dry Wt		pCi/g	Annual	Grab Comp	

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

4.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed for the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

4.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

4.2.1.3 Multiple Sludge Sample Points (Outfalls)

If there are multiple sludge sample points (outfalls), but the sludges are not subject to different sludge treatment processes, then a separate List 2 analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be calculated for each sludge type. In this case, List 1, 3, and 4 and PCBs need only be analyzed on a single sludge type, at the specified frequency. If there are multiple sludge sample points (outfalls), due to multiple treatment processes, List 1, 2, 3 and 4 and PCBs shall be analyzed for each sludge type at the specified frequency.

4.2.1.4 Sludge Which Exceeds the High Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

4.2.1.5 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2010**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

4.2.1.6 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS B SLUDGE

The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	

* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

4.2.1.7 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements.		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

5 Schedules of Compliance

5.1 Mercury Pollutant Minimization Program

An alternative mercury effluent limitation of 3.89 ng/L is included in this permit pursuant to NR 106.145(6), Wis. Adm. Code. Therefore, the permittee shall implement a pollutant minimization program as outlined below.

Required Action	Date Due
Implement the Mercury Pollutant Minimization Program (PMP) Plan:: The permittee shall continue to implement the mercury PMP plan as amended by agreement of the permittee and the Department.	
Annual Report #1: The permittee shall submit to the Department an annual status report on the progress of the PMP as required by s. NR 106.145(7), Wis. Adm. Code. Submittal of the first annual status report is required by the Date Due.	02/15/2009
Annual Report #2: Submit the second annual report	02/15/2010
Annual Report #3: Submit the third annual report	02/15/2011
Annual Report #4: Submit the fourth annual report	02/15/2012
Submit Final Report: Submit the final progress report. Note: If the permittee wishes to apply for an alternative mercury effluent limitation, that application is due with the application for permit reissuance, six months prior to permit expiration. The permittee should submit or reference the PMP plan as updated by the Annual Status Report or more recent developments as part of that application.	02/15/2013

5.2 Chemical Specific Toxic Pollutants - Cyanide, Amenable

Cyanide, Amenable limits, effective after Compliance Schedule: 17 ug/L and the Applicable Mass Limit.

Required Action	Date Due
Report on Effluent Discharges: Submit a report on effluent discharges of Cyanide, Amenable with conclusions regarding compliance. If the Department determines, based on the additional effluent data, that the effluet limitations are unnecessary based on the procedures in section NR 106.05, Wis Admin Code, the Department shall notify the permittee that the limits will no longer become effective. The monitoring requirement shall also be discontinued. But if after reviewing the data, the Department determines that effluent limitations are necessary, the requirement to meet the effluent limitations according to the Compliance Schedule is not removed	12/31/2009
Action Plan: Submit an action plan for complying with the effluent limitation. If construction is required, include plans and specifications with the submittal.	06/30/2010
Initiate Actions: Initiate actions identified in the plan.	09/30/2010
Complete Actions: Complete actions necessary to achieve compliance with the effluent limitations.	12/31/2011

6 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

6.1 Reporting and Monitoring Requirements

6.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. When submitting a paper Discharge Monitoring Report form, the original and one copy of the Wastewater Discharge Monitoring Report Form shall be submitted to the return address printed on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

All Wastewater Discharge Monitoring Reports submitted to the Department should be submitted using the electronic Discharge Monitoring Report system. Permittees who may be unable to submit Wastewater Discharge Monitoring Reports electronically may request approval to submit paper DMRs upon demonstration that electronic reporting is not feasible or practicable.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

An Electronic Discharge Monitoring Report Certification sheet shall be signed and submitted with each electronic Discharge Monitoring Report submittal. This certification sheet, which is not part of the electronic report form, shall be signed by a principal executive officer, a ranking elected official or other duly authorized representative and shall be mailed to the Department at the time of submittal of the electronic Discharge Monitoring Report. The certification sheet certifies that the electronic report form is true, accurate and complete. Paper reports shall be signed by a principal executive officer, a ranking elected official, or other duly authorized representative.

6.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

6.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;

- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

6.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

6.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

A separate CMAR certification document, that is not part of the electronic report form, shall be mailed to the Department at the time of electronic submittal of the CMAR. The CMAR certification shall be signed and submitted by an authorized representative of the permittee. The certification shall be submitted by mail. The certification shall verify the electronic report is complete, accurate and contains information from the owner's treatment works.

6.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

6.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

6.2 System Operating Requirements

6.2.1 Noncompliance Notification

- The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:
  - any noncompliance which may endanger health or the environment;
  - any violation of an effluent limitation resulting from an unanticipated bypass;
  - any violation of an effluent limitation resulting from an upset; and
  - any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

- A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at **1-800-943-0003**

6.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

6.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-536, Wis. Adm. Code.

6.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

6.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

6.2.6 Unscheduled Bypassing

Any unscheduled bypass or overflow of wastewater at the treatment works or from the collection system is prohibited, and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats., unless:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- The permittee notified the Department as required in this Section.

Whenever there is an unscheduled bypass or overflow occurrence at the treatment works or from the collection system, the permittee shall notify the Department within 24 hours of initiation of the bypass or overflow occurrence by telephoning the wastewater staff in the regional office as soon as reasonably possible (FAX, email or voice mail, if staff are unavailable).

In addition, the permittee shall within 5 days of conclusion of the bypass or overflow occurrence report the following information to the Department in writing:

- Reason the bypass or overflow occurred, or explanation of other contributing circumstances that resulted in the overflow event. If the overflow or bypass is associated with wet weather, provide data on the amount and duration of the rainfall or snow melt for each separate event.
- Date the bypass or overflow occurred.
- Location where the bypass or overflow occurred.
- Duration of the bypass or overflow and estimated wastewater volume discharged.
- Steps taken or the proposed corrective action planned to prevent similar future occurrences.
- Any other information the permittee believes is relevant.

6.2.7 Scheduled Bypassing

Any construction or normal maintenance which results in a bypass of wastewater from a treatment system is prohibited unless authorized by the Department in writing. If the Department determines that there is significant public interest in the proposed action, the Department may schedule a public hearing or notice a proposal to approve the bypass. Each request shall specify the following minimum information:

- proposed date of bypass;
- estimated duration of the bypass;

- estimated volume of the bypass;
- alternatives to bypassing; and
- measures to mitigate environmental harm caused by the bypass.

6.2.8 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. The wastewater treatment facility shall be under the direct supervision of a state certified operator as required in s. NR 108.06(2), Wis. Adm. Code. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

6.3 Surface Water Requirements

6.3.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

6.3.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average limits and mass limits:

Weekly/Monthly average concentration = the sum of all daily results for that week/month, divided by the number of results during that time period.

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

6.3.3 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

6.3.4 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

6.3.5 Fecal Coliforms

The limit for fecal coliforms shall be expressed as a monthly geometric mean.

6.3.6 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

6.3.7 Applicability of Alternative Wet Weather Mass Limitations

- An alternative wet weather mass limitation applies when:
  - The applicable mass limitation (based on annual average design flow) is exceeded; and
  - The permittee demonstrates to the satisfaction of the Department that the discharge exceedance is caused by and occurs during a wet weather event. For the purposes of this demonstration, a wet weather event occurs during and immediately following periods of precipitation or snowmelt, including but not limited to rain, sleet, snow, hail or melting snow during which water from the precipitation, snowmelt or elevated groundwater enters the sewerage system through infiltration or inflow, or both. The permittee shall present demonstrations to the Department by attaching them to the Wastewater Discharge Monitoring Report Form(s).

Note: In making this demonstration, the permittee may want to consider presenting a discussion of normal effluent flow rates, the effluent flow rates that resulted in the exceedance and identification of the event, including intensity and duration, which caused the high flow rates. A graph of effluent flow over time may also be helpful.

6.3.8 Total Residual Chlorine Requirements (When De-Chlorinating Effluent)

Test methods for total residual chlorine, approved in ch. NR 219 - Table B, Wis. Adm. Code, normally achieve a limit of detection of about 20 to 50 micrograms per liter and a limit of quantitation of about 100 micrograms per liter. Reporting of test results and compliance with effluent limitations for chlorine residual and total residual halogens shall be as follows:

- Sample results which show no detectable levels are in compliance with the limit. These test results shall be reported on Wastewater Discharge Monitoring Report Forms as "< 100 µg/L". (Note: 0.1 mg/L converts to 100 µg/L)

- Samples showing detectable traces of chlorine are in compliance if measured at less than 100 µg/L, unless there is a consistent pattern of detectable values in this range. These values shall also be reported on Wastewater Discharge Monitoring Report Forms as "<100 µg/L." The facility operating staff shall record actual readings on logs maintained at the plant, shall take action to determine the reliability of detected results (such as re-sampling and/or calculating dosages), and shall adjust the chemical feed system if necessary to reduce the chances of detects.

- Samples showing detectable levels greater than 100 µg/L shall be considered as exceedances, and shall be reported as measured.

- To calculate average or mass discharge values, a "0" (zero) may be substituted for any test result less than 100 µg/L. Calculated values shall then be compared directly to the average or mass limitations to determine compliance.

6.3.9 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

6.3.10 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Watershed Management, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;

- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:

  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)

- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;

- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

6.4 Land Application Requirements

6.4.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

6.4.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

6.4.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

6.4.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report, unless approval for not submitting the lab reports has been given. Both reports shall be submitted by January 31 following each year of analysis.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

6.4.5 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note:** It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

6.4.6 Land Application Report

Land Application Report Form 3400-55 shall be submitted by January 31, following each year non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code.

6.4.7 Other Methods of Disposal or Distribution Report

The permittee shall submit Report Form 3400-52 by January 31, following each year sludge is hauled, landfilled, incinerated, or when exceptional quality sludge is distributed or land applied.

6.4.8 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permission from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

6.4.9 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

6.4.10 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

6.4.11 Class B Sludge: Fecal Coliform Limitation

Compliance with the fecal coliform limitation for Class B sludge shall be demonstrated by calculating the geometric mean of at least 7 separate samples. (Note that a Total Solids analysis must be done on each sample). The geometric mean shall be less than 2,000,000 MPN or CFU/g TS. Calculation of the geometric mean can be done using one of the following 2 methods.

Method 1:

Geometric Mean = $(X_1 \times X_2 \times X_3 \ldots \times X_n)^{1/n}$

Where X = Coliform Density value of the sludge sample, and where n = number of samples (at least 7)

Method 2:

Geometric Mean = antilog$[(X_1 + X_2 + X_3 \ldots + X_n) \div n]$

Where X = $\log_{10}$ of Coliform Density value of the sludge sample, and where n = number of samples (at least 7)

Example for Method 2

Sample Number	Coliform Density of Sludge Sample	$\log_{10}$
1	6.0×10^5	5.78
2	4.2×10^6	6.62
3	1.6×10^6	6.20

4	9.0×10^5	5.95
5	4.0×10^5	5.60
6	1.0×10^6	6.00
7	5.1×10^5	5.71

The geometric mean for the seven samples is determined by averaging the $\log_{10}$ values of the coliform density and taking the antilog of that value.

$(5.78 + 6.62 + 6.20 + 5.95 + 5.60 + 6.00 + 5.71) \div 7 = 5.98$

The antilog of $5.98 = 9.5 \times 10^5$

6.4.12 Vector Control: Volatile Solids Reduction

The mass of volatile solids in the sludge shall be reduced by a minimum of 38% between the time the sludge enters the digestion process and the time it either exits the digester or a storage facility. For calculation of volatile solids reduction, the permittee shall use the Van Kleeck equation or one of the other methods described in "Determination of Volatile Solids Reduction in Digestion" by J.B. Farrell, which is Appendix C of EPA's *Control of Pathogens in Municipal Wastewater Sludge* (EPA/625/R-92/013). The Van Kleeck equation is:

$$VSR\% = \frac{VS_{IN} - VS_{OUT}}{VS_{IN} - (VS_{OUT} \times VS_{IN})} \times 100$$

Where: VS_{IN} = Volatile Solids in Feed Sludge (g VS/g TS)

VS_{OUT} = Volatile Solids in Final Sludge (g VS/g TS)

VSR% = Volatile Solids Reduction, (Percent)

6.4.13 Class B Sludge - Vector Control: Injection

No significant amount of the sewage sludge shall be present on the land surface within one hour after the sludge is injected.

6.4.14 Land Application of Sludge Which Contains Elevated Levels of Radium-226

When contributory water supplies exceed 2 pci per liter of Radium 226, monitoring for Radium 226 in sludge is required. Sludge containing Radium 226 shall be land applied in accordance with the requirements in s. NR 204.07(3)(n), Wis. Adm. Code.

7 Summary of Reports Due

FOR INFORMATIONAL PURPOSES ONLY

Description	Date	Page
Mercury Pollutant Minimization Program -Implement the Mercury Pollutant Minimization Program (PMP) Plan	See Permit	12
Mercury Pollutant Minimization Program -Annual Report #1	February 15, 2009	12
Mercury Pollutant Minimization Program -Annual Report #2	February 15, 2010	12
Mercury Pollutant Minimization Program -Annual Report #3	February 15, 2011	12
Mercury Pollutant Minimization Program -Annual Report #4	February 15, 2012	12
Mercury Pollutant Minimization Program -Submit Final Report	February 15, 2013	12
Chemical Specific Toxic Pollutants - Cyanide, Amenable -Report on Effluent Discharges	December 31, 2009	12
Chemical Specific Toxic Pollutants - Cyanide, Amenable -Action Plan	June 30, 2010	12
Chemical Specific Toxic Pollutants - Cyanide, Amenable -Initiate Actions	September 30, 2010	12
Chemical Specific Toxic Pollutants - Cyanide, Amenable -Complete Actions	December 31, 2011	12
Compliance Maintenance Annual Reports (CMAR)	by June 30, each year	14
General Sludge Management Form 3400-48	prior to any significant sludge management changes	19
Characteristic Form 3400-49 and Lab Report	by January 31 following each year of analysis	20
Land Application Report Form 3400-55	by January 31, following each year non-exceptional quality sludge is land applied	21
Report Form 3400-52	by January 31, following each year sludge is hauled, landfilled, incinerated, or when exceptional quality sludge is distributed or land applied	21
Wastewater Discharge Monitoring Report	no later than the date indicated on the form	13

Report forms shall be submitted to the address printed on the report form. Any facility plans or plans and specifications for municipal, industrial, industrial pretreatment and non industrial wastewater systems shall be

submitted to the Bureau of Watershed Management, P.O. Box 7921, Madison, WI 53707-7921. All other submittals required by this permit shall be submitted to:
Southeast Region - Waukesha, 141 NW Barstow St., Room 180, Waukesha, WI 53188

Appendix TM2-C
Existing Unit Processes

Appendix TM2-C
Existing Unit Processes
Wastewater Treatment Plant
City of Whitewater, WI

Preliminary Treatment

Influent Pumping

Number	4	
Type	Dry-Pit Submersible, Variable Speed	
Capacity, each	2,560	gpm
Design Capacity, firm	7,860	gpm (1)

Notes:
(1) Peak flows up to 15 mgd (10,417 gpm) have been recorded.

Mechanical Screening

Number	1	
Screen Capacity (per manufacturer's literature)	10.0	mgd
Compactor Capacity	99	cf/h

Grit Removal

Number	1	
Type	Vortex	
Capacity	12.0	mgd

Influent Flow Metering

Number	1	
Type	Magnetic Flow Meter	
Size	12	in
Capacity	15	mgd

Primary Treatment

Primary Clarifiers

Number	2		
Type	Circular, Center Feed		
Size, Diameter	70	ft	
Sidewater Depth	10.3	ft	
Surface Area, Total	7,697	sf	
Weir Length, Total	440	ft	
Weir Loading Rate @ Design Avg Flow of 1.85 mgd	4,206	gpd/ft	
Surface Overflow Rate @ 1.85 mgd	240	gpd/sf	
Surface Overflow Rate @ Design Peak Hour Flow of 11	1429	gpd/sf	(1)

Notes:
(1) 10 State Standards recommends a surface overflow rate of 1,200 gpd/sf for primary clarifiers co-settling WAS.

Primary Sludge Pumps

Number	2	
Type	Rotary Lobe, Variable Speed	
Capacity, Each @ 25 PSI	50	gpm
Displacement	24	gal/100 rev
Maximum Pump Speed	240	rpm

Secondary Treatment

RBC Units

Number of Trains	6	(1)
Number of Units per Train	8	
Type	24 Standard Density and 24 High Density	
Area, Standard Media, Each	104,000	sf
Area, High Density Media, Each	156,000	sf
Area Total	6,240,000	sf
Supplemental Aeration	Combination Fine Bubble-REEF (first 4 units/train) Course Bubble-Flexcap(last 4 units/train)	

Notes:
(1) NR 110 requires equalization for avg:peak hour flows greater than 1:2.5. Original RBC design flow of 3.65 mgd to a peak hour of 11 mgd equates to a 1:3.

Appendix TM2-C
Existing Unit Processes
Wastewater Treatment Plant
City of Whitewater, WI

RBC Blowers

Number	2	
Type	Positive Displacement	
Capacity, each	2,400 scfm @ 5 psig	

Secondary Clarifiers

Number	2		
Type	Circular, Center Feed		
Diameter	70	ft	
Sidewater Depth	10.3	ft	
Surface Area, Total	7,697	sf	
Weir Length, Total	440	ft	
Weir Loading Rate @ Design Avg Flow of 1.85 mgd	4,206	gpd/ft	
Surface Overflow Rate @ 1.85 mgd	240	gpd/sf	
Surface Overflow Rate @ Design Peak Hour Flow of 11	1429	gpd/sf	(1)

Notes:
(1) 10 State Standards recommends and NR 110 requires a surface overflow rate of 1,200 gpd/sf.

Secondary Sludge Pumps

Number	2	
Type	Rotary Lobe, Variable Speed	
Capacity, Each @ 25 PSI	50	gpm
Displacement	24	gal/100 rev
Maximum Pump Speed	240	rpm

Tertiary Treatment

Phosphorous Removal Chemical Pumps

Number	2	
Type	Diaphragm	
Capacity, Each	0.4 to 25 gph	gpm

Filter Beds

Number	1	
Cells	4	
Type	Anthracite Media (30-inch Depth), Gravity	
Size, Cell	22 ft x 20 ft	
Area, Cell	440	sf
Area, Total	1,760	sf
Capacity (Once Cell out of Service)	9.5	mgd

Air Wash Blower

Number	1	
Type	Positive Displacement	
Capacity	2,200 cfm @ 5 psig	

Filter Backwash Pumps

Number	2	
Type	14-inch Propeller	
Capacity	5,336 gpm @ 14 ft TDH	

Filter Wastewater Pumps

Number	2	
Type	Submersible	
Capacity	240	gpm

Filter Chlorination

Number	1	
Type	Gaseous Chlorine	
Capacity	50	ppd

Disinfection

Ultraviolet System

Type	Low Pressure, High Intensity	
Number of Channels	1	
Number of Banks	2	
Number of UV Modules per Bank	8	
Total Number of UV Lamps	128	
Design UV Transmittance	65%	
Design Capacity	11	mgd

Appendix TM2-C
Existing Unit Processes
Wastewater Treatment Plant
City of Whitewater, WI

Postaeration

Postaeration Tank

Number	1
Length	38 ft
Width	24 ft
Sidewater Depth	9 ft
Volume	8,208 cf
Diffuser Type	Tubular

Postaeration Blowers

Number	3
Type	Positive Displacement
Capacity	1 @ 119 cfm, 2 @ 238 cfm

Effluent Flow Measurement

Number	1.0
Type	Parshall Flume
Size	18 inch
Capacity	0.112 to 15.9 mgd

Nonpotable Water System

Nonpotable Water Pumps

Number	2
Type	Centrifugal Booster
Size, Each	300 gpm @ 136 ft TDH

Solids Handling

Anaerobic Digesters

Number	2
Type	Mixed, Mesophilic
Diameter, Each	60 ft
Sidewater Depth, Each	25 ft
Volume, Total	157,000 ft

Digester No. 1 Recirculation Pump

Number	1
Type	Centrifugal
Capacity, Each	350 gpm

Digester No. 1 Mixing

Number	2
Type	Pump Jet-Mix
Capacity, Each	1,800 gpm

Sludge Storage Tank

Number	1
Diameter, Each	85 ft
Sidewater Depth, Each	25 ft
Volume, Total	157,000 ft

Sludge Storage Tank Mixing

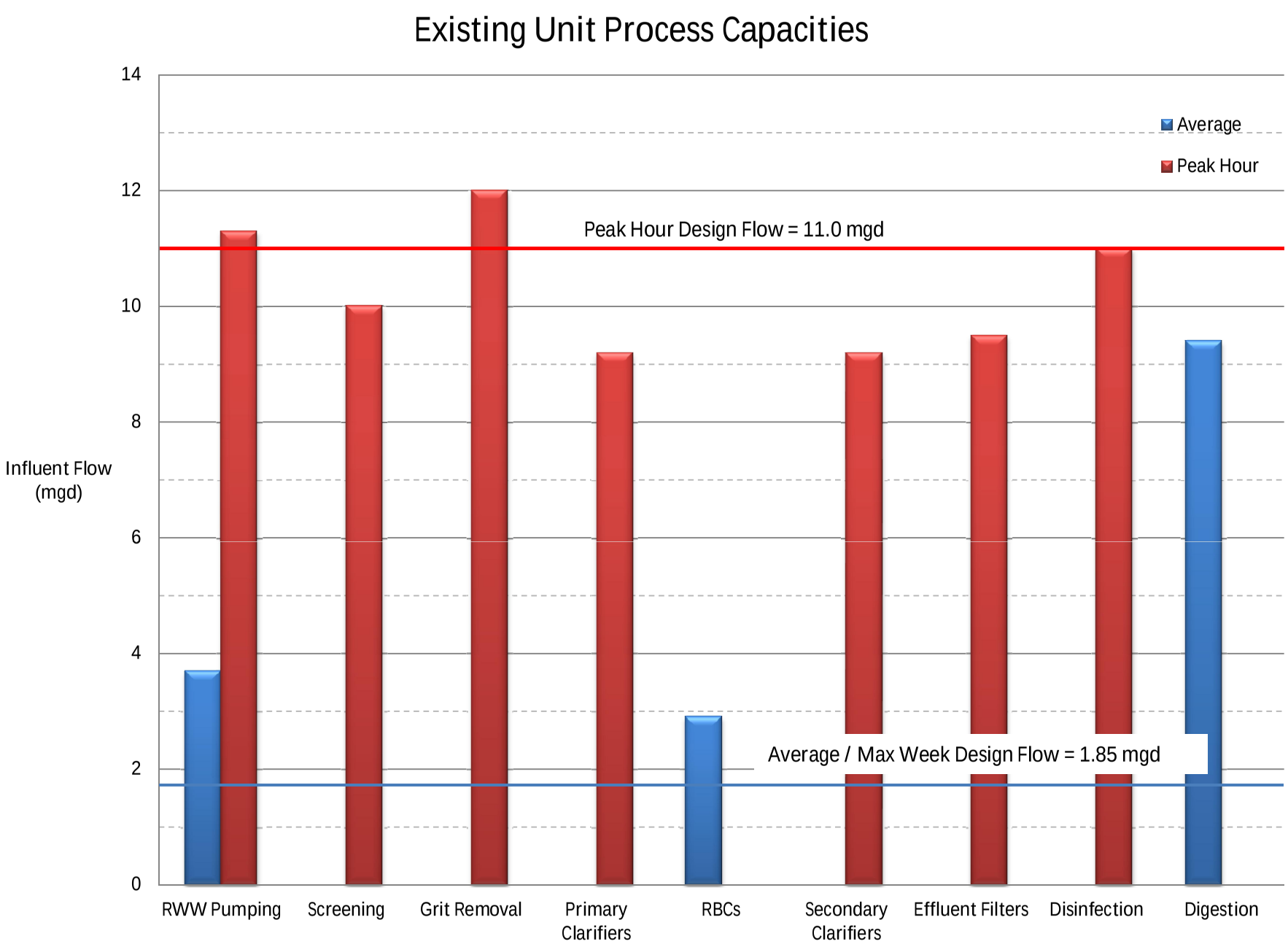
Number	2
Type	Pump Jet-Mix
Capacity, Each	3,600 gpm

Sludge Storage Supernatant System

Number	1
Type	Submersible Pump with Weir Box
Capacity, Each	40 gpm

Biogas Storage Sphere (Not in Use)

Number	1
Diameter	35 ft


Existing Unit Process Capacities
Influent Flow (mgd)
14
12
10
8
6
4
2
0
Average
Peak Hour
Peak Hour Design Flow = 11.0 mgd
Average / Max Week Design Flow = 1.85 mgd
RWW Pumping
Screening
Grit Removal
Primary Clarifiers
RBCs
Secondary Clarifiers
Effluent Filters
Disinfection
Digestion