Permit Rationale

Date: February 17, 2021 (updated 4/13/2021)

Permit Writer: Ben Hucka

Facility Name: City of Waterloo STP

Location: County: Blackhawk
Latitude: 42 degrees 28 minutes 18 seconds
Longitude: 92 degrees 18 minutes 18 seconds

Region/FO: 1, Manchester

Design: **Easton Ave WWTP:** Discharge to Cedar River (A1, B(WW-1), HH) via river diffuser
Treatment: Activated Sludge
Date constructed: 1998
Flow: ADW: 12.7 MGD, AWW: 26.7 MGD, MWW: 36.0 MGD
Design BOD5: 30,000 LBS/day, TKN: 7,500 LBS/day, P.E. 179,641
Source: Construction Permit 98-361-S, issued August 21, 1998
and schedule G dated March 11, 1998

Satellite WWTP: Discharge to Cedar River (A1, B(WW-1), HH) via river diffuser
Treatment: Activated Sludge
Date constructed: 1995
Flow: ADW: 5.3 MGD, AWW: 8.1 MGD, MWW: 11.1 MG
Design: BOD5 58,000 LBS/day, TKN: 13,550 LBS/day, P.E. 347,305
Source: Construction Permit 95-317-S, issued July 7, 1995

Treatment Plant Description: The treatment plant consists of two equalization basins and two treatment facilities; the Easton Avenue Plant and Satellite Plant. The facility receives waste from two separate dedicated trunk lines. Industrial waste from the Northeast section of the city is sent to the Satellite Plant, while the rest of the City's waste is sent to the Easton Avenue Plant via the other line. Industrial wastewater arriving at the Satellite Plant can be treated at the Satellite plant or diverted to the Easton Avenue Plant. The Satellite Plant is currently not in operation and all wastewater is treated at the Easton Plant.

Wastewater treatment at the Easton Avenue Plant consists of bar screening, grit removal, two primary clarifiers, four single-pass aeration basins, four final clarifiers and ultraviolet disinfection. Effluent is then discharged via a river diffuser (outfall 801).

When in operation, the Satellite Plant receives pretreated industrial wastewater. Wastewater treatment consists of two two-stage aeration basins and four final clarifiers (outfall 008). When not in operation, wastewater from this truck line arrives at the Satellite pumping station and is routed directly to the Easton plant aeration basins, bypassing the headworks and primary clarification. The wastewater from the Tannery and Tyson's is pretreated prior to discharging to the Satellite trunk line at the anaerobic lagoon located near the Tyson facility.

Outfalls: The following is a description of the outfalls permitted for wastewater discharge included in this permit:

001 – Easton Avenue Activated Sludge Wastewater Treatment Facility. This is an internal outfall immediately following the secondary treatment process of the Easton Avenue wastewater treatment facility. All wastewater from this outfall is permitted to be discharged through outfall 011 or 801.

008 – Satellite Activated Sludge Wastewater Treatment Facility. This is an internal outfall immediately following the secondary treatment process of the Satellite wastewater treatment facility. All wastewater from this outfall is permitted to be discharged through outfall 011 or 801.

011 – Total Treatment Facility Shoreline Discharge. Wastewater is permitted to be discharged from this location only when stream flow in the Cedar River is equal to or greater than 8500 CFS as measured at USGS Gage 05464000. Discharge from this location when stream flow is less than 8500 CFS is prohibited and included as a bypass (Outfall 009).

801 – Total Treatment Facility Diffuser Discharge. This is the primary outfall used for the wastewater treatment facility and includes a diffuser in the Cedar River.

Blending Mode of Operations: To alleviate the direct bypass of untreated wastewater from the EQ basins, the City may operate their wastewater treatment plant in blending mode as described below. This mode of operation shall be evaluated at each permit reissuance to determine if language needs to remain in future permits.

Influent flows that exceed the hydraulic capacity of the Easton Avenue plant are diverted to two flow equalization basins (FEQ) after passing through grit removal. Flows stored in the FEQ basins are returned to the Easton Wet Well once the Easton Avenue plant regains hydraulic capacity. In the event that the Easton Avenue plant has yet to regain hydraulic capacity, the flow from the FEQ will be diverted to the Satellite plant. The flows from the FEQ will be routed through the Satellite plant and returned to the headworks of the Easton Avenue plant via portable pumps. If the biological system at the Easton Avenue Plant could be jeopardized due to excessive flows, the partially treated wastewater from the Satellite plant will be diverted to the disinfection chamber and blended with the final effluent from the Easton plant. Once the Easton Avenue plant regains hydraulic capacity the facility is no longer authorized to blend the FEQ overflow via the Satellite plant.

All effluent limits and monitoring requirements for outfalls 801 and 011 remain in effect to ensure the protection of human health and the receiving stream during this mode of operation with the exception of $CBOD_5$. Non-standard limits for BOD_5 (Page 10 of the permit) are in effect in lieu of $CBOD_5$ when the facility is operating in the blending mode due to the addition of partially treated wastewater.

Sludge Handling and Disposal: Easton Avenue Plant- Sludge from the primary clarifiers is pumped to the Treated Activated Sludge (TAS) building for dewatering. Sludge from the final clarifiers is pumped to either the Return Activated Sludge (RAS) building and returned to the aeration basins or Waste Activated Sludge (WAS) building. WAS is pumped to the sludge thickener building, and the thickened sludge is pumped to the TAS building. Supernatant is pumped back to the aeration basins. TAS is treated in two parallel digester units, each consisting of one thermophilic and two mesophilic digesters. Methane gas from last digester in each unit is captured and used in the facility's boilers. Excess gas is flamed off.

Satellite Plant- Sludge from the final clarifiers is pumped to either the RAS building for the Satellite plant or to the WAS building. RAS is pumped back to the aeration basins and WAS follows the treatment process described above.

Treated sludge is pumped to sludge storage tanks, and hauled to a sludge storage structure south of Waterloo before being land applied.

Wasteload Allocation (WLA): WLAs dated February 5, 2009, May 21, 2015 and December 7, 2020. The additive flows of the Easton plant and the Satellite plant were used to calculate the Water Quality Based Effluent Limits (WQBEL): ADW: 18.0 MGD, AWW: 34.8 MGD, MWW: 47.1 MGD

Antidegradation: The discharge to be authorized under this permit does not include any new pollutants of concern, and the proposed permit does not include a design capacity increase, change in outfall location, or less stringent water quality-based effluent limits. Since none of the factors that trigger a Tier II antidegradation review are present, a Tier II review is not required.

Impaired Waterbody: The following waterbodies in the discharge route are on the 2018 impaired waters list:

- Cedar River for bacteria (indicator bacteria, *E. coli*)
- Cedar River for pH
- Cedar River for nutrients (nitrogen)
- Cedar River for biological (loss of native mussel species)
- Iowa River for bacteria (indicator bacteria, *E. coli*)
- Mississippi River for metals (aluminum)

A TMDL for *E. coli* for the Cedar River was completed in 2010. This facility was assigned limits in the TMDL. A TMDL was completed for the Cedar River for Nitrate Nitrogen in 2006. This facility was assigned Total Nitrogen limits in the TMDL.

All limits in the proposed permit are consistent with the approved TMDLs.

Final Limits for Outfall 001:

Parameter	Season	7-day ave mg/l	30-day ave mg/L	daily max mg/L	7-day ave lbs/day	30-day ave lbs/day	daily max lbs/day	Geo - mean	Min	Max
$CBOD_5$	Yearly	40	25	---	---	---	---	---	---	---
TSS	Yearly	45	30	---	---	---	---	---	---	---

Final Limits for Outfall 008:

Parameter	Season	7-day ave mg/l	30-day ave mg/L	daily max mg/L	7-day ave lbs/day	30-day ave lbs/day	daily max lbs/day	Geo - mean	Min	Max
$CBOD_5$	Yearly	40	25	---	---	---	---	---	---	---
TSS	Yearly	45	30	---	---	---	---	---	---	---

Final Limits for Outfall 801:

Parameter	Season	7-day ave mg/l	30-day ave mg/L	daily max mg/L	7-day ave lbs/day	30-day ave lbs/day	daily max lbs/day	Geo - mean	Min	Max
$CBOD_5$	Yearly	---	---	---	11,609	7,256	---	---	---	---
TSS	Yearly	---	---	---	13,060	8,707	---	---	---	---
Ammonia (NH_3-N)	January	---	55.9	95.0	---	9,364	16,561	---	---	---
	February	---	70.0	116.5	---	11,372	19,558	---	---	---
	March	---	30.7	108.5	---	4,998.7	21,421	---	---	---
	April	---	21.5	79.8	---	3,519	14,363	---	---	---
	May	---	18.0	79.1	---	2,962.7	14,162.8	---	---	---
	June	---	11.6	78.1	---	1,931.6	13,877.8	---	---	---
	July	---	14.2	87.4	---	2,283.2	25,229	---	---	---
	August	---	13.0	74.1	---	2,082.2	13,652.6	---	---	---
	September	---	13.4	94.6	---	2,221.8	16,916	---	---	---
	October	---	30.8	93.5	---	5,020.2	16,990	---	---	---
	November	---	38.7	78.4	---	6,282.3	13,970.8	---	---	---
	December	---	45.8	72.7	---	8,998	13,467	---	---	---
pH	Yearly	---	---	---	---	---	---	---	6.0	9.0
E. coli	Summer	---	---	---	---	---	---	126	---	---
Total Nitrogen		---	---	---	---	9,285.5	15,199.0	---	---	---

Final Limits for Outfall 011:

Parameter	Season	7-day ave mg/l	30-day ave mg/L	daily max mg/L	7-day ave lbs/day	30-day ave lbs/day	daily max lbs/day	Geo - mean	Min	Max
$CBOD_5$	Yearly	---	---	---	11,609	7,256	---	---	---	---
TSS	Yearly	---	---	---	13,060	8,707	---	---	---	---
Ammonia (NH_3-N)	January	---	69.4	69.4	---	12,696	12,696	---	---	---
	February	---	78.4	78.4	---	13,832	13,832	---	---	---
	March	---	68.0	68.0	---	12,392	12,392	---	---	---
	April	---	53.9	53.9	---	10,546	10,546	---	---	---
	May	---	60.5	60.5	---	11,394	11,394	---	---	---
	June	---	59.5	59.5	---	10,079	11,114	---	---	---
	July	---	64.1	64.1	---	11,575	12,395	---	---	---
	August	---	62.0	62.0	---	10,982	11,823	---	---	---
	September	---	55.2	55.2	---	10,890	10,890	---	---	---
	October	---	54.0	54.0	---	10,558	10,558	---	---	---
	November	---	52.5	52.5	---	10,145	10,145	---	---	---
	December	---	54.3	54.3	---	10,655	10,655	---	---	---
pH	Yearly	---	---	---	---	---	---	---	6.0	9.0
E. coli	Summer	---	---	---	---	---	---	126	---	---
Total Nitrogen		---	---	---	---	9,285.5	15,199.0	---	---	---

Basis for limits:

Technology-based limits: The five-day carbonaceous biochemical oxygen demand ($CBOD_5$) and total suspended solids (TSS) concentration limits for outfalls 001 and 008 are consistent with Standard Secondary Treatment requirements at 567 IAC 62.3(1)"a" and "b". The additive design of the Easton and Satellite POTW's was used to calculate the mass limits for $CBOD_5$ and TSS for outfalls 011 and 801.

The pH limits for outfalls 011 and 801 are consistent with Standard Secondary Treatment requirements at 567 IAC 62.3(1)"c".

Water Quality-based limits: Limits for ammonia nitrogen (NH3-N, hereinafter referred to as "ammonia"), *Escherichia coli* (*E. coli*), and total nitrogen (TN) are based on the attached WLAs dated February 5, 2009, May 21, 2015 and December 7, 2020. Pollutant-specific analyses are described below.

Ammonia: The Department reviewed available ammonia discharge monitoring report (DMR) data for outfalls 801 and 011 from January 2017 to January 2021 (attached). The data shows that the facility can consistently comply with the applicable limits for outfalls 801 and 011. As such, the ammonia limits for both outfalls will be effective at permit issuance.

The ammonia limits for outfall 801 are the more stringent between the permit issued March 1, 2010 (WLA dated February 5, 2009) and the WLA dated December 7, 2020. The permit limits for outfall 801 included in the April 1, 2016 permit renewal were appealed by the city and never became effective limits. As such, they are not included in this evaluation.

Ammonia limits for outfall 011 are the more stringent between the May 21, 2015 and December 7, 2020 WLAs.

E. coli: The receiving water body for both outfalls 801 and 011 (Cedar River) is a Class (A1) water body. The water quality criteria for *E. coli* in a Class (A1) water body include a geometric mean of 126 organisms/100 mL and a sample maximum of 235 organisms/100 mL from March 15th through November 15th, applicable at the "end-of-pipe." However, in accordance with 567 IAC 62.8(2), only the geometric mean limit applies. The Waterloo wastewater treatment facilities includes a UV disinfection system and can consistently comply with the proposed limits. As such, the *E. coli* limit for both outfalls will be effective at permit issuance.

Total Residual Chlorine: The permit does not include total residual chlorine limits for outfall 801 or outfall 011 since the City of Waterloo wastewater treatment facility does not currently use chlorine or employ chlorine disinfection.

Chloride: The City of Waterloo NPDES permit renewal application included average and maximum daily chloride results of 228 mg/L and 262 mg/L, respectively. These results are well below the 30-day average chloride limits calculated in the December 7, 2020, WLA for outfall 801 (4,443 mg/L) and outfall 011 (5,168 mg/L). Therefore, there is no reasonable potential for the discharge to violate the chloride limits calculated in the aforementioned WLA, and no chloride limits are included in the permit.

Sulfate: The NPDES permit renewal application also included average and maximum daily sulfate results of 156 mg/L and 194 mg/L, respectively. These results are well below the 30-day average sulfate limits calculated in the December 7, 2020, WLA for outfall 801 (16,289 mg/L) and outfall 011 (12,584 mg/L). Therefore, there is no reasonable potential for the discharge to violate the sulfate limits calculated in the aforementioned WLA, and no sulfate limits are included in the permit.

Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite Nitrogen: The Department also received average and maximum daily results for total phosphorus (6.89 mg/L and 55 mg/L, respectively), total kjeldahl nitrogen (TKN) (3.79 mg/L and 26.97 mg/L, respectively), and nitrate + nitrite nitrogen (32.22 mg/L and 50.11 mg/L, respectively) as part of the facility's NPDES permit renewal application. There are no applicable numeric water quality criteria for total phosphorus or total kjeldahl nitrogen. The numeric water quality criterion for nitrate + nitrite nitrogen (10 mg/L) only applies only to Class "C" (drinking water supply) waters. Note that NPDES permits are protective of Iowa's narrative standards that apply at all times to all surface waters regardless of whether or not the standards are specifically included in the permit. The Department is addressing nitrogen and phosphorus discharges from point sources through the Iowa Nutrient Reduction Strategy (see "Nutrient Reduction Strategy" section below for further detail).

Total Nitrogen: In the 2006 Nitrate TMDL for the Cedar River, the City of Waterloo was assigned a total nitrogen WLA of 505.2 tons/year and 2,768 lbs/day. However, the TMDL calculation only considered the discharge flows from one of the two treatment trains. The actual combined plant flows were used to calculate the TMDL WLA for this facility. In addition, the corrected WLA was converted to 30-day average and daily maximum limits based on the procedure in the November 20, 2008 memo "Deriving total

nitrogen limits from the WLA in the Cedar River TMDL". The calculations were made as a part of Waterloo's NPDES permit amendment in 2011. The final TMDL-based total nitrogen limits for this facility apply to outfalls 801 and 011.

Oil and Grease: The oil and grease result included in the NPDES permit renewal application was 8.8 mg/L. Iowa's water quality standards (WQS) only include a narrative standard for oil and grease at 567 IAC 61.3(2). In most cases if oil and grease is below 10 mg/L, there should not be a visible sheen.

Dissolved Oxygen: A dissolved oxygen (DO) result of 6.85 mg/L was included in the facility's NPDES permit renewal application. Based on modeling that considered the allowable $CBOD_5$ and ammonia levels for outfalls 801 and 011, the December 7, 2020 WLA determined that the effluent from these outfalls will not cause the DO level in the receiving stream to be below 5.0 mg/L at any time. Therefore, no numeric DO limits are included in the permit.

Part B Pollutants: The City's NPDES permit renewal application included three effluent sampling results for each of the metal and toxic pollutants identified on Part B of the application. As detailed in the attached reasonable potential analysis spreadsheets, the Department compared these results with the concentration limits calculated in the WLA dated December 7, 2020. Where results were reported as less than the method detection limit (MDL), the Department evaluated whether the MDL was below the limits calculated in the WLAs.

The Department noted that the MDLs for hexachlorobenzene were not low enough to determine whether reasonable potential exists to violate the limits calculated in the aforementioned WLA for outfalls 801 and 011; however, all sample results were non-detect values at a sufficiently sensitive sampling method. Limits and monitoring are not required.

All other parameters in Part B were either well below the WQBELs or were non-detect values below the WQBELs. No additional monitoring or limits are necessary for parameters listed in Part B of the application.

Backsliding: The permit has been reviewed for anti-backsliding according to sections 303(d)(4) and 402(o) of the Clean Water Act and 40 CFR 122.44. All limits and conditions proposed in this permit are at least as stringent as those in the previous permit. Backsliding is not occurring.

Effluent toxicity: The Department is incorporating acute toxicity limits and testing into the permit as per 567 IAC 63.4 which became effective on June 19, 1991. Special monitoring language in the permit requires annual acute toxicity testing of the facility's effluent using the test organisms *Ceriodaphnia dubia* and *Pimephales promelas*. The December 7, 2020 WLA calculated the dilution percentage for outfalls 801 (8.9% of the effluent and 91.1% of dilution water) and 011 (11.6% of the effluent and 88.4% of dilution water). To ensure the protection of aquatic life, the dilution percentage in the proposed permit is consistent with the higher percentage of effluent as calculated for outfall 011. A test performed at the percentage calculated for 011 shall satisfy the monitoring requirement listed in the permit for both outfalls. An annual monitoring frequency is specified in the permit.

Nutrient Reduction Strategy: The city was required to submit a nutrient removal feasibility study by the NPDES permit issued April 1, 2016. The city submitted a report that identified nutrient reduction options that were not feasible at the time. The NPDES permit was not amended at the time, which would've included the requirement for the city to submit an updated study in five years. As such, this permit renewal requires the permittee to submit an updated nutrient reduction strategy. The report shall be

submitted no later than 24 months after permit issuance and shall address the items described on the "Nutrient Reduction Requirements" page of the permit.

Monitoring Basis: The Department recently updated Chapter 63 of the IAC which contains the monitoring and reporting requirements for NPDES permits. Note that most of the prescribed requirements for operational monitoring have been removed from Chapter 63; two requirements (TRC and lagoon cell depth for controlled discharge lagoons) remain. While the City's reissued NPDES permit will not include the operational monitoring requirements of the past, the rule requires permittees to perform operational monitoring to ensure proper facility operation in accordance with the facility design, and requires permittees to maintain records of operational monitoring for three years. Thus, necessary operational monitoring can be performed at the discretion of your facility upon reissuance. Please note that operational monitoring requirements can still be placed in permits on a case-by-case basis. For additional information on this topic, please refer to the attachment titled "Operational Monitoring Recommendations for NPDES Permittees."

Compliance monitoring requirements are based on Chapter 63 IAC, Tables II, Category >105,000 (PE based on the additive design BOD loadings for the Easton and Satellite facilities). The weekly influent and effluent monitoring for total nitrogen and total phosphorus is required by the Iowa Nutrient Reduction strategy. Raw waste TKN monitoring is also set at once per week to be consistent with the total nitrogen monitoring frequency.

Special Monitoring: Special monitoring requirements for *E.coli* and total nitrogen for outfalls 801 and 011; raw waste flow, stream flow and raw waste monitoring for outfall 801; and flow for outfall 008 are specified on the Special Monitoring Requirements page of the proposed permit.

As previously described, outfall 801 utilizes a diffuser in the Cedar River. The proposed permit has several requirements for diffusers including visual monitoring, diffuser performance analysis and bathymetric analysis requirements. Additional information on these requirements can be found on the Diffuser Special Monitoring Requirements pages of the proposed permit.

Sludge: Sludge must be land applied according to Chapter 67 IAC land application rules or otherwise disposed of in accordance with the Federal regulations in 40 CFR 503. No adverse environmental or public health impacts have been identified.

Compliance Schedule: None.

Pretreatment: The City of Waterloo's Pretreatment Program was approved on March 14, 1984. The Department's and EPA's most recent pretreatment program inspection reports for the City of Waterloo are attached (dated November 15, 2018, and November 18, 2020, respectively).

The permit requires the city to evaluate the adequacy of its local limits to meet the general prohibitions against interference and pass through listed in 40 CFR 403.5(a) and the specific prohibitions listed in 40 CFR 403.5(b). The permit also requires an annual pretreatment report describing the pretreatment program activities of the previous year be submitted to the Department by March 1st of each year. Additionally, the city shall evaluate the approved pretreatment program for compliance with 40 CFR 403 and Iowa Administrative Code 567 – Chapter 62. These requirements can be found on the Significant Industrial User Limitations, Monitoring and Reporting Requirements page in the proposed permit.

Administrative Order: None.

City of Waterloo

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This Package Contains

WASTELOAD ALLOCATION CALCULATIONS & NOTES

Please Do Not Separate

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Diffuser Discharge Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 801	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
CBOD5	Secondary Treatment Levels Will Not Violate WQS			
Total D.O.	Minimum Concentration (mg/l)			
January - December	Numerical limits are not required			
Ammonia – Nitrogen[1]				
January	55.9	95.0	**9,364**	**16,561**
February	70.0	116.5	**11,372**	**19,558**
March	102.3	127.9	**15,953**	**21,421**
April	97.3	189.5	**15,339**	**31,005**
May	102.9	222.1	**16,008**	**35,738**
June	65.6	187.6	**10,258**	**30,397**
July	35.9	148.9	5,812	**25,229**
August	23.7	115.8	3,924	**19,957**
September	25.7	94.8	4,344	**16,916**
October	34.7	96.4	5,820	**16,990**
November	56.9	91.8	**9,298**	**16,095**
December	52.3	72.7	8,998	13,467
Bacteria[2]	Geometric Mean (#org./100 ml)		March 15th – November 15th	
E. coli	126			
Chloride	4,443	6,687	721,509	1,092,022
Sulfate	16,289	16,289	2,657,384	2,657,384
TRC[3]	0.093	0.213	15.0	34.6
Total Nitrogen[4]			9,285.5	15,199.0
pH	5.7 – 14.0 Standard Units			

Major Facility Acute WET Testing Ratio: Use 8.9% of effluent and 91.1% of dilution water for the testing

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) HH)

Annual critical low flows in Cedar River at the outfall:
1Q10 flow 359 cfs, 7Q10 flow 403 cfs, 30Q10 flow 453 cfs, 30Q5 flow 566 cfs, harmonic mean flow 1,518 cfs
Annual critical low flows in Cedar River at the downstream Class C designation:
1Q10 flow 329 cfs, 7Q10 flow 439 cfs, 30Q10 flow 503 cfs, 30Q5 flow 675 cfs, harmonic mean flow 1,878 cfs
See monthly flows in the report.
Excel spreadsheet calculations [X] Qual II E model [ ] Qual II E modeling date [ ]
Performed by: Katie Greenstein

1: The **bold** ammonia nitrogen limits will be limited by the TMDL based Total Nitrogen WLA.
2: Cedar River *E. coli* TMDL based limit.
3: Only required if chlorine is used for disinfection.
4: Corrected Cedar River Nitrate TMDL limits based on Easton/Satellite plants combined flow and converted to a 30-day average and daily maximum using the procedure from the Nov. 20, 2008 memo "Deriving total nitrogen limits from the WLA in the Cedar River TMDL."

Antidegradation Review Requirement

Less stringent ammonia nitrogen limits for certain months is the only factor that triggers an antidegradation review. See Section 2 for details.
Please note that the antidegradation review conducted in this wasteload allocation is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Diffuser Discharge Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 801	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
1,1,1-Trichloroethane	5.048E+00	2.953E+02	7.858E+02	4.803E+04
1,1,2-Trichloroethane	4.107E-01	4.107E-01	6.249E+01	6.249E+01
1,1-Dichloroethylene	2.259E+01	6.040E+02	3.437E+03	9.824E+04
1,2,4-Trichlorobenzene	1.767E+00	1.767E+00	2.750E+02	2.750E+02
1,2-Dichloroethane	2.601E-01	6.599E+02	3.958E+01	1.073E+05
1,2-Dichloropropane	3.422E-01	3.422E-01	5.207E+01	5.207E+01
2,3,7,8-TCDD (Dioxin)	2.247E-09	2.247E-09	3.445E-07	3.445E-07
2,4,5-TP (Silvex)	2.524E-01	2.524E-01	3.929E+01	3.929E+01
2,4-D	2.522E+00	2.522E+00	3.926E+02	3.926E+02
3,3-Dichlorobenzidine	1.234E-02	1.234E-02	1.891E+00	1.891E+00
4,4' DDT	1.243E-05	1.230E-02	2.007E-03	2.001E+00
Alachlor	4.927E-02	4.927E-02	7.676E+00	7.676E+00
Aldrin	2.203E-05	3.355E-02	3.378E-03	5.458E+00
Aluminum	1.082E+00	8.389E+00	1.746E+02	1.364E+03
Antimony	1.413E-01	1.230E+02	2.200E+01	2.001E+04
Arsenic (III)	1.232E-02	3.803E+00	1.875E+00	6.185E+02
Asbestos	1.767E-01	1.767E-01	2.750E+01	2.750E+01
Atrazine	7.344E-02	7.344E-02	1.145E+01	1.145E+01
Barium	2.296E+01	2.292E+03	3.587E+03	3.728E+05
Benzene	1.506E+00	1.846E+02	2.291E+02	3.002E+04
Benzidine	3.355E+00	3.355E+00	5.458E+02	5.458E+02
Benzo(a)Pyrene	2.601E-03	2.601E-03	3.958E-01	3.958E-01
Beryllium	1.010E-01	5.592E+00	1.572E+01	9.096E+02
Bis(2-ethylhexyl)phthalate	8.213E-01	8.213E-01	1.250E+02	1.250E+02
Bromoform	2.943E+00	2.943E+00	4.478E+02	4.478E+02
Cadmium	5.623E-03	4.827E-02	9.075E-01	7.851E+00
Carbofuran	1.010E+00	1.010E+00	1.572E+02	1.572E+02
Carbon Tetrachloride	1.574E-01	2.410E+02	2.395E+01	3.920E+04
Chlordane	5.346E-05	2.684E-02	8.628E-03	4.366E+00
Chlorobenzene	2.524E+00	1.801E+02	3.929E+02	2.929E+04
Chlorodibromomethane	2.738E-01	2.738E-01	4.166E+01	4.166E+01
Chloroform	3.901E+00	3.901E+00	5.936E+02	5.936E+02
Chloropyrifos	5.098E-04	9.284E-04	8.227E-02	1.510E-01
Chromium (VI)	1.368E-01	1.790E-01	2.207E+01	2.911E+01
cis-1,2-Dichloroethylene	1.767E+00	1.767E+00	2.750E+02	2.750E+02
Copper	2.097E-01	3.009E-01	3.385E+01	4.893E+01
Cyanide	6.465E-02	2.461E-01	1.043E+01	4.002E+01
Dalapon	5.048E+00	5.048E+00	7.858E+02	7.858E+02
Di(2-ethylhexyl)adipate	1.010E+01	1.010E+01	1.572E+03	1.572E+03

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Diffuser Discharge Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 801	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
Dibromochloropropane	5.048E-03	5.048E-03	7.858E-01	7.858E-01
Dibutyl phthalate	1.957E+00	1.957E+00	3.184E+02	3.184E+02
Dichlorobromomethane	3.764E-01	3.764E-01	5.728E+01	5.728E+01
Dichloromethane	1.262E-01	1.262E-01	1.965E+01	1.965E+01
Dieldrin	2.380E-05	2.684E-03	3.648E-03	4.366E-01
Dinoseb	1.767E-01	1.767E-01	2.750E+01	2.750E+01
Diquat	5.048E-01	5.048E-01	7.858E+01	7.858E+01
Endosulfan	6.963E-04	2.461E-03	1.124E-01	4.002E-01
Endothall	2.524E+00	2.524E+00	3.929E+02	3.929E+02
Endrin	4.476E-04	9.619E-04	7.224E-02	1.565E-01
Ethylbenzene	1.338E+01	2.533E+02	2.082E+03	4.120E+04
Ethylene dibromide	1.262E-03	1.262E-03	1.965E-01	1.965E-01
Fluoride	8.779E+01	8.779E+01	1.431E+04	1.431E+04
gamma-Hexachlorocyclohexane (Lindane)	1.063E-02	1.063E-02	1.728E+00	1.728E+00
Glyphosate	1.767E+01	1.767E+01	2.750E+03	2.750E+03
Heptachlor	3.481E-05	5.816E-03	5.337E-03	9.460E-01
Heptachlor epoxide	1.719E-05	5.816E-03	2.635E-03	9.460E-01
Hexachlorobenzene	1.278E-04	1.278E-04	1.959E-02	1.959E-02
Hexachlorocyclopentadiene	1.010E+00	1.010E+00	1.572E+02	1.572E+02
Iron	1.118E+01	1.118E+01	1.819E+03	1.819E+03
Lead	9.565E-02	2.208E+00	1.544E+01	3.591E+02
Mercury (II)	1.262E-03	1.834E-02	1.965E-01	2.983E+00
Methoxychlor	2.524E+00	2.524E+00	3.929E+02	3.929E+02
Nickel	1.166E+00	9.433E+00	1.881E+02	1.534E+03
Nitrate as N	2.524E+02	3.579E+03	3.929E+04	5.821E+05
Nitrate+Nitrite as N	2.524E+02	3.579E+03	3.929E+04	5.821E+05
Nitrite as N	2.524E+01	2.524E+01	3.929E+03	3.929E+03
o-Dichlorobenzene	1.514E+01	1.514E+01	2.358E+03	2.358E+03
Oxamyl (Vydate)	5.048E+00	5.048E+00	7.858E+02	7.858E+02
para-Dichlorobenzene	1.590E+00	2.237E+01	2.475E+02	3.638E+03
Parathion	1.616E-04	7.270E-04	2.609E-02	1.182E-01
Pentachlorophenol (PCP)	1.848E-01	3.259E-01	2.812E+01	5.301E+01
Phenols	6.217E-01	2.796E+01	1.003E+02	4.548E+03
Picloram	1.262E+01	1.262E+01	1.965E+03	1.965E+03
Polychlorinated Biphenyls (PCBs)	2.820E-05	2.237E-02	4.323E-03	3.638E+00

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Diffuser Discharge Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 801	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
Polynuclear Aromatic Hydrocarbons (PAHs)	3.730E-04	3.355E-01	6.020E-02	5.458E+01
Selenium	6.217E-02	2.159E-01	1.003E+01	3.511E+01
Silver	4.250E-02	4.250E-02	6.913E+00	6.913E+00
Simazine	1.010E-01	1.010E-01	1.572E+01	1.572E+01
Styrene	2.524E+00	2.524E+00	3.929E+02	3.929E+02
Tetrachloroethlyene	4.723E-01	4.723E-01	7.186E+01	7.186E+01
Thallium	6.058E-03	6.689E+00	9.430E-01	1.088E+03
Toluene	6.217E-01	2.796E+01	1.003E+02	4.548E+03
Toxaphene	2.487E-05	8.165E-03	4.013E-03	1.328E+00
trans-1,2-Dichloroethylene	2.388E+00	2.388E+00	3.781E+02	3.781E+02
Trichloroethylene (TCE)	9.947E-01	4.474E+01	1.605E+02	7.277E+03
Trihalomethanes (total)	2.019E+00	2.019E+00	3.143E+02	3.143E+02
Vinyl Chloride	1.711E-02	1.711E-02	2.604E+00	2.604E+00
Xylenes (Total)	2.524E+02	2.524E+02	3.929E+04	3.929E+04
Zinc	2.411E+00	2.411E+00	3.922E+02	3.922E+02

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Low Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 009	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
CBOD5	Secondary Treatment Levels Will Not Violate WQS			
Total D.O.	Minimum Concentration (mg/l)			
January - December	Numerical limits are not required			
Ammonia - Nitrogen				
January	18.0	18.0	3,306	4,842
February	17.6	17.6	4,173	4,636
March	18.6	18.6	4,868	4,868
April	22.5	22.5	4,816	5,634
May	22.7	22.7	5,197	5,578
June	20.6	20.6	3,351	5,152
July	11.4	22.9	1,847	5,933
August	7.6	20.1	1,274	5,309
September	8.0	19.8	1,356	5,307
October	11.1	19.0	1,882	5,074
November	17.7	17.7	3,098	4,735
December	16.3	18.3	2,794	5,002
Bacteria[1]	Geometric Mean (#org./100 ml)		March 15th – November 15th	
E. coli	126			
Chloride	821	821	211,295	211,295
Sulfate	1,981	1,981	509,515	509,515
TRC[2]	0.025	0.025	6.2	6.4
Total Nitrogen[3]			9,285.5	15,199.0
pH	6.1 – 14.0 Standard Units			

Major Facility Acute WET Testing Ratio: Use 75.6% of effluent and 24.4% of dilution water for the testing

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) HH)

Annual critical low flows in Cedar River at the outfall:
1Q10 flow 359 cfs, 7Q10 flow 403 cfs, 30Q10 flow 453 cfs, 30Q5 flow 566 cfs, harmonic mean flow 1,518 cfs
Annual critical low flows in Cedar River at the downstream Class C designation:
1Q10 flow 329 cfs, 7Q10 flow 439 cfs, 30Q10 flow 503 cfs, 30Q5 flow 675 cfs, harmonic mean flow 1,878 cfs
See monthly flows in the report.
Excel spreadsheet calculations [X] Qual II E model [ ] Qual II E modeling date [ ]

Performed by: Katie Greenstein

1: Cedar River *E. coli* TMDL based limit.
2: Only required if chlorine is used for disinfection.
3: Corrected Cedar River Nitrate TMDL limits based on Easton/Satellite plants combined flow and converted to a 30-day average and daily maximum using the procedure from the Nov. 20, 2008 memo "Deriving total nitrogen limits from the WLA in the Cedar River TMDL."

Antidegradation Review Requirement

A tier II antidegradation review is not required. See Section 2 for details.

Please note that the antidegradation review conducted in this wasteload allocation is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Low Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 009	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
1,1,1-Trichloroethane	5.048E+00	3.491E+01	7.858E+02	8.939E+03
1,1,2-Trichloroethane	4.107E-01	4.107E-01	6.249E+01	6.249E+01
1,1-Dichloroethylene	2.259E+01	7.140E+01	3.437E+03	1.829E+04
1,2,4-Trichlorobenzene	1.767E+00	1.767E+00	2.750E+02	2.750E+02
1,2-Dichloroethane	2.601E-01	7.802E+01	3.958E+01	1.998E+04
1,2-Dichloropropane	3.422E-01	3.422E-01	5.207E+01	5.207E+01
2,3,7,8-TCDD (Dioxin)	5.723E-10	5.723E-10	9.306E-08	9.306E-08
2,4,5-TP (Silvex)	2.524E-01	2.524E-01	3.929E+01	3.929E+01
2,4-D	2.522E+00	2.522E+00	3.926E+02	3.926E+02
3,3-Dichlorobenzidine	3.142E-03	3.142E-03	5.109E-01	5.109E-01
4,4' DDT	4.618E-06	1.455E-03	8.334E-04	3.725E-01
Alachlor	4.927E-02	4.927E-02	7.676E+00	7.676E+00
Aldrin	5.611E-06	3.967E-03	9.123E-04	1.016E+00
Aluminum	4.018E-01	9.917E-01	7.250E+01	2.540E+02
Antimony	1.413E-01	1.455E+01	2.200E+01	3.725E+03
Arsenic (III)	1.232E-02	4.496E-01	1.875E+00	1.151E+02
Asbestos	1.767E-01	1.767E-01	2.750E+01	2.750E+01
Atrazine	7.344E-02	7.344E-02	1.145E+01	1.145E+01
Barium	2.296E+01	2.710E+02	3.587E+03	6.941E+04
Benzene	1.506E+00	2.182E+01	2.291E+02	5.587E+03
Benzidine	3.967E-01	3.967E-01	1.016E+02	1.016E+02
Benzo(a)Pyrene	2.020E-03	2.020E-03	3.284E-01	3.284E-01
Beryllium	1.010E-01	6.612E-01	1.572E+01	1.693E+02
Bis(2-ethylhexyl)phthalate	2.469E-01	2.469E-01	4.014E+01	4.014E+01
Bromoform	2.943E+00	2.943E+00	4.478E+02	4.478E+02
Cadmium	2.089E-03	5.707E-03	3.769E-01	1.461E+00
Carbofuran	1.010E+00	1.010E+00	1.572E+02	1.572E+02
Carbon Tetrachloride	1.574E-01	2.850E+01	2.395E+01	7.297E+03
Chlordane	1.986E-05	3.174E-03	3.584E-03	8.127E-01
Chlorobenzene	2.524E+00	2.129E+01	3.929E+02	5.452E+03
Chlorodibromomethane	2.738E-01	2.738E-01	4.166E+01	4.166E+01
Chloroform	3.901E+00	3.901E+00	5.936E+02	5.936E+02
Chloropyrifos	1.098E-04	1.098E-04	2.811E-02	2.811E-02
Chromium (VI)	2.116E-02	2.116E-02	5.418E+00	5.418E+00
cis-1,2-Dichloroethylene	1.767E+00	1.767E+00	2.750E+02	2.750E+02
Copper	3.557E-02	3.557E-02	9.108E+00	9.108E+00
Cyanide	2.401E-02	2.909E-02	4.334E+00	7.450E+00
Dalapon	5.048E+00	5.048E+00	7.858E+02	7.858E+02
Di(2-ethylhexyl)adipate	1.010E+01	1.010E+01	1.572E+03	1.572E+03

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Low Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 009	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
Dibromochloropropane	5.048E-03	5.048E-03	7.858E-01	7.858E-01
Dibutyl phthalate	2.314E-01	2.314E-01	5.926E+01	5.926E+01
Dichlorobromomethane	3.764E-01	3.764E-01	5.728E+01	5.728E+01
Dichloromethane	1.262E-01	1.262E-01	1.965E+01	1.965E+01
Dieldrin	6.060E-06	3.174E-04	9.853E-04	8.127E-02
Dinoseb	1.767E-01	1.767E-01	2.750E+01	2.750E+01
Diquat	5.048E-01	5.048E-01	7.858E+01	7.858E+01
Endosulfan	2.586E-04	2.909E-04	4.667E-02	7.450E-02
Endothall	2.524E+00	2.524E+00	3.929E+02	3.929E+02
Endrin	1.137E-04	1.137E-04	2.912E-02	2.912E-02
Ethylbenzene	1.010E+01	2.995E+01	1.811E+03	7.670E+03
Ethylene dibromide	1.262E-03	1.262E-03	1.965E-01	1.965E-01
Fluoride	1.060E+01	1.060E+01	2.723E+03	2.723E+03
gamma-Hexachlorocyclohexane (Lindane)	1.256E-03	1.256E-03	3.217E-01	3.217E-01
Glyphosate	1.767E+01	1.767E+01	2.750E+03	2.750E+03
Heptachlor	8.865E-06	6.876E-04	1.441E-03	1.761E-01
Heptachlor epoxide	4.376E-06	6.876E-04	7.116E-04	1.761E-01
Hexachlorobenzene	3.254E-05	3.254E-05	5.292E-03	5.292E-03
Hexachlorocyclopentadiene	1.010E+00	1.010E+00	1.572E+02	1.572E+02
Iron	1.322E+00	1.322E+00	3.386E+02	3.386E+02
Lead	3.553E-02	2.610E-01	6.411E+00	6.685E+01
Mercury (II)	7.217E-04	2.169E-03	1.294E-01	5.553E-01
Methoxychlor	2.524E+00	2.524E+00	3.929E+02	3.929E+02
Nickel	4.330E-01	1.115E+00	7.814E+01	2.856E+02
Nitrate as N	2.524E+02	4.231E+02	3.929E+04	1.084E+05
Nitrate+Nitrite as N	2.524E+02	4.231E+02	3.929E+04	1.084E+05
Nitrite as N	2.524E+01	2.524E+01	3.929E+03	3.929E+03
o-Dichlorobenzene	1.514E+01	1.514E+01	2.358E+03	2.358E+03
Oxamyl (Vydate)	5.048E+00	5.048E+00	7.858E+02	7.858E+02
para-Dichlorobenzene	9.141E-01	2.645E+00	1.638E+02	6.772E+02
Parathion	6.004E-05	8.595E-05	1.083E-02	2.201E-02
Pentachlorophenol (PCP)	3.853E-02	3.853E-02	9.866E+00	9.866E+00
Phenols	2.309E-01	3.306E+00	4.167E+01	8.465E+02
Picloram	1.262E+01	1.262E+01	1.965E+03	1.965E+03
Polychlorinated Biphenyls (PCBs)	7.182E-06	2.645E-03	1.168E-03	6.772E-01

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Low Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 009	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
Polynuclear Aromatic Hydrocarbons (PAHs)	1.385E-04	3.967E-02	2.500E-02	1.016E+01
Selenium	2.309E-02	2.552E-02	4.167E+00	6.535E+00
Silver	5.025E-03	5.025E-03	1.287E+00	1.287E+00
Simazine	1.010E-01	1.010E-01	1.572E+01	1.572E+01
Styrene	2.524E+00	2.524E+00	3.929E+02	3.929E+02
Tetrachloroethlyene	3.703E-01	3.703E-01	6.021E+01	6.021E+01
Thallium	2.261E-03	7.907E-01	4.053E-01	2.025E+02
Toluene	2.309E-01	3.306E+00	4.167E+01	8.465E+02
Toxaphene	9.236E-06	9.653E-04	1.667E-03	2.472E-01
trans-1,2-Dichloroethylene	6.736E-01	6.736E-01	1.207E+02	1.207E+02
Trichloroethylene (TCE)	3.694E-01	5.289E+00	6.667E+01	1.354E+03
Trihalomethanes (total)	2.019E+00	2.019E+00	3.143E+02	3.143E+02
Vinyl Chloride	1.711E-02	1.711E-02	2.604E+00	2.604E+00
Xylenes (Total)	2.524E+02	2.524E+02	3.929E+04	3.929E+04
Zinc	2.850E-01	2.850E-01	7.299E+01	7.299E+01

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – High Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 011	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
CBOD5	Secondary Treatment Levels Will Not Violate WQS			
Total D.O.	Minimum Concentration (mg/l)			
January - December	Numerical limits are not required			
Ammonia – Nitrogen[1]				
January	69.4	69.4	**12,696**	12,696
February	78.4	78.4	**13,832**	13,832
March	68.0	68.0	**12,392**	12,392
April	53.9	53.9	**10,546**	10,546
May	60.5	60.5	**11,394**	11,394
June	59.5	59.5	**11,114**	11,114
July	64.1	64.1	**11,575**	12,395
August	62.0	62.0	**10,982**	11,823
September	55.2	55.2	**10,890**	10,890
October	54.0	54.0	**10,558**	10,558
November	52.5	52.5	**10,145**	10,145
December	54.3	54.3	**10,655**	10,655
Bacteria[2]	Geometric Mean (#org./100 ml)		March 15th – November 15th	
E. coli	126			
Chloride	5,168	5,168	863,979	863,979
Sulfate	12,584	12,584	2,101,246	2,101,246
TRC[3]	0.164	0.164	27.3	27.3
Total Nitrogen[4]			9,285.5	15,199.0
pH	5.0 – 14.0 Standard Units			

Major Facility Acute WET Testing Ratio: Use 11.6% of effluent and 88.4% of dilution water for the testing

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) HH)

Annual critical low flows in Cedar River at the outfall:
1Q10 flow 8,500 cfs, 7Q10 flow 8,500 cfs, 30Q10 flow 8,500 cfs, 30Q5 flow 8,500 cfs, harmonic mean flow 8,500 cfs
Annual critical low flows in Cedar River at the downstream Class C designation:
1Q10 flow 8,500 cfs, 7Q10 flow 8,500 cfs, 30Q10 flow 8,500 cfs, 30Q5 flow 8,500 cfs, harmonic mean flow 8,500 cfs

Excel spreadsheet calculations [X] Qual II E model [ ] Qual II E modeling date [ ]

Performed by: Katie Greenstein

1: The **bold** ammonia nitrogen limits will be limited by the TMDL based Total Nitrogen WLA.
2: Cedar River *E. coli* TMDL based limit.
3: Only required if chlorine is used for disinfection.
4: Corrected Cedar River Nitrate TMDL limits based on Easton/Satellite plants combined flow and converted to a 30-day average and daily maximum using the procedure from the Nov. 20, 2008 memo "Deriving total nitrogen limits from the WLA in the Cedar River TMDL."

Antidegradation Review Requirement

Less stringent ammonia nitrogen limits for certain months is the only factor that triggers an antidegradation review. See Section 2 for details.
Please note that the antidegradation review conducted in this wasteload allocation is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – High Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 011	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
1,1,1-Trichloroethane	6.125E+01	2.279E+02	9.223E+03	3.791E+04
1,1,2-Trichloroethane	1.838E+00	1.838E+00	2.767E+02	2.767E+02
1,1-Dichloroethylene	1.011E+02	4.661E+02	1.522E+04	7.754E+04
1,2,4-Trichlorobenzene	2.144E+01	2.144E+01	3.228E+03	3.228E+03
1,2-Dichloroethane	1.164E+00	5.092E+02	1.752E+02	8.471E+04
1,2-Dichloropropane	1.531E+00	1.531E+00	2.306E+02	2.306E+02
2,3,7,8-TCDD (Dioxin)	2.970E-09	2.970E-09	4.530E-07	4.530E-07
2,4,5-TP (Silvex)	3.063E+00	3.063E+00	4.611E+02	4.611E+02
2,4-D	3.060E+01	3.060E+01	4.608E+03	4.608E+03
3,3-Dichlorobenzidine	1.631E-02	1.631E-02	2.487E+00	2.487E+00
4,4' DDT	7.731E-05	9.494E-03	1.175E-02	1.579E+00
Alachlor	5.972E-01	5.972E-01	8.994E+01	8.994E+01
Aldrin	2.912E-05	2.589E-02	4.441E-03	4.308E+00
Aluminum	6.473E+00	6.473E+00	1.022E+03	1.077E+03
Antimony	1.715E+00	9.494E+01	2.582E+02	1.579E+04
Arsenic (III)	5.513E-02	2.935E+00	8.301E+00	4.882E+02
Asbestos	2.144E+00	2.144E+00	3.228E+02	3.228E+02
Atrazine	8.901E-01	8.901E-01	1.340E+02	1.340E+02
Barium	2.776E+02	1.769E+03	4.181E+04	2.942E+05
Benzene	6.738E+00	1.424E+02	1.015E+03	2.369E+04
Benzidine	2.589E+00	2.589E+00	4.308E+02	4.308E+02
Benzo(a)Pyrene	1.048E-02	1.048E-02	1.599E+00	1.599E+00
Beryllium	1.225E+00	4.316E+00	1.845E+02	7.179E+02
Bis(2-ethylhexyl)phthalate	1.281E+00	1.281E+00	1.954E+02	1.954E+02
Bromoform	1.317E+01	1.317E+01	1.983E+03	1.983E+03
Cadmium	3.497E-02	3.725E-02	5.312E+00	6.197E+00
Carbofuran	1.225E+01	1.225E+01	1.845E+03	1.845E+03
Carbon Tetrachloride	7.044E-01	1.860E+02	1.061E+02	3.094E+04
Chlordane	3.324E-04	2.072E-02	5.051E-02	3.446E+00
Chlorobenzene	3.063E+01	1.390E+02	4.611E+03	2.312E+04
Chlorodibromomethane	1.225E+00	1.225E+00	1.845E+02	1.845E+02
Chloroform	1.746E+01	1.746E+01	2.629E+03	2.629E+03
Chloropyrifos	7.164E-04	7.164E-04	1.192E-01	1.192E-01
Chromium (VI)	1.381E-01	1.381E-01	2.297E+01	2.297E+01
cis-1,2-Dichloroethylene	2.144E+01	2.144E+01	3.228E+03	3.228E+03
Copper	2.322E-01	2.322E-01	3.862E+01	3.862E+01
Cyanide	1.899E-01	1.899E-01	3.159E+01	3.159E+01
Dalapon	6.125E+01	6.125E+01	9.223E+03	9.223E+03
Di(2-ethylhexyl)adipate	1.225E+02	1.225E+02	1.845E+04	1.845E+04

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – High Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 011	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
Dibromochloropropane	6.125E-02	6.125E-02	9.223E+00	9.223E+00
Dibutyl phthalate	1.510E+00	1.510E+00	2.513E+02	2.513E+02
Dichlorobromomethane	1.684E+00	1.684E+00	2.536E+02	2.536E+02
Dichloromethane	1.531E+00	1.531E+00	2.306E+02	2.306E+02
Dieldrin	3.145E-05	2.072E-03	4.796E-03	3.446E-01
Dinoseb	2.144E+00	2.144E+00	3.228E+02	3.228E+02
Diquat	6.125E+00	6.125E+00	9.223E+02	9.223E+02
Endosulfan	1.899E-03	1.899E-03	3.159E-01	3.159E-01
Endothall	3.063E+01	3.063E+01	4.611E+03	4.611E+03
Endrin	7.423E-04	7.423E-04	1.235E-01	1.235E-01
Ethylbenzene	1.223E+02	1.955E+02	1.865E+04	3.252E+04
Ethylene dibromide	1.531E-02	1.531E-02	2.306E+00	2.306E+00
Fluoride	6.781E+01	6.781E+01	1.131E+04	1.131E+04
gamma-Hexachlorocyclohexane (Lindane)	8.200E-03	8.200E-03	1.364E+00	1.364E+00
Glyphosate	2.144E+02	2.144E+02	3.228E+04	3.228E+04
Heptachlor	4.601E-05	4.488E-03	7.017E-03	7.466E-01
Heptachlor epoxide	2.271E-05	4.488E-03	3.464E-03	7.466E-01
Hexachlorobenzene	1.689E-04	1.689E-04	2.576E-02	2.576E-02
Hexachlorocyclopentadiene	1.225E+01	1.225E+01	1.845E+03	1.845E+03
Iron	8.631E+00	8.631E+00	1.436E+03	1.436E+03
Lead	5.948E-01	1.704E+00	9.036E+01	2.834E+02
Mercury (II)	8.735E-03	1.416E-02	1.332E+00	2.355E+00
Methoxychlor	3.063E+01	3.063E+01	4.611E+03	4.611E+03
Nickel	7.249E+00	7.279E+00	1.101E+03	1.211E+03
Nitrate as N	2.762E+03	2.762E+03	4.595E+05	4.595E+05
Nitrate+Nitrite as N	2.762E+03	2.762E+03	4.595E+05	4.595E+05
Nitrite as N	3.063E+02	3.063E+02	4.611E+04	4.611E+04
o-Dichlorobenzene	1.838E+02	1.838E+02	2.767E+04	2.767E+04
Oxamyl (Vydate)	6.125E+01	6.125E+01	9.223E+03	9.223E+03
para-Dichlorobenzene	1.106E+01	1.726E+01	1.688E+03	2.872E+03
Parathion	5.610E-04	5.610E-04	9.333E-02	9.333E-02
Pentachlorophenol (PCP)	2.515E-01	2.515E-01	4.184E+01	4.184E+01
Phenols	3.866E+00	2.158E+01	5.873E+02	3.590E+03
Picloram	1.531E+02	1.531E+02	2.306E+04	2.306E+04
Polychlorinated Biphenyls (PCBs)	3.727E-05	1.726E-02	5.685E-03	2.872E+00

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – High Flow Shoreline Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 011	**ADW = 18.0 mgd & AWW = 34.8 mgd**			
Toxics				
Polynuclear Aromatic Hydrocarbons (PAHs)	2.319E-03	2.589E-01	3.524E-01	4.308E+01
Selenium	1.666E-01	1.666E-01	2.771E+01	2.771E+01
Silver	3.280E-02	3.280E-02	5.456E+00	5.456E+00
Simazine	1.225E+00	1.225E+00	1.845E+02	1.845E+02
Styrene	3.063E+01	3.063E+01	4.611E+03	4.611E+03
Tetrachloroethlyene	1.922E+00	1.922E+00	2.931E+02	2.931E+02
Thallium	2.737E-02	5.161E+00	4.175E+00	8.586E+02
Toluene	3.866E+00	2.158E+01	5.873E+02	3.590E+03
Toxaphene	1.546E-04	6.301E-03	2.349E-02	1.048E+00
trans-1,2-Dichloroethylene	8.153E+00	8.153E+00	1.244E+03	1.244E+03
Trichloroethylene (TCE)	6.185E+00	3.453E+01	9.397E+02	5.743E+03
Trihalomethanes (total)	2.450E+01	2.450E+01	3.689E+03	3.689E+03
Vinyl Chloride	7.656E-02	7.656E-02	1.153E+01	1.153E+01
Xylenes (Total)	3.063E+03	3.063E+03	4.611E+05	4.611E+05
Zinc	1.861E+00	1.861E+00	3.095E+02	3.095E+02

WLAs/Permit Limits for the City of Waterloo's Mechanical Plant

These wasteload allocations and water quality based permit limitations are for the City of Waterloo's wastewater discharge. The wasteload allocations/permit limits are based on the Water Quality Standards (IAC 567.61) and 'Iowa Wasteload Allocation (WLA) Procedure,' February 21, 2018. The chloride allocation/permit limits are based on the criteria that became effective on November 11, 2009.

The water quality based limits in this WLA are calculated to meet the surface water quality criteria to protect downstream uses. There could be technology based limits applicable to this facility that are more stringent than the water quality based limits shown in this WLA. The technology based limits could be derived from either federal guidelines based on different industrial categories or permit writer's judgment.

1. BACKGROUND:

The City of Waterloo discharges treated domestic wastewater from a mechanical wastewater treatment facility via a diffuser or potentially a shoreline outfall into Cedar River (at 42° 28' 01" N, 92° 18' 28" W).

Outfalls:

WLA limits are calculated for three outfalls, described in Table 1.

Table 1. Description of City of Waterloo STP outfalls

Outfall	Description
801	Diffuser discharge
009	Shoreline discharge when the flow in the Cedar River at USGS Gage 05464000 is less than 8,500 cfs
011	Shoreline discharge when the flow in the Cedar River at USGS Gage 05464000 is greater than or equal to 8,500 cfs

Under normal operating conditions wastewater is discharged via the diffuser (Outfall 801). Outfall 009 may be used during maintenance or repairs to the diffuser during low flow conditions. Outfall 011 may be used to prevent backup into the plant when the river flows are high (8,500 cfs or greater). WLAs are calculated based on the assumption that simultaneous discharge from the diffuser and shoreline outfalls does not occur.

Route of flow and use designations:

The Cedar River is an A1, B(WW-1) HH designated use waterbody. The Cedar River also has a Class C use designation at the Cedar Rapids Municipal Water Works intake (approximately 70 miles downstream from the outfall of this facility). The designations have been adopted in Iowa's state rule described in the rule referenced document of Surface Water Classification effective on July 24, 2019. The use designations of waterbodies further downstream will not impact the resulting limits for this facility.

Critical low flow determination:

The annual critical low flows in the Cedar River at the outfall are estimated based on the Weighted Drainage Area Ratio (WDAR) method from 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa,' 2012 (revised 2017) and flow statistics obtained at USGS gage station 05464000, located on the Cedar River at Waterloo, Iowa.

The annual critical low flows in the Cedar River at the Class C use designation are estimated based on the Weighted Drainage Area Ratio (WDAR) method from 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa,' 2012 (revised 2017) and flow statistics obtained at USGS gage station 05464500, located on the Cedar River at Cedar Rapids, Iowa.

Table 2a: Annual Critical Low Flows

Location	D.A. (mi^2)	1Q10 (cfs)	7Q10 (cfs)	30Q10 (cfs)	30Q5 (cfs)	Harmonic Mean (cfs)
Cedar River at the Outfall	5,160	359	403	453	566	1,518
Cedar River at the USGS Gage 05464000	5,146	355	398	448	561	1,520
Cedar River at Downstream Class C Use Designation	6,490	329	439	503	675	1,878
Cedar River at the USGS Gage 05464500	6,510	329	440	504	677	1,880

The monthly critical low flows in the Cedar River at the outfall were estimated based on the WDAR method from 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa', 2012 (revised 2017) and flow statistics obtained at USGS gage station 05464500, located on the Cedar River at Cedar Rapids, Iowa. Monthly 1Q10, 7Q10, and 30Q10 values were calculated at the gage with flow statistics obtained at the USGS gage station and a Log-Pearson Type III distribution analysis as described in 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa,' 2012 (revised 2017). The years of record used were 1960-2019, which corresponded with Kendall's *tau* tests for each month's data that had a p-value greater than 0.05 (indicating no statistically significant trend). Provisional data was excluded from analysis. The statistical analysis was completed using USGS SWToolbox, available at the following website: https://www.usgs.gov/software/swtoolbox-software-information. Monthly critical low flows at the outfall are shown in Table 2b.

Table 2b: Monthly Critical Low Flows at the Outfall

	Critical Low Flows (cfs)		
Period	**1Q10**	**7Q10**	**30Q10**
January	399	436	508
February	430	471	580
March	578	663	1,748
April	1,287	1465	2,172
May	1,268	1395	2,038
June	1,059	1168	1,710
July	791	876	1,172
August	600	653	792
September	565	612	751
October	586	622	691
November	563	679	782
December	407	500	630

Based on information provided by the consultant, the high flow shoreline discharge will not occur until the flow in the Cedar River is at least 8,500 cfs at USGS Gage 05464000. This flow corresponds to a river elevation of 826.5 feet at the outfall, when the shoreline pumps are initiated.

When the discharge reaches the Cedar Rapids Municipal Water Works intake under this scenario the flow in the Cedar River should be greater than 8,500 cfs. However, since the flows are high and complete mixing is assumed in the calculation of WLAs, 8,500 cfs is used as the flow at the Cedar Rapids Municipal Water Works intake.

Table 2c: High Stream Flows for Outfall 011 Shoreline Discharge

Location	D.A. (mi^2)	1Q10 (cfs)	7Q10 (cfs)	30Q10 (cfs)	30Q5 (cfs)	Harmonic Mean (cfs)
Cedar River at the Outfall 011	5,160	8,500	8,500	8,500	8,500	8,500
Cedar River at Downstream Class C Use Designation	6,490	8,500	8,500	8,500	8,500	8,500

Mixing Zone (MZ) and Zone of Initial Dilution (ZID), and 100-foot Diffuser mixing area:
This facility discharges wastewater via a diffuser (Outfall 801). Based on data from the August 2019 diffuser study, the February 2020 velocity measurements, and the September 2020 diffuser study, it is estimated that 79% mixing will occur under 7Q10 flow conditions within 100 feet of the diffuser. Thus, for Outfall 801, 79% of applicable stream low flows will be used to calculate appropriate limits. Based on shifts in the bathymetry following installation of the wing dike, additional monitoring of the bathymetric profile at the diffuser cross section of the Cedar River is requested to confirm that 79% mixing remains applicable for Outfall 801.

When or if the diffuser is not in operation a shoreline discharge will occur (Outfall 009 or 011 depending on the flow in the Cedar River). For the calculation of WLAs for Outfalls 009 and 011, the MZ and ZID are based on the default procedures. Based on a phone conversation with the City of Evansdale and information found on the Black Hawk County Online website, on the East bank of the Cedar River 1,500 feet downstream from the outfall of this facility is the upper limits of Deerwood Park and Campground. As a result, the MZ is restricted to 18.75% for HH-fish criteria. The MZ and ZID for all other criteria are 25% and 2.5%, respectively, based on a default shoreline MZ length of 2,000 feet.

2. ANTIDEGRADATION REVIEW:
According to the Iowa Antidegradation Implementation Procedure, effective February 17, 2010 (IAC 567-61.2(2).e), all new or expanded regulated activities (with limited exceptions, such as unsewered communities) are subject to antidegradation review requirements.

Table 3a: Antidegradation Review Analysis for Outfall 801 (Diffuser Discharge)

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☐, No ☒, or Not Applicable ☐	
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	1: Note that if chlorine is utilized for disinfection in the future an antidegradation review will be required.
4	Less Stringent Water Quality Based Limits?	Yes ☒, No ☐, or Not Applicable ☒	1: Less stringent WQ-based pH limits will not trigger an antidegradation review. 2: Less stringent WQ-based ammonia limits for certain months will trigger an antidegradation review.
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	

Conclusion and discussion:

Due to Item 4, less stringent ammonia nitrogen limits for certain months is the only factor that triggers an antidegradation review. If the more stringent limits between those in the current NPDES permits and those in this report are to be used in the renewal NPDES permit, the antidegradation review is not necessary.

Please note that the antidegradation review conducted in this WLA is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

Table 3b: Antidegradation Review Analysis for Outfall 009 (Low Flow Shoreline Discharge)

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☐, No ☒, or Not Applicable ☐	
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	1: Note that if chlorine is utilized for disinfection in the future an antidegradation review will be required.
4	Less Stringent Water Quality Based Limits?	Yes ☐, No ☒, or Not Applicable ☐	1: Less stringent WQ-based pH limits will not trigger an antidegradation review.
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	

Conclusion and discussion:

None of the factors trigger the antidegradation review; therefore, a tier II antidegradation review is not required.

Please note that the antidegradation review conducted in this WLA is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

Table 3c: Antidegradation Review Analysis for Outfall 011 (High Flow Shoreline Discharge)

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☐, No ☒, or Not Applicable ☐	
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	1: Note that if chlorine is utilized for disinfection in the future an antidegradation review will be required.
4	Less Stringent Water Quality Based Limits?	Yes ☒, No ☐, or Not Applicable ☐	1: Less stringent WQ-based pH limits will not trigger an antidegradation review. 2: Less stringent WQ-based ammonia limits will trigger an antidegradation review.
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	

Conclusion and discussion:

Due to Item 4, less stringent ammonia nitrogen limits for certain months is the only factor that triggers an antidegradation review. If the more stringent limits between those in the current NPDES permits and those in this report are to be used in the renewal NPDES permit, the antidegradation review is not necessary.

Please note that the antidegradation review conducted in this WLA is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

3. TOTAL MAXIMUM DAILY LOAD (TMDL) LIMITATIONS:

The following waterbodies in the discharge route are on the 2018 impaired waters list:

- Cedar River for bacteria (indicator bacteria, *E. coli*)
- Cedar River for pH
- Cedar River for nutrients (nitrogen)
- Cedar River for biological (loss of native mussel species)
- Iowa River for bacteria (indicator bacteria, *E. coli*)
- Mississippi River for metals (aluminum)

A TMDL for *E. coli* for the Cedar River was completed in 2010. This facility was assigned limits in the TMDL (see Section 4 below). A TMDL was completed for the Cedar River for Nitrate Nitrogen in 2006. This facility was assigned Total Nitrogen limits in the TMDL (See Section 4 below).

Please note that the results presented in this report are wasteload allocations based on meeting the State's current water quality standards in the receiving waterbody. Additional and/or more stringent effluent limits may be applicable to this discharge based on approved TMDLs for impaired waterbodies, which may provide watershed based wasteload allocations. Information on impaired streams in Iowa and approved TMDLs can be found at the following website: http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Improvement/Impaired-Waters.

4. CALCULATIONS:

The WLAs/permit limits for this outfall are calculated based on the facility's Average Dry Weather (ADW) design flow of 18.0 mgd and its Average Wet Weather (AWW) design flow of 34.8 mgd.

Please note that only wasteload allocations/permit limits (water quality based effluent limits) calculated using DNR approved design flows can be applied in NPDES permits. Water quality based effluent limits calculated using proposed flows that have not been approved by the DNR for permitting and compliance may be used for informational purposes only.

The water quality based permit concentration limits are derived using the allowed stream flow and the ADW design flow, while the loading limits are derived using the allowed stream flow and the AWW design flow.

Toxics:
The toxics wasteload allocations will consider the procedures included in the 2000 revised WQS and the 2007 chemical criteria.

Outfall 801 (Diffuser Discharge):
To protect the aquatic life use:
Important to toxics is the use of the 1Q10 stream flow in association with the acute wasteload allocation calculation. The chronic WLA will continue to use the 7Q10 stream flow in its calculations. In this case, 79% of the 7Q10 flow and 79% of the 1Q10 flow in Cedar River at the outfall are used as the Mixing Zone (MZ) and the Zone of Initial Dilution (ZID), respectively.

To protect the human health (HH) use:
For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 79% of the 30Q5 flow in Cedar River at the outfall.

For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 79% of the harmonic mean flow in Cedar River at the outfall.

To protect the downstream Class C use:
The discharge from the City of Waterloo STP is assumed to be 100% mixed at the downstream Class C use designation.

For pollutants that are non-carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the 7Q10 flow in the receiving stream at the Class C use designation. For pollutants that are carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the harmonic mean flow in the receiving stream at the Class C use designation.

Final limits:
The maximum limits are those calculated for the protection of the aquatic life use and the average limits are the more stringent between those for the protection of the aquatic life use and those for the protection of the HH and C uses.

Please note that the TRC limits are based on a sampling frequency of 7/week, based on a design population equivalent (PE) of 526,946; the limits for other toxics are based on a sampling frequency of 1/week.

Outfall 009 (Low Flow Shoreline Discharge):
To protect the aquatic life use:
Important to toxics is the use of the 1Q10 stream flow in association with the acute wasteload allocation calculation. The chronic WLA will continue to use the 7Q10 stream flow in its calculations. In this case, 25% of the 7Q10 flow and 2.5% of the 1Q10 flow in Cedar River at the outfall are used as the Mixing Zone (MZ) and the Zone of Initial Dilution (ZID), respectively.

To protect the human health (HH) use:
HH-fish criteria:
The MZ and ZID for HH-fish criteria are proportionately reduced to 75% of their default values due to Deerwood Park. For pollutants that are non-carcinogenic and have criteria for human health protection,

the criteria apply at the end of the MZ, which in this case is 18.75% of the 30Q5 flow in Cedar River at the outfall. For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of the harmonic mean flow in Cedar River at the outfall.

All other HH criteria:
For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of the 30Q5 flow in Cedar River at the outfall. For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of the harmonic mean flow in Cedar River at the outfall.

To protect the downstream Class C use:
The discharge from the City of Waterloo STP is assumed to be 100% mixed at the downstream Class C use designation.

For pollutants that are non-carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the 7Q10 flow in the receiving stream at the Class C use designation. For pollutants that are carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the harmonic mean flow in the receiving stream at the Class C use designation.

Final limits:
The maximum limits are those calculated for the protection of the aquatic life use and the average limits are the more stringent between those for the protection of the aquatic use and those for the protection of the HH and C uses.

Please note that the TRC limits are based on a sampling frequency of 7/week, based on a design population equivalent (PE) of 526,946; the limits for other toxics are based on a sampling frequency of 1/week.

<u>Outfall 011 (High Flow Shoreline Discharge):</u>
To protect the aquatic life use:
Important to toxics is the use of the 1Q10 stream flow in association with the acute wasteload allocation calculation. The chronic WLA will continue to use the 7Q10 stream flow in its calculations. In this case, 25% of 8,500 cfs flow and 2.5% of 8,500 cfs flow in Cedar River at the outfall are used as the Mixing Zone (MZ) and the Zone of Initial Dilution (ZID), respectively.

To protect the human health (HH) use:
HH-fish criteria:
The MZ and ZID for HH-fish criteria are proportionately reduced to 75% of their default values due to Deerwood Park. For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of 8,500 cfs flow in Cedar River at the outfall. For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of 8,500 cfs flow in Cedar River at the outfall.

All other HH criteria:
For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of 8,500 cfs flow in Cedar River at the outfall. For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of 8,500 cfs flow in Cedar River at the outfall.

To protect the downstream Class C use:
The discharge from the City of Waterloo STP is assumed to be 100% mixed at the downstream Class C use designation.

For pollutants that are non-carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of 8,500 cfs flow in Cedar River at the Class C use designation. For pollutants that are carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of 8,500 cfs flow in Cedar River at the Class C use designation.

Final limits:
The maximum limits are those calculated for the protection of the aquatic life use and the average limits are the more stringent between those for the protection of the aquatic use and those for the protection of the HH and C uses.

Please note that the TRC limits are based on a sampling frequency of 7/week, based on a design population equivalent (PE) of 526,946; the limits for other toxics are based on a sampling frequency of 1/week.

Ammonia Nitrogen:
Standard stream background pH, temperatures, and concentrations of NH3-N are mixed with the discharge from the facility's effluent pH and temperature values to calculate the applicable instream criteria for the protection of Cedar River.

The monthly background pH, temperatures, and NH3-N concentrations shown in Table 4 are used for the wasteload allocation/permit limits calculations based on the Year 2000 ammonia nitrogen criteria. Table 5 shows the statewide monthly effluent pH and temperature values for mechanical facilities. Cedar River is a B(WW-1) stream; therefore, early life protection will begin in March and run through September.

Table 4: Background pH, Temperatures, and NH3-N Concentrations
For Use with Year 2000 Ammonia Nitrogen Criteria

Months	pH	Temperature (°C)	NH_3-N (mg/l)
January	8.1	0.3	0.02
February	8.0	0.1	0.08
March	8.1	1.5	0.12
April	8.3	9.3	0.03
May	8.2	15.0	0.03
June	8.2	19.4	0.02
July	8.2	23.5	0.02
August	8.2	24.3	0.02
September	8.3	20.2	0.02
October	8.3	14.2	0.02
November	8.3	8.0	0.02
December	8.3	0.8	0.03

Table 5: Standard Effluent pH & Temperature Values for Mechanical Facilities

Months	pH	Temperature (°C)
January	7.67	12.4
February	7.71	11.3
March	7.69	13.1
April	7.65	16.2
May	7.67	19.3
June	7.70	22.1
July	7.58	24.1
August	7.63	24.4
September	7.62	22.8
October	7.65	20.2
November	7.69	17.1
December	7.64	14.1

Outfall 801 (Diffuser Discharge):
Based on the diffuser study and velocity measurements, 79% of the 1Q10 flow and 79% of the 30Q10 monthly flows in Cedar River at the outfall are used as the ZID and the MZ, respectively. Table 6a shows the calculated ammonia nitrogen wasteload allocations for Outfall 801.

Table 6a: Outfall 801 Wasteload Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	95.0	55.9	57.1	32.3
February	116.5	70.0	67.4	39.2
March	127.9	102.3	73.8	55.0
April	189.5	97.3	106.8	52.9
May	222.1	102.9	123.1	55.2
June	187.6	65.6	104.7	35.3
July	148.9	35.9	86.9	20.0
August	115.8	23.7	68.8	13.5
September	94.8	25.7	58.3	15.0
October	96.4	34.7	58.5	20.1
November	91.8	56.9	55.5	32.0
December	72.7	52.3	46.4	31.0

*: bases for concentration limits; **: bases for mass loading limits

Outfall 009 (Low Flow Shoreline Discharge):
Based on the ratio of the stream flow to the discharge flow, 2.5% of the 1Q10 flow and 25% of the 30Q10 monthly flows in Cedar River at the outfall are used as the ZID and the MZ, respectively. Table 6b shows the calculated ammonia nitrogen wasteload allocations for Outfall 009.

Table 6b: Outfall 009 Wasteload Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	18.0	18.8	16.7	11.4
February	17.6	24.1	16.0	14.4
March	18.6	33.1	16.8	18.1
April	22.5	30.7	19.4	16.6
May	22.7	33.0	19.2	17.9
June	20.6	21.1	17.7	11.5
July	22.9	11.4	20.4	6.4
August	20.1	7.6	18.3	4.4
September	19.8	8.0	18.3	4.7
October	19.0	11.1	17.5	6.5
November	17.7	18.5	16.3	10.7
December	18.3	16.3	17.2	9.6

*: bases for concentration limits; **: bases for mass loading limits

Outfall 011 (High Flow Shoreline Discharge):
Based on the ratio of the stream flow to the discharge flow, 2.5% of 8,500 cfs flow and 25% of 8,500 cfs flow in Cedar River at the outfall are used as the ZID and the MZ, respectively. Table 6c shows the calculated ammonia nitrogen wasteload allocations for Outfall 011.

Table 6c: Outfall 011 Wasteload Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	69.4	261.7	43.7	137.0
February	78.4	299.4	47.7	156.8
March	68.0	153.0	42.7	80.1
April	53.9	115.5	36.3	60.5
May	60.5	132.1	39.3	69.2
June	59.5	99.7	38.3	52.2
July	64.1	76.2	42.7	39.9
August	62.0	72.3	40.7	37.8
September	55.2	80.2	37.5	42.0
October	54.0	118.7	36.4	62.2
November	52.5	177.8	35.0	93.1
December	54.3	189.0	36.7	99.0

*: bases for concentration limits; **: bases for mass loading limits

CBOD5/Total Dissolved Oxygen:
Streeter-Phelps DO Sag Model is used to simulate the decay of CBOD and dispersion of total Dissolved Oxygen (DO) in the receiving water downstream from the outfall. The criterion is that the discharge cannot cause the DO level in the receiving stream (warm water) to be below 5.0 mg/l.

The parameter values used in the modeling are listed below:

Background:
The temperature and ammonia nitrogen levels are shown in Table 4. The ultimate CBOD and DO levels are assumed to be 6.0 mg/l and 6.0 mg/l, respectively.

Effluent:
The temperatures are shown in Table 5. The CBOD5 level used in the modeling is 40 mg/l, which is the technology based maximum limit for standard secondary treatment. The ammonia nitrogen values used in the modeling are the calculated acute wasteload allocations shown in Tables 6a, 6b, and 6c for Outfalls 801, 009, and 011, respectively. Both ADW and AWW flows and the ammonia nitrogen limits associated with them are used in the modeling.

Receiving stream parameters:
There is an average water channel slope of 0.00031 (the water channel elevation changes from 820 ft to 800 ft over a distance of approximately 64,286 ft, estimated based on the GIS LiDAR 2-ft contour coverage).

USGS gage 05464000, located on the Cedar River at Waterloo, IA, had field measurement data, such as stream flow, cross section area, stream width and velocity. The stream depth is not reported, however, can be derived using the following equation:

Depth = Cross Sectional Area / Width

Regression equations of Ln (Velocity) vs. Ln (Flow) and Ln (Depth) vs. Ln (Flow) were established with acceptable R-squared values. The Width is calculated using the Flow, Velocity, and Depth information.

Ln (Velocity) = 0.3824*Ln (Flow) - 2.1160 R-squared = 0.6476
Ln (Depth) = 0.5455*Ln (Flow) - 3.4606 R-squared = 0.7607

Width = Flow / Velocity / Depth

The gage station is about 3.7 miles upstream of the discharge. Therefore, it is assumed that the above regression equations are valid at the outfall. The stream width, depth, and velocity at 7Q10 and ADW/AWW conditions were estimated using the above regression equations. The stream width, depth, and velocity at 8,500 cfs river flow and ADW/AWW conditions were also estimated using the above regression equations.

Table 7: Stream Width, Depth and Velocity

Flow condition	Flow (cfs)	Width (ft)	Depth (ft)	Velocity (fps)
7Q10 + ADW	430.8	409.1	0.86	1.23
7Q10 + AWW	456.8	410.8	0.89	1.25
8,500 + ADW	8,527.8	507.3	4.38	3.84
8,500 + AWW	8,553.8	507.5	4.39	3.84

Reaeration:
The USGS channel-control model (Melching and Flores 1999) is used for reaeration because the Cedar River is a large channelized river with relatively consistent flow characteristics.

Outfall 801 (Diffuser Discharge):
Discussion and conclusion:
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment) and ammonia nitrogen levels as shown in Table 6a, will not cause the DO level in the receiving stream to be below 5.0 mg/l at any time. Numerical DO limits are not required.

Outfall 009 (Low Flow Shoreline Discharge):
Discussion and conclusion:
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment) and ammonia nitrogen levels as shown in Table 6b, will not cause the DO level in the receiving stream to be below 5.0 mg/l at any time. Numerical DO limits are not required.

Outfall 011 (High Flow Shoreline Discharge):
Discussion and conclusion:
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment) and ammonia nitrogen levels as shown in Table 6c, will not cause the DO level in the receiving stream to be below 5.0 mg/l at any time. Numerical DO limits are not required.

***E. coli*:**
This facility discharges into a Class A1 waterbody. The water quality standard for *E. coli* in a Class A1 waterbody is a geometric mean of 126 org./100 ml and a sample maximum of 235 org./100 ml from March 15th through November 15th. The criteria apply at "end-of-pipe."

This facility was also assigned limits of a geometric mean of 126 org./100 ml and a sample maximum of 235 org./100 ml from March 15th through November 15th in the Cedar River *E. coli* TMDL.

However, 567 IAC 62.8(2) states that "the daily sample maximum criteria for *E. coli* set forth in 567 – Chapter 61 shall not be used as an end-of-pipe permit limitation." Therefore, only the geometric mean limit of 126 org./100 ml applies. This limit applies to all outfalls.

Total Nitrogen:
In the 2006 Nitrate TMDL for the Cedar River, the City of Waterloo was assigned a Total Nitrogen WLA of 505.2 tons/year and 2,768 lbs/day. However, the TMDL calculation only considered the discharge flows from one of the two treatment trains. The actual combined plant flows were used to calculate the TMDL WLA for this facility. In addition, the corrected WLA was converted to 30-day average and daily maximum limits based on the procedure in the November 20, 2008 memo "Deriving total nitrogen limits from the WLA in the Cedar River TMDL". The calculations were made as a part of Waterloo's NPDES permit amendment in 2011. The final TMDL-based total nitrogen limits for this facility are a 30-day average of 9,285.5 lbs/day and a daily maximum of 15,199.0 lbs/day. These limits apply to all outfalls.

It should be noted that limits were included for various forms of nitrogen in this WLA report. There may be situations where the Total Nitrogen limits based on the Cedar River Nitrate TMDL will control the mass limits for the different forms of nitrogen included in this report.

Chloride and Sulfate:
The chloride and sulfate criteria became effective on Nov. 11, 2009 and apply to all Class B waters. The default hardness for background and effluent is 200 mg/l.

Chloride criteria are functions of hardness and sulfate concentration, shown as follows:

$$\text{Acute criteria} = 287.8*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$
$$\text{Chronic criteria} = 177.87*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$

Sulfate criteria, shown in Table 8, are functions of hardness and chloride concentration and serve as both the acute and chronic criteria.

Table 8: Sulfate Criteria

Hardness (mg/l as CaCO3)	Sulfate Criteria (mg/l)		
	Chloride < 5 mg/l	5 mg/l <= Chloride < 25 mg/l	25 mg/l <= Chloride < 500 mg/l
< 100	500	500	500
100<=H<=500	500	(-57.478+5.79*H+54.163*Cl)*0.65	(1276.7+5.508*H-1.457*Cl)*0.65
H> 500	500	2,000	2,000

The default chloride concentration for both background water and effluent is 34 mg/l, while the default sulfate concentration for both background water and effluent is 63 mg/l. The limits are calculated based on an assumed sampling frequency of 1/week.

The acute criteria apply at the end of the ZID, and the chronic criteria apply at the end of the MZ.

Outfall 801 (Diffuser Discharge):
In this case, 79% of the 7Q10 flow and 79% of the 1Q10 flow in Cedar River at the outfall are used as the MZ and the ZID, respectively.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, 25% of the 7Q10 flow and 2.5% of the 1Q10 flow in Cedar River at the outfall are used as the MZ and the ZID, respectively.

Outfall 011 (High Flow Shoreline Discharge):
In this case, 25% of 8,500 cfs flow and 2.5% of 8,500 cfs flow in Cedar River at the outfall are used as the MZ and the ZID, respectively.

Iron:
The current iron criteria are defined in the 2005 issue paper entitled 'Iron Criteria and Implementation for Iowa's Surface Waters (December 5, 2005).' An iron criterion of 1 mg/l applies at the end of the ZID for both general use and designated use streams.

Outfall 801 (Diffuser Discharge):
In this case, the ZID is 79% of the 1Q10 flow in Cedar River at the outfall.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 flow in Cedar River at the outfall.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of 8,500 cfs flow in Cedar River at the outfall.

Benzidine:
There are currently no water quality criteria for benzidine in Iowa. Thus, the protection of the Cedar River is achieved by assuring the WLA does not exceed a value set at ½ 48hrEC50 for critical species in the stream, which is 0.3 mg/l for *Daphnia magna* (water flea) (Kuhn et al., 1989).

Outfall 801 (Diffuser):
In this case, the ZID is 79% of the 1Q10 at the outfall.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 at the outfall.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 8,500 cfs high flow at the outfall.

Dibutyl phthalate:
There are currently no water quality criteria for dibutyl phthalate in Iowa. Thus, the protection of the Cedar River is achieved by assuring the WLA does not exceed a value set at ½ 96hrLC50 for critical species in the stream, which is 0.175 mg/l for *Perca flavescens* (yellow perch) (Mayer and Ellersieck, 1986).

Outfall 801 (Diffuser):
In this case, the ZID is 79% of the 1Q10 at the outfall.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 at the outfall.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 8,500 cfs high flow at the outfall.

pH:
Iowa Water Quality Standards (IAC 567.61.3.(3).a.(2) and IAC 567.61.3.(3).b.(2)) require that pH in Class A or Class B waters "shall not be less than 6.5 nor greater than 9.0."

Outfall 801 (Diffuser Discharge):
The criteria apply at the end of the MZ, which is 79% of the 7Q10 flow in Cedar River at the outfall.

Outfall 009 (Low Flow Shoreline Discharge):
The criteria apply at the end of the MZ, which is 25% of the 7Q10 flow in Cedar River at the outfall.

Outfall 011 (High Flow Shoreline Discharge):
The criteria apply at the end of the MZ, which is 25% of 8,500 cfs flow in Cedar River at the outfall.

TDS:
Effective Nov. 11, 2009, the site-specific TDS approach is no longer applicable; instead the new chloride and sulfate criteria became applicable. However, the TDS level should be controlled to a level such that the narrative criteria stated in IAC 567.61.3 are fulfilled.

Major Facility Acute WET Testing Ratio:
Outfall 801 (Diffuser Discharge):
Use 8.9% of effluent and 91.1% of dilution water for the testing. The ratio is calculated using the ADW design flow and 79% of the 1Q10 flow in Cedar River at the outfall as the ZID.

Outfall 009 (Low Flow Shoreline Discharge):
Use 75.6% of effluent and 24.4% of dilution water for the testing. The ratio is calculated using the ADW design flow and 2.5% of the 1Q10 flow in Cedar River at the outfall as the ZID.

Outfall 011 (High Flow Shoreline Discharge):
Use 11.6% of effluent and 88.4% of dilution water for the testing. The ratio is calculated using the ADW design flow and 2.5% of 8,500 cfs flow in Cedar River at the outfall as the ZID.

5. PERMIT LIMITATIONS:
- Based on the Year 2006 Water Quality Standards & 2002 Permit Derivation Procedure.
The acute and chronic WLAs are used as the values for input into the current permit derivation procedure. Under the 2002 permit derivation procedure, only for toxic parameters is the monitoring frequency considered in the calculation of final limits. The water quality based limits are shown on Pages 1 – 12 of this report.

City of Waterloo

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This Package Contains

WASTELOAD ALLOCATION CALCULATIONS & NOTES

Please Do Not Separate

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Diffuser Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
CBOD5	Secondary Treatment Levels Will Not Violate WQS				--
Total D.O.	Numerical limits are not required				--
Ammonia – Nitrogen [1]					
January	37.5	79.7	6,347	14,110	--
February	42.6	91.2	7,202	15,687	--
March	18.7	68.3	3,198	12,353	--
April	13.1	52.8	2,268	10,273	--
May	11.1	52.1	1,918	10,080	--
June	7.2	**50.5**	1,269	**6,791**	--
July	8.6	**40.3**	1,436	**5,369**	--
August	7.8	**44.1**	1,310	**5,892**	--
September	8.3	**46.3**	1,452	**6,182**	--
October	18.8	60.4	3,212	11,374	--
November	23.5	51.5	4,006	9,894	--
December	27.8	60.8	4,732	11,470	--
Bacteria [2]	Geometric Mean (#org/100ml)		March 15th – November 15th		--
E. coli	126				
Chloride [3]	2,538	3,917	435,385	676,055	1/ month
Sulfate [3]	9,531	9,531	1,642,946	1,642,946	1/month
TRC [4]	0.257	0.424	68.3	108.3	7/week
Total Nitrogen [5]	--	--	9,285.5	15,199.0	--
pH [6]	6.0 to 14.0				--
Major Facility Acute WET Testing Ratio: use 15.3% of effluent and 84.7% of dilution water for the testing					

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) and HH) — Date Done: May 21, 2015

Annual critical low flow in Cedar River at the discharge point
30Q10 flow 338 cfs, 7Q10 flow 296 cfs, 1Q10 flow 270 cfs, Harmonic Mean flow 1525 cfs

Excel Spreadsheet calculations [X] Qual II E Model [ ] Qual II E Modeling date[ ]

Performed by: Collin Klingbeil Approved By: Connie Dou

1. The **bold** ammonia nitrogen limits are governed by the CBOD5/DO modeling. The gray cell ammonia nitrogen limit will be limited by the TMDL based Total Nitrogen WLA.
2. Cedar River *E. coli* TMDL based limit. Due to a recent revision to IAC567.62 (Chapter 62), sample maximum limit for bacteria is no longer required. Only geometric mean is required.
3. Chloride/sulfate limits are based on the new chloride/sulfate criteria that took effective on Nov. 11, 2009. Chloride/sulfate criteria are hardness dependent and the default hardness has been changed from 100 mg/l to 200 mg/l, effective Nov. 11, 2009.
4. For informational purposes. This facility utilizes UV disinfection.
5. Corrected Cedar River Nitrate TMDL limits based on the Easton/Satellite plants combined flow and converted to a 30-day average and daily maximum using the procedure from the Nov. 20, 2008 memo "Deriving total nitrogen limits form the WLA in the Cedar River TMDL
6. The upper pH limit may be governed by a technology based limit of 9.0

Antidegradation Review Requirement

A tier II antidegradation review is not required. See Section 2 for details.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Diffuser Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
1,1,1-Trichloroethane	2.699E+00	1.723E+02	4.333E+02	2.957E+04	1/week
1,1,2-Trichloroethane	4.098E-01	4.098E-01	6.236E+01	6.236E+01	1/week
1,1-Dichloroethylene	2.254E+01	3.524E+02	3.430E+03	6.048E+04	1/week
1,2,4-Trichlorobenzene	9.448E-01	9.448E-01	1.516E+02	1.516E+02	1/week
1,2-Dichloroethane	2.595E-01	3.851E+02	3.949E+01	6.608E+04	1/week
1,2-Dichloropropane	3.415E-01	3.415E-01	5.197E+01	5.197E+01	1/week
2,3,7,8-TCDD (Dioxin)	1.643E-09	1.643E-09	2.538E-07	2.538E-07	1/week
2,4,5-TP (Silvex)	1.350E-01	1.350E-01	2.166E+01	2.166E+01	1/week
2,4-D	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
3,3-Dichlorobenzidine	9.021E-03	9.021E-03	1.393E+00	1.393E+00	1/week
4,4' DDT	7.059E-06	7.180E-03	1.200E-03	1.232E+00	1/week
Alachlor	2.699E-02	2.699E-02	4.333E+00	4.333E+00	1/week
Aldrin	1.611E-05	1.958E-02	2.488E-03	3.360E+00	1/week
Aluminum	6.141E-01	4.895E+00	1.044E+02	8.399E+02	1/week
Antimony	7.558E-02	7.180E+01	1.213E+01	1.232E+04	1/week
Arsenic (III)	1.229E-02	2.219E+00	1.871E+00	3.808E+02	1/week
Asbestos	9.448E-02	9.448E-02	1.516E+01	1.516E+01	1/week
Atrazine	4.049E-02	4.049E-02	6.499E+00	6.499E+00	1/week
Barium	1.350E+01	1.338E+03	2.166E+03	2.296E+05	1/week
Benzene	1.503E+00	1.077E+02	2.286E+02	1.848E+04	1/week
Benzidine	6.527E+01	6.527E+01	1.120E+04	1.120E+04	1/week
Benzo(a)Pyrene	2.595E-03	2.595E-03	3.949E-01	3.949E-01	1/week
Beryllium	5.399E-02	3.263E+00	8.665E+00	5.600E+02	1/week
Bis(2-ethylhexyl)phthalate	1.553E-01	1.553E-01	1.095E+02	1.095E+02	1/week
Bromoform	2.937E+00	2.937E+00	4.469E+02	4.469E+02	1/week
Cadmium	3.193E-03	2.817E-02	5.426E-01	4.833E+00	1/week
Carbofuran	5.399E-01	5.399E-01	8.665E+01	8.665E+01	1/week
Carbon Tetrachloride	1.571E-01	1.407E+02	2.390E+01	2.413E+04	1/week
Chlordane	3.035E-05	1.566E-02	5.159E-03	2.688E+00	1/week
Chloride	2.538E+03	3.917E+03	4.35385E+05	6.76055E+05	1/month
Chlorobenzene	1.350E+00	1.051E+02	2.166E+02	1.803E+04	1/week
Chlorodibromomethane	2.732E-01	2.732E-01	4.157E+01	4.157E+01	1/week
Chloroform	3.893E+00	3.893E+00	5.924E+02	5.924E+02	1/week
Chloropyrifos	2.894E-04	5.417E-04	4.919E-02	9.295E-02	1/week
Chromium (VI)	7.765E-02	1.044E-01	1.320E+01	1.792E+01	1/week
cis-1,2-Dichloroethylene	9.448E-01	9.448E-01	1.516E+02	1.516E+02	1/week
Copper	9.350E-02	1.522E-01	1.640E+01	2.662E+01	1/week
Cyanide	3.671E-02	1.436E-01	6.239E+00	2.464E+01	1/week
Dalapon	2.699E+00	2.699E+00	4.333E+02	4.333E+02	1/week
Di(2-ethylhexyl)adipate	5.399E+00	5.399E+00	8.665E+02	8.665E+02	1/week
Dibromochloropropane	2.699E-03	2.699E-03	4.333E-01	4.333E-01	1/week

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ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Diffuser Discharge Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
Dibutyl phthalate	1.142E+00	1.142E+00	1.960E+02	1.960E+02	1/week
Dichlorobromomethane	3.756E-01	3.756E-01	5.716E+01	5.716E+01	1/week
Dichloromethane	6.749E-02	6.749E-02	1.083E+01	1.083E+01	1/week
Dieldrin	1.740E-05	1.566E-03	2.687E-03	2.688E-01	1/week
Dinoseb	9.448E-02	9.448E-02	1.516E+01	1.516E+01	1/week
Diquat	2.699E-01	2.699E-01	4.333E+01	4.333E+01	1/week
Endosulfan	3.953E-04	1.436E-03	6.719E-02	2.464E-01	1/week
Endothall	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
Endrin	2.541E-04	5.613E-04	4.319E-02	9.631E-02	1/week
Ethylbenzene	7.154E+00	1.478E+02	1.148E+03	2.537E+04	1/week
Ethylene dibromide	6.749E-04	6.749E-04	1.083E-01	1.083E-01	1/week
Fluoride	5.272E+01	5.272E+01	8.665E+03	9.046E+03	1/week
gamma-Hexachlorocyclohexane (Lindane)	6.200E-03	6.200E-03	1.064E+00	1.064E+00	1/week
Glyphosate	9.448E+00	9.448E+00	1.516E+03	1.516E+03	1/week
Heptachlor	2.545E-05	3.394E-03	3.931E-03	5.824E-01	1/week
Heptachlor epoxide	1.256E-05	3.394E-03	1.941E-03	5.824E-01	1/week
Hexachlorobenzene	9.343E-05	9.343E-05	1.443E-02	1.443E-02	1/week
Hexachlorocyclopentadiene	5.399E-01	5.399E-01	8.665E+01	8.665E+01	1/week
Iron	6.527E+00	6.527E+00	1.120E+03	1.120E+03	1/week
Lead	5.430E-02	1.288E+00	9.230E+00	2.211E+02	1/week
Mercury (II)	6.749E-04	1.070E-02	1.083E-01	1.837E+00	1/week
Methoxychlor	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
Nickel	6.619E-01	5.504E+00	1.125E+02	9.445E+02	1/week
Nitrate as N*	1.350E+02	2.089E+03	2.166E+04	3.584E+05	1/week
Nitrate+Nitrite as N*	1.350E+02	2.089E+03	2.166E+04	3.584E+05	1/week
Nitrite as N*	1.350E+01	1.350E+01	2.166E+03	2.166E+03	1/week
o-Dichlorobenzene	8.098E+00	8.098E+00	1.300E+03	1.300E+03	1/week
Oxamyl (Vydate)	2.699E+00	2.699E+00	4.333E+02	4.333E+02	1/week
para-Dichlorobenzene	8.503E-01	1.305E+01	1.365E+02	2.240E+03	1/week
Parathion	9.177E-05	4.242E-04	1.560E-02	7.279E-02	1/week
Pentachlorophenol (PCP)	1.291E-01	1.555E-01	2.194E+01	2.669E+01	1/week
Phenols	3.530E-01	1.632E+01	5.999E+01	2.800E+03	1/week
Picloram	6.749E+00	6.749E+00	1.083E+03	1.083E+03	1/week
Polychlorinated Biphenyls (PCBs)	2.062E-05	1.305E-02	3.185E-03	2.240E+00	1/week
Polynuclear Aromatic Hydrocarbons (PAHs)	2.118E-04	1.958E-01	3.599E-02	3.360E+01	1/week
Selenium	3.530E-02	1.260E-01	5.999E+00	2.161E+01	1/week
Silver	2.480E-02	2.480E-02	4.256E+00	4.256E+00	1/week

* The mass limits will be controlled by the TMDL based Total Nitrogen WLAs.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Diffuser Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
Simazine	5.399E-02	5.399E-02	8.665E+00	8.665E+00	1/week
Styrene	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
Sulfate	9.531E+03	9.531E+03	1.642946E+06	1.642946E+06	1/month
Tetrachloroethlyene	9.313E-02	9.313E-02	7.171E+01	7.171E+01	1/week
Thallium	3.239E-03	3.903E+00	5.199E-01	6.697E+02	1/week
Toluene	3.530E-01	1.632E+01	5.999E+01	2.800E+03	1/week
Total Residual Chlorine (TRC)	2.57E-01	4.24E-01	6.83E+01	1.08E+02	7/week
Toxaphene	1.412E-05	4.765E-03	2.400E-03	8.175E-01	1/week
trans-1,2-Dichloroethylene	9.883E-01	9.883E-01	1.680E+02	1.680E+02	1/week
Trichloroethylene (TCE)	3.374E-01	2.611E+01	5.416E+01	4.480E+03	1/week
Trihalomethanes (total)	1.080E+00	1.080E+00	1.733E+02	1.733E+02	1/week
Vinyl Chloride	3.374E-03	3.374E-03	2.598E+00	2.598E+00	1/week
Xylenes (Total)	1.350E+02	1.350E+02	2.166E+04	2.166E+04	1/week
Zinc	1.407E+00	1.407E+00	2.414E+02	2.414E+02	1/week

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Low Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd (Discharge when Cedar River flow at USGS gage 05464000 is less than 8,500 cfs)**				
CBOD5	Secondary Treatment Levels Will Not Violate WQS				--
Total D.O.	Numerical limits are not required				--
Ammonia – Nitrogen [1]					
January	18.0	18.0	3,625.9	4,838.3	--
February	17.6	17.6	4,105.5	4,627.9	--
March	9.8	17.1	1,858.7	4,627.2	--
April	6.9	17.6	1,336.2	4,840.7	--
May	5.9	17.0	1,139.8	4,686.3	--
June	3.9	16.2	775.8	4,461.7	--
July	4.4	19.7	806.1	**5,369.3**	--
August	4.0	18.0	735.1	4,986.7	--
September	4.5	18.7	878.3	5,117.2	--
October	9.8	17.8	1,866.2	4,879.7	--
November	12.2	16.5	2,311.8	4,535.6	--
December	14.4	18.1	2,719.2	4,958.0	--
Bacteria [2]	Geometric Mean (#org/100ml)		March 15th – November 15th		--
E. coli	126				
Chloride [3]	773	773	204,160	204,160	1/ month
Sulfate [3]	1,865	1,865	492,113	492,113	1/month
TRC [4]	0.232	0.324	64.5	93.3	7/week
Total Nitrogen [5]	--	--	9,285.5	15,199.0	--
pH [6]	6.5 to 9.3				--

Major Facility Acute WET Testing Ratio: use 80.5% of effluent and 19.5% of dilution water for the testing

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) and HH) — Date Done: May 21, 2015

Annual critical low flow in Cedar River at the discharge point
30Q10 flow 338 cfs, 7Q10 flow 296 cfs, 1Q10 flow 270 cfs, Harmonic Mean flow 1525 cfs

Excel Spreadsheet calculations [X] Qual II E Model [ ] Qual II E Modeling date[ ]

Performed by: Collin Klingbeil Approved By: Connie Dou

1. The **bold** ammonia nitrogen limits are governed by the CBOD5/DO modeling.
2. Cedar River *E. coli* TMDL based limit. Due to a recent revision to IAC567.62 (Chapter 62), sample maximum limit for bacteria is no longer required. Only geometric mean is required.
3. Chloride/sulfate limits are based on the new chloride/sulfate criteria that took effective on Nov. 11, 2009. Chloride/sulfate criteria are hardness dependent and the default hardness has been changed from 100 mg/l to 200 mg/l, effective Nov. 11, 2009.
4. For informational purposes. This facility utilizes UV disinfection.
5. Corrected Cedar River Nitrate TMDL limits based on the Easton/Satellite plants combined flow and converted to a 30-day average and daily maximum using the procedure from the Nov. 20, 2008 memo "Deriving total nitrogen limits form the WLA in the Cedar River TMDL
6. The upper pH limit may be governed by a technology based limit of 9.0

Antidegradation Review Requirement

A tier II antidegradation review is not required. See Section 2 for details.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Low Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd (Discharge when Cedar River flow at USGS gage 05464000 is less than 8,500 cfs)**				
Toxics					
1,1,1-Trichloroethane	2.699E+00	3.280E+01	4.333E+02	8.623E+03	1/week
1,1,2-Trichloroethane	4.098E-01	4.098E-01	6.236E+01	6.236E+01	1/week
1,1-Dichloroethylene	2.254E+01	6.709E+01	3.430E+03	1.764E+04	1/week
1,2,4-Trichlorobenzene	9.448E-01	9.448E-01	1.516E+02	1.516E+02	1/week
1,2-Dichloroethane	2.595E-01	7.330E+01	3.949E+01	1.927E+04	1/week
1,2-Dichloropropane	3.415E-01	3.415E-01	5.197E+01	5.197E+01	1/week
2,3,7,8-TCDD (Dioxin)	5.747E-10	5.747E-10	9.342E-08	9.342E-08	1/week
2,4,5-TP (Silvex)	1.350E-01	1.350E-01	2.166E+01	2.166E+01	1/week
2,4-D	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
3,3-Dichlorobenzidine	3.155E-03	3.155E-03	5.129E-01	5.129E-01	1/week
4,4' DDT	3.657E-06	1.367E-03	6.892E-04	3.593E-01	1/week
Alachlor	2.699E-02	2.699E-02	4.333E+00	4.333E+00	1/week
Aldrin	5.634E-06	3.727E-03	9.159E-04	9.799E-01	1/week
Aluminum	3.182E-01	9.318E-01	5.996E+01	2.450E+02	1/week
Antimony	7.558E-02	1.367E+01	1.213E+01	3.593E+03	1/week
Arsenic (III)	1.229E-02	4.224E-01	1.871E+00	1.111E+02	1/week
Asbestos	9.448E-02	9.448E-02	1.516E+01	1.516E+01	1/week
Atrazine	4.049E-02	4.049E-02	6.499E+00	6.499E+00	1/week
Barium	1.350E+01	2.547E+02	2.166E+03	6.696E+04	1/week
Benzene	1.503E+00	2.050E+01	2.286E+02	5.389E+03	1/week
Benzidine	1.242E+01	1.242E+01	3.266E+03	3.266E+03	1/week
Benzo(a)Pyrene	2.028E-03	2.028E-03	3.297E-01	3.297E-01	1/week
Beryllium	5.399E-02	6.212E-01	8.665E+00	1.633E+02	1/week
Bis(2-ethylhexyl)phthalate	6.585E-02	6.585E-02	1.297E+01	1.297E+01	1/week
Bromoform	2.937E+00	2.937E+00	4.469E+02	4.469E+02	1/week
Cadmium	1.654E-03	5.362E-03	3.117E-01	1.410E+00	1/week
Carbofuran	5.399E-01	5.399E-01	8.665E+01	8.665E+01	1/week
Carbon Tetrachloride	1.571E-01	2.677E+01	2.390E+01	7.039E+03	1/week
Chlordane	1.573E-05	2.982E-03	2.963E-03	7.839E-01	1/week
Chloride	7.73E+02	7.73E+02	2.04160E+05	2.04160E+05	1/month
Chlorobenzene	1.350E+00	2.000E+01	2.166E+02	5.259E+03	1/week
Chlorodibromomethane	2.732E-01	2.732E-01	4.157E+01	4.157E+01	1/week
Chloroform	3.893E+00	3.893E+00	5.924E+02	5.924E+02	1/week
Chloropyrifos	1.031E-04	1.031E-04	2.711E-02	2.711E-02	1/week
Chromium (VI)	1.988E-02	1.988E-02	5.226E+00	5.226E+00	1/week
cis-1,2-Dichloroethylene	9.448E-01	9.448E-01	1.516E+02	1.516E+02	1/week
Copper	3.240E-02	3.240E-02	8.632E+00	8.632E+00	1/week
Cyanide	1.902E-02	2.733E-02	3.584E+00	7.186E+00	1/week
Dalapon	2.699E+00	2.699E+00	4.333E+02	4.333E+02	1/week
Di(2-ethylhexyl)adipate	5.399E+00	5.399E+00	8.665E+02	8.665E+02	1/week
Dibromochloropropane	2.699E-03	2.699E-03	4.333E-01	4.333E-01	1/week

By Collin Klingbeil
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ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Low Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd (Discharge when Cedar River flow at USGS gage 05464000 is less than 8,500 cfs)**				
Toxics					
Dibutyl phthalate	2.174E-01	2.174E-01	5.716E+01	5.716E+01	1/week
Dichlorobromomethane	3.756E-01	3.756E-01	5.716E+01	5.716E+01	1/week
Dichloromethane	6.749E-02	6.749E-02	1.083E+01	1.083E+01	1/week
Dieldrin	6.085E-06	2.982E-04	9.891E-04	7.839E-02	1/week
Dinoseb	9.448E-02	9.448E-02	1.516E+01	1.516E+01	1/week
Diquat	2.699E-01	2.699E-01	4.333E+01	4.333E+01	1/week
Endosulfan	2.048E-04	2.733E-04	3.859E-02	7.186E-02	1/week
Endothall	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
Endrin	1.068E-04	1.068E-04	2.481E-02	2.809E-02	1/week
Ethylbenzene	6.286E+00	2.814E+01	1.148E+03	7.398E+03	1/week
Ethylene dibromide	6.749E-04	6.749E-04	1.083E-01	1.083E-01	1/week
Fluoride	1.003E+01	1.003E+01	2.638E+03	2.638E+03	1/week
gamma-Hexachlorocyclohexane (Lindane)	1.180E-03	1.180E-03	3.103E-01	3.103E-01	1/week
Glyphosate	9.448E+00	9.448E+00	1.516E+03	1.516E+03	1/week
Heptachlor	8.902E-06	6.461E-04	1.447E-03	1.698E-01	1/week
Heptachlor epoxide	4.395E-06	6.461E-04	7.144E-04	1.698E-01	1/week
Hexachlorobenzene	3.268E-05	3.268E-05	5.312E-03	5.312E-03	1/week
Hexachlorocyclopentadiene	5.399E-01	5.399E-01	8.665E+01	8.665E+01	1/week
Iron	1.242E+00	1.242E+00	3.266E+02	3.266E+02	1/week
Lead	2.814E-02	2.453E-01	5.302E+00	6.448E+01	1/week
Mercury (II)	4.490E-04	2.038E-03	8.842E-02	5.357E-01	1/week
Methoxychlor	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
Nickel	3.429E-01	1.048E+00	6.462E+01	2.755E+02	1/week
Nitrate as N*	1.350E+02	3.976E+02	2.166E+04	1.045E+05	1/week
Nitrate+Nitrite as N*	1.350E+02	3.976E+02	2.166E+04	1.045E+05	1/week
Nitrite as N*	1.350E+01	1.350E+01	2.166E+03	2.166E+03	1/week
o-Dichlorobenzene	8.098E+00	8.098E+00	1.300E+03	1.300E+03	1/week
Oxamyl (Vydate)	2.699E+00	2.699E+00	4.333E+02	4.333E+02	1/week
para-Dichlorobenzene	5.687E-01	2.485E+00	1.120E+02	6.532E+02	1/week
Parathion	4.755E-05	8.076E-05	8.959E-03	2.123E-02	1/week
Pentachlorophenol (PCP)	2.961E-02	2.961E-02	7.784E+00	7.784E+00	1/week
Phenols	1.829E-01	3.106E+00	3.446E+01	8.166E+02	1/week
Picloram	6.749E+00	6.749E+00	1.083E+03	1.083E+03	1/week
Polychlorinated Biphenyls (PCBs)	7.212E-06	2.485E-03	1.172E-03	6.532E-01	1/week
Polynuclear Aromatic Hydrocarbons (PAHs)	1.097E-04	3.727E-02	2.068E-02	9.799E+00	1/week
Selenium	1.829E-02	2.398E-02	3.446E+00	6.304E+00	1/week
Silver	4.721E-03	4.721E-03	1.241E+00	1.241E+00	1/week

* The mass limits will be controlled by the TMDL based Total Nitrogen WLAs.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Low Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd (Discharge when Cedar River flow at USGS gage 05464000 is less than 8,500 cfs)**				
Toxics					
Simazine	5.399E-02	5.399E-02	8.665E+00	8.665E+00	1/week
Styrene	1.350E+00	1.350E+00	2.166E+02	2.166E+02	1/week
Sulfate	1.865E+03	1.865E+03	4.92113E+05	4.92113E+05	1/month
Tetrachloroethlyene	9.313E-02	9.313E-02	1.495E+01	1.495E+01	1/week
Thallium	1.407E-03	7.430E-01	2.770E-01	1.953E+02	1/week
Toluene	1.829E-01	3.106E+00	3.446E+01	8.166E+02	1/week
Total Residual Chlorine (TRC)	2.32E-01	3.24E-01	6.45E+01	9.33E+01	7/week
Toxaphene	7.315E-06	9.070E-04	1.378E-03	2.384E-01	1/week
trans-1,2-Dichloroethylene	4.190E-01	4.190E-01	8.252E+01	8.252E+01	1/week
Trichloroethylene (TCE)	2.926E-01	4.970E+00	5.416E+01	1.306E+03	1/week
Trihalomethanes (total)	1.080E+00	1.080E+00	1.733E+02	1.733E+02	1/week
Vinyl Chloride	3.374E-03	3.374E-03	5.416E-01	5.416E-01	1/week
Xylenes (Total)	1.350E+02	1.350E+02	2.166E+04	2.166E+04	1/week
Zinc	2.678E-01	2.678E-01	7.041E+01	7.041E+01	1/week

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – High Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 011	**ADW =18.0 mgd AWW =34.8 mgd (Shoreline discharge when Cedar River flow at USGS gage 05464000 is equal or more than 8,500 cfs)**				
CBOD5	Secondary Treatment Levels Will Not Violate WQS				--
Total D.O.	Numerical limits are not required				--
Ammonia – Nitrogen [1]					
January	104.2	104.2	17,791	17,791	--
February	120.6	120.6	20,091	20,091	--
March	88.6	88.6	15,404	15,404	--
April	66.5	66.5	12,343	12,343	--
May	65.8	65.8	12,146	12,146	--
June	64.8	64.8	10,079	11,864	--
July	73.0	73.0	12,696	13,673	--
August	62.2	62.2	11,578	11,846	--
September	76.5	78.2	11,693	14,193	--
October	77.1	77.1	13,895	13,895	--
November	65.1	65.1	11,956	11,956	--
December	77.5	77.5	13,992	13,992	--
Bacteria [2]	Geomean (#org/100ml)		March 15th – November 15th		--
E. coli	126				
Chloride [3]	5,168	5,168	863,979	863,979	1/month
Sulfate [3]	12,584	12,584	2,101,246	2,101,246	1/ month
TRC [4]	0.464	0.464	114.4	114.4	7/week
Total Nitrogen [5]	--	--	9,285.5	15,199.0	--
pH [6]	5.9 to 14.0				--

Major Facility Acute WET Testing Ratio: use 11.6% of effluent and 88.4% of dilution water for the testing

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) and HH) — Date Done: May 21, 2015

Minimum high flow in Cedar River at the discharge point when shoreline discharge used
30Q10 flow 8,500 cfs, 7Q10 flow 8,500 cfs, 1Q10 flow 8,500 cfs, Harmonic Mean flow 8,500 cfs

Excel Spreadsheet calculations [X] Qual II E Model [ ] Qual II E Modeling date[ ]

Performed by: Collin Klingbeil Approved By: Connie Dou

1. The gray ammonia nitrogen limits are governed by the TMDL based Total Nitrogen limits for this facility.
2. Cedar River *E. coli* TMDL based limit. Due to a recent revision to IAC567.62 (Chapter 62), sample maximum limit for bacteria is no longer required. Only geometric mean is required.
3. Chloride/sulfate limits are based on the new chloride/sulfate criteria that took effective on Nov. 11, 2009. Chloride/sulfate criteria are hardness dependent and the default hardness has been changed from 100 mg/l to 200 mg/l, effective Nov. 11, 2009.
4. For informational purposes. This facility utilizes UV disinfection.
5. Corrected Cedar River Nitrate TMDL limits based on the Easton/Satellite plants combined flow and converted to a 30-day average and daily maximum using the procedure from the Nov. 20, 2008 memo "Deriving total nitrogen limits form the WLA in the Cedar River TMDL
6. The pH limits may be governed by a technology based limits

Antidegradation Review Requirement

See Section 2.0, Table 2c.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – High Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 011	**ADW =18.0 mgd AWW =34.8 mgd (Shoreline discharge when Cedar River flow at USGS gage 05464000 is equal or more than 8,500 cfs)**				
Toxics					
1,1,1-Trichloroethane	6.125E+01	2.279E+02	9.223E+03	3.791E+04	1/week
1,1,2-Trichloroethane	1.838E+00	1.838E+00	2.767E+02	2.767E+02	1/week
1,1-Dichloroethylene	1.011E+02	4.661E+02	1.522E+04	7.754E+04	1/week
1,2,4-Trichlorobenzene	2.144E+01	2.144E+01	3.228E+03	3.228E+03	1/week
1,2-Dichloroethane	1.164E+00	5.092E+02	1.752E+02	8.471E+04	1/week
1,2-Dichloropropane	1.531E+00	1.531E+00	2.306E+02	2.306E+02	1/week
2,3,7,8-TCDD (Dioxin)	2.970E-09	2.970E-09	4.530E-07	4.530E-07	1/week
2,4,5-TP (Silvex)	3.063E+00	3.063E+00	4.611E+02	4.611E+02	1/week
2,4-D	3.063E+01	3.063E+01	4.611E+03	4.611E+03	1/week
3,3-Dichlorobenzidine	1.631E-02	1.631E-02	2.487E+00	2.487E+00	1/week
4,4' DDT	7.731E-05	9.494E-03	1.175E-02	1.579E+00	1/week
Alachlor	6.125E-01	6.125E-01	9.223E+01	9.223E+01	1/week
Aldrin	2.912E-05	2.589E-02	4.441E-03	4.308E+00	1/week
Aluminum	6.473E+00	6.473E+00	1.022E+03	1.077E+03	1/week
Antimony	1.715E+00	9.494E+01	2.582E+02	1.579E+04	1/week
Arsenic (III)	5.513E-02	2.935E+00	8.301E+00	4.882E+02	1/week
Asbestos	2.144E+00	2.144E+00	3.228E+02	3.228E+02	1/week
Atrazine	9.188E-01	9.188E-01	1.383E+02	1.383E+02	1/week
Barium	3.063E+02	1.769E+03	4.611E+04	2.943E+05	1/week
Benzene	6.738E+00	1.424E+02	1.015E+03	2.369E+04	1/week
Benzidine	8.631E+01	8.631E+01	1.436E+04	1.436E+04	1/week
Benzo(a)Pyrene	1.048E-02	1.048E-02	1.599E+00	1.599E+00	1/week
Beryllium	1.225E+00	4.316E+00	1.845E+02	7.179E+02	1/week
Bis(2-ethylhexyl)phthalate	1.281E+00	1.281E+00	1.954E+02	1.954E+02	1/week
Bromoform	1.317E+01	1.317E+01	1.983E+03	1.983E+03	1/week
Cadmium	3.497E-02	3.725E-02	5.312E+00	6.197E+00	1/week
Carbofuran	1.225E+01	1.225E+01	1.845E+03	1.845E+03	1/week
Carbon Tetrachloride	7.044E-01	1.860E+02	1.061E+02	3.094E+04	1/week
Chlordane	3.324E-04	2.072E-02	5.051E-02	3.446E+00	1/week
Chloride	5.168E+03	5.168E+03	8.63979E+05	8.63979E+05	1/month
Chlorobenzene	3.063E+01	1.390E+02	4.611E+03	2.312E+04	1/week
Chlorodibromomethane	1.225E+00	1.225E+00	1.845E+02	1.845E+02	1/week
Chloroform	1.746E+01	1.746E+01	2.629E+03	2.629E+03	1/week
Chloropyrifos	7.164E-04	7.164E-04	1.192E-01	1.192E-01	1/week
Chromium (VI)	1.381E-01	1.381E-01	2.297E+01	2.297E+01	1/week
cis-1,2-Dichloroethylene	2.144E+01	2.144E+01	3.228E+03	3.228E+03	1/week
Copper	2.000E-01	2.000E-01	3.379E+01	3.379E+01	1/week
Cyanide	1.899E-01	1.899E-01	3.159E+01	3.159E+01	1/week
Dalapon	6.125E+01	6.125E+01	9.223E+03	9.223E+03	1/week
Di(2-ethylhexyl)adipate	1.225E+02	1.225E+02	1.845E+04	1.845E+04	1/week
Dibromochloropropane	6.125E-02	6.125E-02	9.223E+00	9.223E+00	1/week

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – High Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 011	**ADW =18.0 mgd AWW =34.8 mgd (Shoreline discharge when Cedar River flow at USGS gage 05464000 is equal or more than 8,500 cfs)**				
Toxics					
Dibutyl phthalate	1.510E+00	1.510E+00	2.513E+02	2.513E+02	1/week
Dichlorobromomethane	1.684E+00	1.684E+00	2.536E+02	2.536E+02	1/week
Dichloromethane	1.531E+00	1.531E+00	2.306E+02	2.306E+02	1/week
Dieldrin	3.145E-05	2.072E-03	4.796E-03	3.446E-01	1/week
Dinoseb	2.144E+00	2.144E+00	3.228E+02	3.228E+02	1/week
Diquat	6.125E+00	6.125E+00	9.223E+02	9.223E+02	1/week
Endosulfan	1.899E-03	1.899E-03	3.159E-01	3.159E-01	1/week
Endothall	3.063E+01	3.063E+01	4.611E+03	4.611E+03	1/week
Endrin	7.423E-04	7.423E-04	1.235E-01	1.235E-01	1/week
Ethylbenzene	1.223E+02	1.955E+02	1.865E+04	3.252E+04	1/week
Ethylene dibromide	1.531E-02	1.531E-02	2.306E+00	2.306E+00	1/week
Fluoride	6.971E+01	6.971E+01	1.160E+04	1.160E+04	1/week
gamma-Hexachlorocyclohexane (Lindane)	8.200E-03	8.200E-03	1.364E+00	1.364E+00	1/week
Glyphosate	2.144E+02	2.144E+02	3.228E+04	3.228E+04	1/week
Heptachlor	4.601E-05	4.488E-03	7.017E-03	7.466E-01	1/week
Heptachlor epoxide	2.271E-05	4.488E-03	3.464E-03	7.466E-01	1/week
Hexachlorobenzene	1.689E-04	1.689E-04	2.576E-02	2.576E-02	1/week
Hexachlorocyclopentadiene	1.225E+01	1.225E+01	1.845E+03	1.845E+03	1/week
Iron	8.631E+00	8.631E+00	1.436E+03	1.436E+03	1/week
Lead	5.948E-01	1.704E+00	9.036E+01	2.834E+02	1/week
Mercury (II)	8.735E-03	1.416E-02	1.332E+00	2.355E+00	1/week
Methoxychlor	3.063E+01	3.063E+01	4.611E+03	4.611E+03	1/week
Nickel	7.249E+00	7.279E+00	1.101E+03	1.211E+03	1/week
Nitrate as N*	2.762E+03	2.762E+03	4.595E+05	4.595E+05	1/week
Nitrate+Nitrite as N*	2.762E+03	2.762E+03	4.595E+05	4.595E+05	1/week
Nitrite as N*	3.063E+02	3.063E+02	4.611E+04	4.611E+04	1/week
o-Dichlorobenzene	1.838E+02	1.838E+02	2.767E+04	2.767E+04	1/week
Oxamyl (Vydate)	6.125E+01	6.125E+01	9.223E+03	9.223E+03	1/week
para-Dichlorobenzene	1.106E+01	1.726E+01	1.688E+03	2.872E+03	1/week
Parathion	5.610E-04	5.610E-04	9.333E-02	9.333E-02	1/week
Pentachlorophenol (PCP)	2.057E-01	2.057E-01	3.422E+01	3.422E+01	1/week
Phenols	3.866E+00	2.158E+01	5.873E+02	3.590E+03	1/week
Picloram	1.531E+02	1.531E+02	2.306E+04	2.306E+04	1/week
Polychlorinated Biphenyls (PCBs)	3.727E-05	1.726E-02	5.685E-03	2.872E+00	1/week
Polynuclear Aromatic Hydrocarbons (PAHs)	2.319E-03	2.589E-01	3.524E-01	4.308E+01	1/week
Selenium	1.666E-01	1.666E-01	2.771E+01	2.771E+01	1/week
Silver	3.280E-02	3.280E-02	5.456E+00	5.456E+00	1/week

* The mass limits will be controlled by the TMDL based Total Nitrogen WLAs.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – High Flow Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 011	**ADW =18.0 mgd AWW =34.8 mgd (Shoreline discharge when Cedar River flow at USGS gage 05464000 is equal or more than 8,500 cfs)**				
Toxics					
Simazine	1.225E+00	1.225E+00	1.845E+02	1.845E+02	1/week
Styrene	3.063E+01	3.063E+01	4.611E+03	4.611E+03	1/week
Sulfate	1.2584E+04	1.2584E+04	2.101246E+06	2.101246E+06	1/month
Tetrachloroethlyene	1.922E+00	1.922E+00	2.931E+02	2.931E+02	1/week
Thallium	2.737E-02	5.161E+00	4.175E+00	8.586E+02	1/week
Toluene	3.866E+00	2.158E+01	5.873E+02	3.590E+03	1/week
Total Residual Chlorine (TRC)	4.64E-01	4.64E-01	1.144E+02	1.144E+02	7/week
Toxaphene	1.546E-04	6.301E-03	2.349E-02	1.048E+00	1/week
trans-1,2-Dichloroethylene	8.153E+00	8.153E+00	1.244E+03	1.244E+03	1/week
Trichloroethylene (TCE)	6.185E+00	3.453E+01	9.397E+02	5.743E+03	1/week
Trihalomethanes (total)	2.450E+01	2.450E+01	3.689E+03	3.689E+03	1/week
Vinyl Chloride	7.656E-02	7.656E-02	1.153E+01	1.153E+01	1/week
Xylenes (Total)	3.063E+03	3.063E+03	4.611E+05	4.611E+05	1/week
Zinc	1.861E+00	1.861E+00	3.095E+02	3.095E+02	1/week

WLA/permit limits for the City of Waterloo's Mechanical Wastewater Treatment Facility

These wasteload allocations and water quality based permit limitations are for the City of Waterloo's wastewater discharge. The wasteload allocations/permit limits are based on the Water Quality Standards (IAC 567.61) and 'Supporting Document for Iowa Water Quality Management Plans,' Chapter IV, November 11, 2009. The chloride allocation/permit limits are based on the criteria that became effective on November 11, 2009.

The water quality based limits in this WLA are calculated to meet the surface water quality criteria to protect downstream uses. There could be technology based limits applicable to this facility that are more stringent than the water quality based limits shown in this WLA. The technology based limits could be derived from either federal guidelines based on different industrial categories or permit writer's judgment.

1. BACKGROUND: The City of Waterloo discharges treated domestic wastewater from a mechanical wastewater treatment plant (activated sludge) via a diffuser or potentially a shoreline discharge to the Cedar River (at 42° 28' 01" N, 92° 18' 28" W).

Outfalls: For the purposes of this WLA reissuance limits are calculated for three outfalls.

- Outfall 801 is the diffuser discharge
- Outfall 009 is a shoreline discharge when the flow in the Cedar River at USGS Gage 05464000 is less than 8,500 cfs
- Outfall 011 is a shoreline discharge when the flow in the Cedar River at USGS Gage 05464000 is greater than or equal to 8,500 cfs

Under normal operating conditions wastewater is discharged via the diffuser (Outfall 801). Outfall 009 may be used during maintenance or repairs to the diffuser during low flow conditions. Outfall 011 may be used to prevent backup into the plant when the river flows are high. WLAs are calculated based on the assumption that simultaneous discharge from the diffuser and shoreline outfalls does not occur.

Route of Flow and Use Designations:
The Cedar River is an A1, B(WW-1), HH designated use waterbody from the outfall of this facility to the mouth (Louisa Co.) and also has a Class C use designation at the Cedar Rapids Municipal Water Works intake (approximately 70 miles downstream from the outfall of this facility). The designations have been adopted in Iowa's state rule described in the rule referenced document of Surface Water Classification effective on December 22, 2010. The use designations of the stream segments downstream from the Cedar River will not impact the resulting limits for this facility.

Stream Flows:
The annual critical low flows in the Cedar River at the discharge location were estimated based on the Drainage Area Ratio method and flow statistic data obtained at USGS gage station 05464000, located on the Cedar River at Waterloo, Iowa.

The annual critical low flows in the Cedar River at the Cedar Rapids Municipal Water Works intake (used for calculating WLAs for the protection of the Class C use designation) were estimated based on the Drainage Area Ratio method and flow statistic data obtained at USGS gage station 05464500, located on the Cedar River at Cedar Rapids, Iowa.

Table 1a: Annual Critical Low Flows

Location	Drainage Area (squaremile)	Harmonic Mean (cfs)	Annual critical low flows (cfs)		
			1Q10	7Q10	30Q10
USGS Gage (05464000)	5,146	1,520[$]	269[$]	295[$]	337[$]
Outfalls 801 and 009	5,163	1,525[@]	270[@]	296[@]	338[@]
USGS Gage (05464500)	6,510	1,880[$]	303[$]	349[$]	400[$]
Cedar Rapids Municipal Water Works intake	6,488	1,874[@]	302[@]	348[@]	399[@]

[$]: USGS gage station statistic data
[@]: Estimated based on drainage area ratio method

Based on information provided by the consultant, the high flow shoreline discharge will not occur until the flow in the Cedar River is at least 8,500 cfs at USGS Gage 05464000. This flow corresponds to a river elevation of 826.5 feet at the outfall, when the shoreline pumps are initiated.

When the discharge reaches the Cedar Rapids Municipal Water Works intake under this scenario the flow in the Cedar River should be greater than 8,500 cfs. However, since the flows are high and complete mixing is assumed in the calculation of WLAs 8,500 cfs is used as the flow at the Cedar Rapids Municipal Water Works intake.

Table 1b: High Stream Flows for Shoreline Discharge

Location	Drainage Area (squaremile)	Harmonic Mean (cfs)	Annual critical low flows (cfs)		
			1Q10	7Q10	30Q10
Outfall 011	5,163	8,500[@]	8,500[@]	8,500[@]	8,500[@]
Cedar Rapids Municipal Water Works intake	6,488	8,500[$]	8,500[$]	8,500[$]	8,500[$]

[@]: Stream flows at the outfall for the calculation of the high flow shoreline WLAs
[$]: Conservative assumption of the stream flow at the water intake

Mixing Zone (MZ) and Zone of Initial Dilution (ZID):
This facility discharges wastewater via a diffuser (Outfall 801). Previous WLAs considered flows in the MZ and ZID for Outfall 801 of 100% of the applicable stream low flows. However, based on the 2014 Diffuser Report from the City of Waterloo there is reasonable doubt that rapid and complete mixing occurs under critical low flow conditions. The Cedar River channel at the outfall has changed since the diffuser was installed in 1996. Some diffuser ports are now buried, and additionally water now flows around (to the East) the East bank manhole. Without further information, it is conservatively estimated (see attachments) that 57% mixing will occur under 7Q10 flow conditions. Thus, the MZ and ZID for Outfall 801 will be 57% of the applicable stream low flows.

When or if the diffuser is not in operation a shoreline discharge will occur (Outfall 009 or 011 depending on the flow in the Cedar River). For the calculation of WLAs for Outfalls 009 and 011 the MZ and ZID are based on the default procedures.

According to IAC 61.2(4)"b"(2), the length of a mixing zone is not to exceed 2000 feet unless otherwise limited pursuant to the criteria set forth therein. The prior permit and wasteload allocation for this facility provided for a mixing zone of 2000 feet for Outfall 009.

Based on a phone conversation with the City of Evansdale and information found on the Black Hawk County Online website, on the East bank of the Cedar River 1,500 feet downstream from the outfall of this facility is the upper limits of Deerwood Park and Campground. The mixing zone is restricted for HH-

fish criteria but will consider a default mixing zone length of 2,000 feet for the protection of all other criteria as a result of a Department analysis for implementing mixing zone restrictions.

2. ANTIDEGRADATION REVIEW REQUIREMENT:
According to the Iowa Antidegradation Implementation Procedure, effective February 17, 2010 (IAC 567-61.2(2).e), all new or expanded regulated activities (with limited exceptions, such as unsewered communities) are subject to antidegradation review requirements.

Table 2a: Antidegradation Review Analysis for the Diffuser Discharge (Outfall 801)

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☐, No ☒, or Not Applicable ☐	1: Existing design capacity sheet attached
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☒, or Not Applicable ☐	1: As indicated in the request form
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	1: As indicated in the request form
4	Less Stringent Permit limits?	Yes ☐, No ☒, or Not Applicable ☐	1: Current limits sheet attached
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	
Conclusion and discussion: None of the factors triggers the antidegradation review; therefore a tier II antidegradation review is not required.			

Table 2b: Antidegradation Review Analysis for the Low Flow Shoreline Discharge (Outfall 009)

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☐, No ☒, or Not Applicable ☐	1: Existing design capacity sheet attached
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☒, or Not Applicable ☐	1: As indicated in the request form
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	1: As indicated in the request form
4	Less Stringent Permit limits?	Yes ☐, No ☒, or Not Applicable ☐	1: Current limits sheet attached
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	
Conclusion and discussion: None of the factors triggers the antidegradation review; therefore a tier II antidegradation review is not required.			

Table 2c: Antidegradation Review Analysis for the High Flow Shoreline Discharge (Outfall 011)

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☐, No ☒, or Not Applicable ☐	1: Existing design capacity sheet attached
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☒, or Not Applicable ☐	1: As indicated in the request form
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	1: As indicated in the request form
4	Less Stringent Permit limits?	Yes ☒, No ☐, or Not Applicable ☐	1: Current limits sheet attached 2: Less stringent ammonia nitrogen limits
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	
Conclusion and discussion: Due to Item 4, less stringent ammonia nitrogen limits is the only factor that triggers an antidegradation review. If the more stringent limits between those for Outfall 801 (Diffuser) in the current NPDES permit and those in this report for the high flow shoreline discharge (Outfall 011) were to be used in the renewal NPDES permit, the antidegradation review is not necessary.			

3. TOTAL MAXIMUM DAILY LOAD (TMDL) LIMITATIONS:

The following stream segments in the discharge route, as shown in Table 3, are on the 2012 impaired waters list.

Table 3: Impairments downstream of the outfall

Waterbody	Segment	Impaired Use	Pollutant	Year Impaired	TMDL Priority	Location Description
Cedar River	IA 02-CED-0040_2	Primary Contact	Indicator Bacteria	2008	Low	from bridge crossing in LaPorte City in S19 T87N R11W Black Hawk Co.) to dam of Cedar Falls Impoundment in NW 1/4 S12 T89N R14W Black Hawk Co
	IA 02-CED-0040_1	Primary Contact	Indicator Bacteria	2004	Complete	from Wolf Cr. (NE 1/4 S29 T87N R11W Black Hawk Co.) to bridge crossing in LaPorte City in S19 T87N R11W Black Hawk Co.)
	IA 02-CED-0030_3	Primary Contact	Indicator Bacteria	2008	Low	from confluence with Bear Cr. (NE 1/4 S21 T84N R8W Linn Co.) to confluence with Hinkle Cr. in SW 1/4 S16 T85N R10W Benton Co.
	IA 02-CED-0030_2	Primary Contact	Indicator Bacteria	2006	Complete	from confluence with McCloud Run (SW 1/4 S16 T83N R7W Linn Co.) to confluence with Bear Cr. in NE 1/4 S21 T84N R8W Linn Co. (includes East West Seminole and Northwest well fields for city of Cedar Rapids water supply).
		Drinking Water	Nitrate Nitrogen	2004	Complete	
	IA 02-CED_0030_1	Primary Contact	Indicator Bacteria	2004	Complete	from Prairie Cr. (SE 1/4 S34 T83N R7W Linn Co.) to confluence with McCloud Run in SW 1/4 S16 T83N R7W Linn Co.
	IA 02-CED-0020_3	Primary Contact	Indicator Bacteria	2004	Complete	from Hwy 30 bridge at Cedar Rapids (S9 T82N R6W Linn Co) to confluence with Prairie Cr. in the SE 1/4 S34 T83N R7W Linn Co.
	IA 02-CED-0020_2	Aquatic Life	Biological	2004	Low	from Rock Run Cr. (S28 T80NR3W Cedar Co) to Hwy 30 bridge at Cedar Rapids in S9 T82N R6W Linn Co.
	IA 02-CED-0010_0	Primary Contact	Indicator Bacteria	2010	Low	mouth (S20 T75N R4W Louisa Co.) to confluence with Sugar Cr. in S17 T78N R2W Muscatine Co.
Iowa River	IA 02-IOW-0010_3	Primary Contact	Indicator Bacteria	2008	Low	From confluence with Long Cr. (S1 T74N R4W Louisa Co.) to confluence with Cedar R in S20 T75N R4W Louisa Co.
	IA 02-IOW-0010_2	Primary Contact	Indicator Bacteria	2012	Low	From south corporate limit of Wapello (S35 T74N R3W Louisa Co.) to Long Cr (S1 T74N R4W Louisa Co.)
	IA 02-IOW-0010_1	Primary Contact	Indicator Bacteria	2012	Low	Mouth (Louisa Co.) to S. corporate limit of Wapello (S35 T74N R3W Louisa Co.)

Table 3 Continued.

Waterbody	Segment	Impaired Use	Pollutant	Year Impaired	TMDL Priority	Location Description
Mississippi River	IA 02-ICM-0010_2	Drinking Water	Arsenic	2006	Low	from Burlington water supply intake (Des Moines Co.) to confluence with Iowa R (S36 T74N R2W Louisa Co.)
		Aquatic Life	Aluminum	2006		
		Aquatic Life	Cadmium	2010		
	IA 03-SKM-0010_1	Drinking Water	Arsenic	2004	Low	IA/MO line to confluence with Sugar Cr. in S23 T67N R5W Lee Co.
		Aquatic Life	Aluminum	2006		
		Aquatic Life	Cadmium	2010		

A TMDL for *E. coli* for various segments (see above) of the Cedar River was completed in 2010. This facility was assigned limits in the TMDL (see Section 4 below). A TMDL was completed for the Cedar River for Nitrate Nitrogen in 2006. This facility was assigned Total Nitrogen limits in the TMDL (See Section 4 below).

Please note that the results presented in this report are wasteload allocations based on meeting the State's current water quality standards in the receiving waterbody. Additional and/or more stringent effluent limits may be applicable to this discharge based on approved TMDLs for impaired waterbodies, which may provide watershed based wasteload allocations. Information on impaired streams in Iowa and approved TMDLs can be found at the following website: http://www.iowadnr.gov/Environment/WaterQuality/WatershedImprovement/WatershedResearchData.aspx

4. CALCULATIONS: The wasteload allocations / permit limits for the outfalls were calculated based on the facility's Average Dry Weather (ADW) design flow of 18.0 mgd and its Average Wet Weather (AWW) design flow of 34.8 mgd.

Please note that only wasteload allocations/permit limits (water quality based effluent limits) calculated using DNR approved design flows can be applied in NPDES permits. Water quality based effluent limits calculated using proposed flows that have not been approved by the DNR for permitting and compliance may be used for informational purposes only.

The water quality based permit concentration limits are derived using the allowed stream flow and the ADW design flow, while loading limits are derived using the allowed stream flow and the AWW design flow.

Toxics: The Toxics wasteload allocations will consider the procedures included in the 2000 revised WQS and the 2007 chemical criteria.

Outfall 801 (Diffuser):
To protect the aquatic life use:
The chronic WLA will continue to use the 7Q10 stream flow in its calculations. In this case, 57% of the 7Q10 flow and 57% of the 1Q10 flow in the Cedar River were used as the Mixing Zone (MZ) and Zone of Initial Dilution (ZID), respectively.

To protect the HH use:
For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 57% of the 7Q10 flow in the receiving stream.

For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 57% of the harmonic mean flow in the receiving stream.

To protect the Class C use at the Cedar Rapids Municipal Water Works intake:
The discharge from the City of Waterloo WWTP is assumed to be 100% mixed at the downstream water intake.

For pollutants that are non-carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the 7Q10 flow in the receiving stream at the water intake.

For pollutants that are carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the harmonic mean flow in the receiving stream at the water intake.

Final limits:
The maximum limits are those calculated for the protection of the aquatic life and the average limits are the more stringent between those for the protection of the aquatic use and those for the protection of the HH and C uses.

Please note that the TRC limits are based on a sampling frequency of 7/week; the limits for other toxics are based on a sampling frequency of 1/week.

Outfall 009 (Low Flow Shoreline Discharge):
To protect the aquatic life use:
The chronic WLA will continue to use the 7Q10 stream flow in its calculations. In this case, 25% of the 7Q10 flow and 2.5% of the 1Q10 flow in the Cedar River were used as the Mixing Zone (MZ) and Zone of Initial Dilution (ZID), respectively.

To protect the HH use:
HH- Fish Criteria:
The MZ and ZID for HH-fish criteria are thus proportionately reduced to 75% of their default values due to Deerwood Park. Thus, for pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of the 7Q10 flow in the receiving stream. For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of the harmonic mean flow in the receiving stream.

All other HH Criteria:
For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of the 7Q10 flow in the receiving stream.

For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of the harmonic mean flow in the receiving stream.

To protect the Class C use at the Cedar Rapids Municipal Water Works intake:
The discharge from the City of Waterloo WWTP is assumed to be 100% mixed at the downstream water intake.

For pollutants that are non-carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the 7Q10 flow in the receiving stream at the water intake.

For pollutants that are carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the harmonic mean flow in the receiving stream at the water intake.

Final limits:
The maximum limits are those calculated for the protection of the aquatic life use and the average limits are the more stringent between those for the protection of the aquatic use and those for the protection of the HH and C uses.

Please note that the TRC limits are based on a sampling frequency of 7/week; the limits for other toxics are based on a sampling frequency of 1/week.

Outfall 011 (High Flow Shoreline Discharge):
To protect the aquatic life use:
The chronic WLA will use a stream flow of 8,500 cfs in its calculations. In this case, 25% of the 8,500 cfs high flow and 2.5% of the 8,500 cfs high flow in the Cedar River were used as the Mixing Zone (MZ) and Zone of Initial Dilution (ZID), respectively.

To protect the HH use:
HH- Fish Criteria:
The MZ and ZID for HH-fish criteria are thus proportionately reduced to 75% of their default values due to Deerwood Park. Thus, for pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of the 8,500 cfs high flow in the receiving stream. For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 18.75% of the 8,500 cfs high flow in the receiving stream.

All other HH Criteria:
For pollutants that are non-carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of the 8,500 cfs high flow in the receiving stream.

For pollutants that are carcinogenic and have criteria for human health protection, the criteria apply at the end of the MZ, which in this case is 25% of the 8,500 cfs high flow in the receiving stream.

To protect the Class C use at the Cedar Rapids Municipal Water Works intake:
The discharge from the City of Waterloo WWTP is assumed to be 100% mixed at the downstream water intake.

For pollutants that are non-carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the 8,500 cfs high flow in the receiving stream at the water intake.

For pollutants that are carcinogenic and have criteria for maximum contaminant level (MCL), the criteria apply at the end of the MZ, which in this case is 100% of the 8,500 cfs high flow in the receiving stream at the water intake.

Final limits:
The maximum limits are those calculated for the protection of the aquatic life use and the average limits are the more stringent between those for the protection of the aquatic use and those for the protection of the HH and C uses.

Please note that the TRC limits are based on a sampling frequency of 7/week; the limits for other toxics are based on a sampling frequency of 1/week.

Ammonia Nitrogen: Standard stream background temperatures, pH, and concentrations of NH3-N were mixed with the discharge from the facility's effluent pH and temperature values to calculate the applicable instream WQS criteria for the protection of the Cedar River. The Cedar River is a B(WW-1) stream, therefore, early life protection will begin in March and run though September.

The monthly background temperatures, pH, and NH3-N concentrations shown in Table 4 were used for the wasteload allocation/permit limits calculations based on the Year 2000 ammonia criteria. Table 5 shows the statewide monthly effluent pH and temperature values for mechanical facilities. Tables 6a – 6c show the calculated ammonia nitrogen waste load allocations for this facility.

Outfall 801 (Diffuser):
In this case 57% of the 1Q10 and 57% of the 30Q10 flow were used as the ZID and the MZ.

Outfall 009 (Low Flow Shoreline Discharge):
In this case 2.5% of the 1Q10 and 25% of the 30Q10 flow were used as the ZID and the MZ.

Outfall 011 (High Flow Shoreline Discharge):
In this case 2.5% of the 8,500 cfs high flow and 25% of the 8,500 cfs high flow were used as the ZID and the MZ.

Table 4: Background Temperature, pH and NH3-N Concentrations
For Use with Year 2000 Ammonia Criteria

Months	pH	Temperature (°C)	NH_3-N (mg/l)
Jan.	7.8	0.6	0.5
Feb.	7.7	1.2	0.5
March	7.9	4.3	0.5
April	8.1	11.7	0.5
May	8.1	16.6	0.5
June	8.1	21.4	0.5
July	8.1	24.8	0.0
August	8.2	23.8	0.0
Sept.	8	22.2	0.5
October	8	12.3	0.5
November	8.1	6	0.5
December	8	1.6	0.5

Table 5: Standard Effluent pH & Temperature Values for Mechanical Facilities

Months	pH	Temperature (°C)
Jan.	7.67	12.4
Feb.	7.71	11.3
March	7.69	13.1
April	7.65	16.2
May	7.67	19.3
June	7.7	22.1
July	7.58	24.1
August	7.63	24.4
Sept.	7.62	22.8
October	7.65	20.2
November	7.69	17.1
December	7.64	14.1

Table 6a: Outfall 801 Waste Load Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	79.7	37.5	48.6	21.9
February	91.2	42.6	54.1	24.8
March	68.3	18.7	42.6	11.0
April	52.8	13.1	35.4	7.8
May	52.1	11.1	34.7	6.6
June	51.1	7.2	33.8	4.4
July	58.2	8.6	39.4	4.9
August	50.0	7.8	34.4	4.5
Sept.	61.5	8.3	40.2	5.0
October	60.4	18.8	39.2	11.1
November	51.5	23.5	34.1	13.8
December	60.8	27.8	39.5	16.3

*: bases for concentration limits; **: bases for mass loading limits

Table 6b: Outfall 009 Waste Load Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	18.0	19.3	16.7	12.5
February	17.6	21.9	15.9	14.1
March	17.1	9.8	15.9	6.4
April	17.6	6.9	16.7	4.6
May	17.0	5.9	16.1	3.9
June	16.2	3.9	15.4	2.7
July	19.7	4.4	18.7	2.8
August	18.0	4.0	17.2	2.5
Sept.	18.7	4.5	17.6	3.0
October	17.8	9.8	16.8	6.4
November	16.5	12.2	15.6	8.0
December	18.1	14.4	17.1	9.4

*: bases for concentration limits; **: bases for mass loading limits

Table 6c: Outfall 011 Waste Load Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	104.2	361.3	61.3	189.4
February	120.6	411.1	69.2	215.4
March	88.6	178.1	53.1	93.5
April	66.5	124.0	42.5	65.1
May	65.8	103.6	41.8	54.5
June	64.8	65.9	40.9	34.7
July	73.0	83.6	47.1	43.7
August	62.2	76.2	40.8	39.9
Sept.	78.2	76.5	48.9	40.3
October	77.1	178.9	47.9	93.9
November	65.1	225.1	41.2	118.1
December	77.5	267.3	48.2	140.2

*: bases for concentration limits; **: bases for mass loading limits

CBOD5/Total Dissolved Oxygen:
Streeter-Phelps DO Sag Model was used to simulate the decay of CBOD and dispersion of total Dissolved Oxygen (DO) in the receiving water downstream from the outfall. The criterion is that the discharge cannot cause the DO level in the receiving stream (warm waters) below 5.0 mg/l.

Note: Modeling was completed for Outfall 801 (Diffuser), Outfall 009 (Low Flow Shoreline Discharge), and Outfall 011 (High Flow Shoreline Discharge). The inputs to the model for each scenario are the same unless otherwise specified.

The parameter values used in the modeling are listed below:

Background: The temperature and ammonia nitrogen levels are shown in Table 4. The ultimate CBOD and DO levels were assumed to be 8.0 mg/l and 6.0 mg/l, respectively.

Effluent: The temperatures are shown in Table 5. The CBOD5 level used in the modeling is 40 mg/l, which is the technology based maximum limit for standard secondary treatment. The ammonia nitrogen values used in the modeling are the calculated acute waste load allocations shown in Tables 6a – 6c. Both ADW and AWW flows and the ammonia nitrogen allocations associated with them were used in the modeling.

Receiving stream parameters: There is an average water channel slope of 0.000288 (the water channel elevation changes from 820 ft near the outfall to 800 ft over a distance of approximately 13.17 miles, estimated based on the USGS 7.5" topographic map).

USGS gage 05464000, located on the Cedar River at Waterloo, IA, had field measurement data, such as stream flow, cross section area, stream width and velocity. The stream depth is not reported, however, can be derived using the following equation:

Depth = Cross Sectional Area / Width

Regression equations of Ln (Velocity) vs. Ln (Flow) and Ln (Depth) vs. Ln (Flow) were established with acceptable R-squared values. The Width is calculated using the Flow, Velocity, and Depth information.

Ln (Velocity) = 0.3949*Ln (Flow) - 2.1812 R-squared = 0.6993

Ln (Depth) = 0.5341*Ln (Flow) - 3.3972 R-squared = 0.7677

Width = Flow / Velocity / Depth

The gage station is about 3.6 miles upstream of the discharge. Therefore in the absence of other data that could be used to estimate stream width, depth and velocity, it is assumed that the above regression equations are valid at the outfall. The stream width, depth and velocity at 7Q10 and ADW/AWW conditions were estimated using the above regression equations.

Table 7: Stream Width, Depth and Velocity

Flow condition	Flow (cfs)	Width (ft)	Depth (ft)	Velocity (fps)
7Q10 + ADW	323.846	398.9	0.73	1.11
7Q10 + AWW	349.836	401.1	0.76	1.14
8,500 + ADW	8527.846	503.2	4.21	4.03
8,500 + AWW	8553.836	503.3	4.21	4.03

Reaeration: USGS (Channel-control) (Melching and Flores 1999)
The Cedar River is a large channelized river with relatively consistent flow characteristics. The USGS Channel-control model is likely the most suitable reaeration model for this stream for both the low and high flow discharge scenarios.

Discussion and Conclusion:
Outfall 801 (Diffuser):
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment), a minimum DO level of 0.0 mg/l will not cause the DO level in the receiving stream below 5.0 mg/l at any time, however, some of the calculated water quality based ammonia nitrogen limits, as shown in Table 6a, need to be reduced. The final ammonia nitrogen limits are shown in Page 1 of this report. Numerical DO limits are not required.

Outfall 009 (Low Flow Shoreline Discharge):
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment), a minimum DO level of 0.0 mg/l will not cause the DO level in the receiving stream below 5.0 mg/l at any time, however, the calculated water quality based ammonia nitrogen mass limit for July needs to be reduced. The final ammonia nitrogen limits are shown in Page 5 of this report. Numerical DO limits are not required.

Outfall 011 (High Flow Shoreline Discharge):
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment) and ammonia nitrogen levels as shown in Table 6c will not cause the DO level in the receiving stream below 5.0 mg/l at any time. Numerical DO limits are not required.

***E. coli*:** The facility discharges into a Class (A1) water body. The water quality standard for *E. coli* in a Class (A1) water body is a Geometric Mean of 126 org./100 ml and a Sample Maximum of 235 org./100 ml from March 15th through November 15th.

This facility was also assigned limits of a Geometric Mean of 126 org./100 ml and a Sample Maximum of 235 org./100 ml in the Cedar River *E. coli* TMDL.

However, the recent chapter 62 revision that became effective on Oct. 14, 2009 states "…that the daily sample maximum criteria for *E. coli* set forth in Part E of the 'Supporting Document for Iowa Water Quality Management Plans' shall not be used as an end-of-pipe permit limitation." Therefore, only the geometric mean limit of 126 org./100 ml applies to this facility. This limit applies to all outfalls.

Total Nitrogen: In the 2006 Nitrate TMDL for the Cedar River the City of Waterloo was assigned a Total Nitrogen WLA of 505.2 tons/year and 2768 lbs/day. However, the TMDL calculation only considered the discharge flows from one of the two treatment trains. The actual combined plant flows were used to calculate the TMDL WLA for this facility. In addition, the corrected WLA was converted to 30-day average and daily maximum limits based on the procedure in the November 20, 2008 memo "Deriving total nitrogen limits from the WLA in the Cedar River TMDL". The calculations were made as a part of Waterloo's NPDES permit amendment in 2011. A copy of the spreadsheet is attached. The final TMDL based total nitrogen limits for this facility are a 30-day average of 9,285.5 lbs/day and a daily maximum of 15,199.0 lbs/day. These limits apply to all outfalls.

It should be noted that limits were included for various forms of nitrogen in this WLA report. There may be situations where the Total Nitrogen limits based on the Cedar River Nitrate TMDL will control the mass limits for the different forms of nitrogen included in this report.

Chloride and Sulfate: The new chloride and sulfate criteria became effective on Nov. 11, 2009. The default hardness for background and effluent has been changed from 100 mg/l to 200 mg/l, effective on Nov. 11, 2009.

Chloride criteria are functions of hardness and sulfate concentration, shown as follows:

$$\text{Acute criteria} = 287.8*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$
$$\text{Chronic criteria} = 177.87*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$

The criteria apply to all Class B waters.

Sulfate criteria, shown in Table 8, are functions of hardness and chloride concentration.

Table 8: Sulfate Criteria

Hardness (mg/l as CaCO3)	Sulfate Criteria (mg/l)		
	Chloride < 5 mg/l	5 mg/l <= Chloride < 25 mg/l	25 mg/l <= Chloride < 500 mg/l
< 100	500	500	500
100<=H<=500	500	(-57.478+5.79*H+54.163*Cl)*0.65	(1276.7+5.508*H-1.457*Cl)*0.65
H> 500	500	2,000	2,000

The criteria defined in Table 8 serve as both acute and chronic criteria and apply to all Class B waters. The acute criteria apply at the end of the ZID, and the chronic criteria apply at the end of the MZ. The default chloride and sulfate concentration for both background water and effluent are 34 and 63 mg/l, respectively.

Outfall 801 (Diffuser):
In this case, 57% of the 7Q10 flow and 57% of the 1Q10 flow in the Cedar River were used as the MZ and the ZID, respectively.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, 25% of the 7Q10 flow and 2.5% of the 1Q10 flow in the Cedar River were used as the MZ and the ZID, respectively.

Outfall 011 (High Flow Shoreline Discharge):
In this case, 25% of the 8,500 cfs high flow and 2.5% of the 8,500 cfs high flow in the Cedar River were used as the MZ and the ZID, respectively.

Iron: The current iron criteria are defined in the 2005 issue paper entitled "Iron Criteria and Implementation for Iowa's Surface Waters (December 5, 2005)". An iron criterion of 1 mg/l applies at the end of the ZID for designated streams.

Outfall 801 (Diffuser):
In this case, the ZID is 57% of the 1Q10 at the discharging point.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 at the discharging point.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 8,500 cfs high flow at the discharging point.

Benzidine: There are currently no water quality criteria for Benzidine in Iowa. Thus, the protection of the Cedar River is achieved by assuring the WLA does not exceed a value set at ½ 96hrLC50 for critical species in the stream, which is 10 mg/l for the Fathead Minnow.

Outfall 801 (Diffuser):
In this case, the ZID is 57% of the 1Q10 at the discharging point.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 at the discharging point.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 8,500 cfs high flow at the discharging point.

Dibutyl phthalate: There are currently no water quality criteria for Dibutyl phthalate in Iowa. Thus, the protection of the Cedar River is achieved by assuring the WLA does not exceed a value set at ½ 96hrLC50 for critical species in the stream, which is 0.175 mg/l for the Yellow Perch.

Outfall 801 (Diffuser):
In this case, the ZID is 57% of the 1Q10 at the discharging point.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 at the discharging point.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 8,500 cfs high flow at the discharging point.

pH: Iowa Water Quality Standards (IAC 567.61.3.(3).a.(2) and IAC 567.61.3.(3).b.(2)) require that pH in Class A or Class B waters "Shall not be less than 6.5 nor greater than 9.0". The criteria apply at the end of the ZID.

Outfall 801 (Diffuser):
In this case, the ZID is 57% of the 1Q10 at the discharging point.

Outfall 009 (Low Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 1Q10 at the discharging point.

Outfall 011 (High Flow Shoreline Discharge):
In this case, the ZID is 2.5% of the 8,500 cfs high flow at the discharging point.

TDS: Effective Nov. 11, 2009, the site-specific TDS approach is no longer applicable; instead the new chloride and sulfate criteria became applicable. However, the TDS level should be controlled to a level such that the narrative criteria stated in IAC 567.61.3.(2) be fulfilled.

Major Facility Acute WET testing Ratio:
Outfall 801 (Diffuser):
Use 15.3% of effluent and 84.7% of dilution water for the testing. The ratio was calculated using ADW design flow and 57% of 1Q10 as the ZID.

Outfall 009 (Low Flow Shoreline Discharge):
Use 80.5% of effluent and 19.5% of dilution water for the testing. The ratio was calculated using the ADW design flow and 2.5% of 1Q10 as the ZID.

Outfall 011 (High Flow Shoreline Discharge):
Use 11.6% of effluent and 88.4% of dilution water for the testing. The ratio was calculated using the ADW design flow and 2.5% of the 8,500 cfs high flow as the ZID.

5. PERMIT LIMITATIONS: - *Based on the Year 2006 Water Quality Standards & 2002 Permit Derivation Procedure.*

The acute and chronic WLAs are used as the values for input into the current permit derivation procedure. Under the 2002 permit derivation procedure, only for toxic parameters is the monitoring frequency considered in the calculation of final limits. The water quality based limits are shown on Pages 1-12 of this report.

City of Waterloo

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This Package Contains

WASTELOAD ALLOCATION CALCULATIONS & NOTES

Please Do Not Separate

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Diffuser Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
CBOD	Secondary Treatment Levels Will Not Violate WQS				
Ammonia - Nitrogen					
January	61.8	128.2	10004.3	21401.0	--
February	70.3	149.4	11363.0	24412.9	--
March	30.7	108.5	4998.7	18394.5	--
April	21.5	79.8	3519.0	14363.0	--
May	18.0	79.1	2962.7	14162.8	--
June	11.6	78.1	1931.6	13877.8	--
July	14.2	87.4	2283.2	15860.0	--
August	13.0	74.1	2082.2	13652.6	--
September	13.4	94.6	2221.8	16662.2	--
October	30.8	93.5	5020.2	16360.4	--
November	38.7	78.4	6282.3	13970.8	--
December	45.8	93.8	7436.3	16458.9	--
Bacteria	Geomean (#org/100ml)	Sample Max. (#org/100ml)	March 15th – November 15th		
E. coli	126	235			
TDS	If TDS > 7,787 mg/l, an acute WET test is required If TDS > 8,441 mg/l, a chronic WET test is required				
Chloride	If chloride > 8,908 mg/l, an acute WET test is required If chloride > 2,356 mg/l, a chronic WET test is required				
	If no WET tests are done, the following limits apply				
	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	
TDS	7,787	7,787	1,309,146	1,309,146	1/ month
TRC	0.289	0.503	72.876	120.240	7/week
pH	5.8-14				
Temperature	<48.5ºC/119.3ºF				

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) and HH) — Date Done: February 5, 2009

Annual critical low flow in Cedar River at the discharge point
30Q10 flow 338 cfs, 7Q10 flow 296 cfs, 1Q10 flow 270 cfs

Excel Spreadsheet calculations [ ] Qual II E Model [ ] Qual II E Modeling date[ ]

Performed by: Xiaojian Gao Approved By: Connie Dou

If WET tests are required due to high effluent TDS and chloride levels, the following dilution ratios may apply:

For the acute WET test, use 9.3% effluent and 90.7% dilution water
For the chronic WET test, use 8.6% effluent and 91.4% dilution water

All major facilities are required to conduct an annual acute WET test, this is a major facility, use 9.3% effluent and 90.7% dilution water for the acute WET test.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Diffuser Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
1,1,1-Trichloroethane	2.824E+02	2.824E+02	4.609E+04	4.609E+04	1/week
1,1-Dichloroethylene	3.337E+02	5.776E+02	5.109E+04	9.427E+04	1/week
1,2-Dichloroethane	1.739E+01	6.311E+02	2.663E+03	1.030E+05	1/week
1,2-Dichloropropane	7.050E+00	7.050E+00	1.079E+03	1.079E+03	1/week
2,3,7,8-TCDD (Dioxin)	2.397E-09	2.397E-09	3.670E-07	3.670E-07	1/week
3,3-Dichlorobenzidine	1.316E-02	1.316E-02	2.015E+00	2.015E+00	1/week
4,4' DDT	1.163E-05	1.177E-02	1.886E-03	1.920E+00	1/week
Aldrin	2.350E-05	2.350E-05	3.598E-03	3.598E-03	1/week
Aluminum	1.012E+00	8.022E+00	1.641E+02	1.309E+03	1/week
Antimony	7.443E+00	7.443E+00	1.207E+03	1.207E+03	1/week
Arsenic (III)	1.744E+00	3.637E+00	2.829E+02	5.936E+02	1/week
Benzene	2.397E+01	1.765E+02	3.670E+03	2.881E+04	1/week
Benzo(a)Pyrene	8.461E-03	8.461E-03	1.295E+00	1.295E+00	1/week
Bromoform	6.580E+01	6.580E+01	1.007E+04	1.007E+04	1/week
Cadmium	7.103E-03	6.971E-02	1.152E+00	1.138E+01	1/week
Carbon Tetrachloride	7.520E-01	2.305E+02	1.151E+02	3.762E+04	1/week
Chlordane	5.001E-05	2.567E-02	8.110E-03	4.190E+00	1/week
Chlorobenzene	1.861E+01	1.722E+02	3.018E+03	2.811E+04	1/week
Chlorodibromomethane	6.110E+00	6.110E+00	9.355E+02	9.355E+02	1/week
Chloroform	2.209E+02	2.209E+02	3.382E+04	3.382E+04	1/week
Chloropyrifos	4.768E-04	8.878E-04	7.733E-02	1.449E-01	1/week
Chromium (VI)	1.279E-01	1.711E-01	2.075E+01	2.793E+01	1/week
Copper	2.325E-01	3.807E-01	3.825E+01	6.267E+01	1/week
Cyanide	6.048E-02	2.353E-01	9.807E+00	3.841E+01	1/week
Di(2-ethylhexyl)phthalate	1.034E+00	1.034E+00	1.583E+02	1.583E+02	1/week
Dichlorobromomethane	7.991E+00	7.991E+00	1.223E+03	1.223E+03	1/week
Dieldrin	2.538E-05	2.538E-05	3.886E-03	3.886E-03	1/week
Endosulfan	6.513E-04	2.353E-03	1.056E-01	3.841E-01	1/week
Endrin	4.187E-04	9.199E-04	6.790E-02	1.501E-01	1/week
Ethylbenzene	2.442E+01	2.423E+02	3.961E+03	3.954E+04	1/week
gamma-Hexachlorocyclohexane (Lindane)	1.016E-02	1.016E-02	1.659E+00	1.659E+00	1/week
Heptachlor	3.713E-05	5.562E-03	5.685E-03	9.078E-01	1/week
Heptachlor epoxide	1.833E-05	1.833E-05	2.807E-03	2.807E-03	1/week
Hexachlorobenzene	1.363E-04	1.363E-04	2.087E-02	2.087E-02	1/week
Hexachlorocyclopentadiene	1.279E+01	1.279E+01	2.075E+03	2.075E+03	1/week
Lead	1.499E-01	3.538E+00	2.431E+01	5.775E+02	1/week

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Diffuser Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 801	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
Mercury (II)	1.744E-03	1.754E-02	2.829E-01	2.863E+00	1/week
Nickel	1.537E+00	1.271E+01	2.492E+02	2.075E+03	1/week
Nitrate as N	3.423E+03	3.423E+03	5.587E+05	5.587E+05	1/week
Nitrate+Nitrite as N	3.423E+03	3.423E+03	5.587E+05	5.587E+05	1/week
para-Dichlorobenzene	2.210E+00	2.139E+01	3.583E+02	3.492E+03	1/week
Parathion	1.512E-04	6.953E-04	2.452E-02	1.135E-01	1/week
Pentachlorophenol (PCP)	2.126E-01	2.549E-01	3.448E+01	4.161E+01	1/week
Phenols	5.815E-01	2.674E+01	9.430E+01	4.365E+03	1/week
Polychlorinated Biphenyls (PCBs)	3.008E-05	2.139E-02	4.606E-03	3.492E+00	1/week
Polynuclear Aromatic Hydrocarbons (PAHs)	3.489E-04	3.209E-01	5.658E-02	5.237E+01	1/week
Selenium (VI)	5.815E-02	2.064E-01	9.430E+00	3.369E+01	1/week
Silver	4.065E-02	4.065E-02	6.634E+00	6.634E+00	1/week
Tetrachloroethlyene	1.551E+00	1.551E+00	2.375E+02	2.375E+02	1/week
Thallium	5.466E-03	5.466E-03	8.864E-01	8.864E-01	1/week
Toluene	5.815E-01	2.674E+01	9.430E+01	4.365E+03	1/week
Toxaphene	2.326E-05	7.808E-03	3.772E-03	1.274E+00	1/week
trans-1,2-Dichloroethylene	1.628E+00	1.628E+00	2.640E+02	2.640E+02	1/week
Trichloroethylene (TCE)	9.304E-01	4.278E+01	1.509E+02	6.983E+03	1/week
Vinyl Chloride	1.128E+00	1.128E+00	1.727E+02	1.727E+02	1/week
Zinc	3.251E+00	3.251E+00	5.306E+02	5.306E+02	1/week
Iron	1.070E+01	1.070E+01	1.746E+03	1.746E+03	--

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: Waterloo, City of STP – Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd**				
CBOD	Secondary Treatment Levels Will Not Violate WQS				
Ammonia - Nitrogen					
January	18.0	18.0	3625.9	4838.3	--
February	17.6	17.6	4105.5	4627.9	--
March	9.8	17.1	1858.7	4627.2	--
April	6.9	17.6	1336.2	4840.7	--
May	5.9	17.0	1139.8	4686.3	--
June	3.9	16.2	775.8	4461.7	--
July	4.4	19.7	806.1	5428.9	--
August	4.0	18.0	735.1	4986.7	--
September	4.5	18.7	878.3	5117.2	--
October	9.8	17.8	1866.2	4879.7	--
November	12.2	16.5	2311.8	4535.6	--
December	14.4	18.1	2719.2	4958.0	--
Bacteria	Geomean (#org/100ml)	Sample Max. (#org/100ml)	March 15th – November 15th		
E. coli	126	235			
TDS	If TDS > 1,170 mg/l, an acute WET test is required If TDS > 2,860 mg/l, a chronic WET test is required				
Chloride	If chloride > 1,061 mg/l, an acute WET test is required If chloride > 761 mg/l, a chronic WET test is required				
	If no WET tests are done, the following limits apply				
	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	
TDS	1,170	1,170	315,705	315,705	1/ month
TRC	0.230	0.324	63.978	93.275	7/week
pH	6.5-9.4				
Temperature	<36.1ºC/97.0ºF				

Stream Network/Classification of Receiving Stream: Cedar River (A1, B(WW-1) and HH) — Date Done: February 5, 2009

Annual critical low flow in Cedar River at the discharge point
30Q10 flow 338 cfs, 7Q10 flow 296 cfs, 1Q10 flow 270 cfs

Excel Spreadsheet calculations [ ] Qual II E Model [ ] Qual II E Modeling date[ ]

Performed by: Xiaojian Gao Approved By: Connie Dou

If WET tests are required due to high effluent TDS and chloride levels, the following dilution ratios may apply:

For the acute WET test, use 80.5% effluent and 19.5% dilution water
For the chronic WET test, use 27.3% effluent and 72.7% dilution water

All major facilities are required to conduct an annual acute WET test, this is a major facility, use 80.5% effluent and 19.5% dilution water for the acute WET test.

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
1,1,1-Trichloroethane	3.280E+01	3.280E+01	8.623E+03	8.623E+03	1/week
1,1-Dichloroethylene	6.709E+01	6.709E+01	1.432E+04	1.764E+04	1/week
1,2-Dichloroethane	4.625E+00	7.330E+01	7.462E+02	1.927E+04	1/week
1,2-Dichloropropane	1.875E+00	1.875E+00	3.025E+02	3.025E+02	1/week
2,3,7,8-TCDD (Dioxin)	6.375E-10	6.375E-10	1.029E-07	1.029E-07	1/week
3,3-Dichlorobenzidine	3.500E-03	3.500E-03	5.647E-01	5.647E-01	1/week
4,4' DDT	3.657E-06	1.367E-03	6.892E-04	3.593E-01	1/week
Aldrin	6.250E-06	6.250E-06	1.008E-03	1.008E-03	1/week
Aluminum	3.182E-01	9.318E-01	5.996E+01	2.450E+02	1/week
Antimony	2.341E+00	2.341E+00	4.411E+02	4.411E+02	1/week
Arsenic (III)	4.224E-01	4.224E-01	1.008E+02	1.111E+02	1/week
Benzene	6.375E+00	2.050E+01	1.029E+03	5.389E+03	1/week
Benzo(a)Pyrene	2.250E-03	2.250E-03	3.630E-01	3.630E-01	1/week
Bromoform	1.750E+01	1.750E+01	2.823E+03	2.823E+03	1/week
Cadmium	2.234E-03	8.097E-03	4.209E-01	2.129E+00	1/week
Carbon Tetrachloride	2.000E-01	2.677E+01	3.227E+01	7.039E+03	1/week
Chlordane	1.573E-05	2.982E-03	2.963E-03	7.839E-01	1/week
Chlorobenzene	5.852E+00	2.000E+01	1.103E+03	5.259E+03	1/week
Chlorodibromomethane	1.625E+00	1.625E+00	2.622E+02	2.622E+02	1/week
Chloroform	5.875E+01	5.875E+01	9.479E+03	9.479E+03	1/week
Chloropyrifos	1.031E-04	1.031E-04	2.711E-02	2.711E-02	1/week
Chromium (VI)	1.988E-02	1.988E-02	5.226E+00	5.226E+00	1/week
Copper	4.794E-02	4.794E-02	1.272E+01	1.272E+01	1/week
Cyanide	1.902E-02	2.733E-02	3.584E+00	7.186E+00	1/week
Di(2-ethylhexyl)phthalate	2.750E-01	2.750E-01	4.437E+01	4.437E+01	1/week
Dichlorobromomethane	2.125E+00	2.125E+00	3.428E+02	3.428E+02	1/week
Dieldrin	6.750E-06	6.750E-06	1.089E-03	1.089E-03	1/week
Endosulfan	2.048E-04	2.733E-04	3.859E-02	7.186E-02	1/week
Endrin	1.068E-04	1.068E-04	2.481E-02	2.809E-02	1/week
Ethylbenzene	7.681E+00	2.814E+01	1.447E+03	7.398E+03	1/week
gamma-Hexachlorocyclohexane (Lindane)	1.180E-03	1.180E-03	3.103E-01	3.103E-01	1/week
Heptachlor	9.876E-06	6.461E-04	1.593E-03	1.698E-01	1/week
Heptachlor epoxide	4.875E-06	4.875E-06	7.865E-04	7.865E-04	1/week
Hexachlorobenzene	3.625E-05	3.625E-05	5.849E-03	5.849E-03	1/week
Hexachlorocyclopentadiene	4.023E+00	4.023E+00	7.581E+02	7.581E+02	1/week
Lead	4.715E-02	4.110E-01	8.884E+00	1.080E+02	1/week

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS (Cont'd)

Facility Name: Waterloo, City of STP – Shoreline Discharge — Sewage File Number: 6-07-90-0-01

Parameters	Ave. Conc. (mg/l)	Max Conc. (mg/l)	Ave. Mass (lbs/d)	Max Mass (lbs/d)	Sampling Frequency
Outfall No. 009	**ADW =18.0 mgd AWW =34.8 mgd**				
Toxics					
Mercury (II)	5.486E-04	2.038E-03	1.034E-01	5.357E-01	1/week
Nickel	4.833E-01	1.477E+00	9.106E+01	3.882E+02	1/week
Nitrate as N	3.976E+02	3.976E+02	1.045E+05	1.045E+05	1/week
Nitrate+Nitrite as N	3.976E+02	3.976E+02	1.045E+05	1.045E+05	1/week
para-Dichlorobenzene	6.949E-01	2.485E+00	1.309E+02	6.532E+02	1/week
Parathion	4.755E-05	8.076E-05	8.959E-03	2.123E-02	1/week
Pentachlorophenol (PCP)	2.961E-02	2.961E-02	7.784E+00	7.784E+00	1/week
Phenols	1.829E-01	3.106E+00	3.446E+01	8.166E+02	1/week
Polychlorinated Biphenyls (PCBs)	8.000E-06	2.485E-03	1.291E-03	6.532E-01	1/week
Polynuclear Aromatic Hydrocarbons (PAHs)	1.097E-04	3.727E-02	2.068E-02	9.799E+00	1/week
Selenium (VI)	1.829E-02	2.398E-02	3.446E+00	6.304E+00	1/week
Silver	4.721E-03	4.721E-03	1.241E+00	1.241E+00	1/week
Tetrachloroethlyene	4.125E-01	4.125E-01	6.655E+01	6.655E+01	1/week
Thallium	1.719E-03	1.719E-03	3.239E-01	3.239E-01	1/week
Toluene	1.829E-01	3.106E+00	3.446E+01	8.166E+02	1/week
Toxaphene	7.315E-06	9.070E-04	1.378E-03	2.384E-01	1/week
trans-1,2-Dichloroethylene	5.120E-01	5.120E-01	9.648E+01	9.648E+01	1/week
Trichloroethylene (TCE)	2.926E-01	4.970E+00	5.513E+01	1.306E+03	1/week
Vinyl Chloride	3.000E-01	3.000E-01	4.840E+01	4.840E+01	1/week
Zinc	3.776E-01	3.776E-01	9.927E+01	9.927E+01	1/week
Iron	1.242E+00	1.242E+00	3.266E+02	3.266E+02	--

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By Xiaoian Gao

WLA/permit limits for the City of Waterloo's Mechanical Wastewater Treatment Facility

These wasteload allocations and water quality based permit limitations are for the City of Waterloo's mechanical wastewater treatment facility. The wasteload allocations/permit limits are based on the Year 2006 revised Water Quality Standards, the 2002 Permit Derivation Procedure, the 2000 ammonia criteria and the 2007 chemical criteria. The TDS wasteload allocation/permit limits are based on the site-specific approach that became effective on June 16, 2004.

1. BACKGROUND: The facility has two outfalls. Outfall 801 is equipped with a diffuser and discharges the Cedar River. Outfall 009 is a shoreline discharge outfall, which also discharges to the Cedar River. Outfall 009 is designed to be a backup outfall. It is used only when outfall 801 is offline. Per request, WLA for both outfalls are calculated, based on the assumption that the two outfalls are never operated simultaneously.

Based on the Year 2006 revised water quality standards, Cedar River is a A1, B(WW-1) and HH stream unless a field Use Attainability Assessment proves the A1 designation otherwise. The annual critical low flows in Cedar River at the discharge points were estimated based on the Drainage Area Ratio method and flow statistic data obtained at USGS gage station 05464000, located on Cedar River at Waterloo, Iowa. The gage statistic data are based on the daily monitoring data from Oct. 1, 1940 to Sep. 30, 2005.

Table 1: Annual Critical Low Flows

Location	Drainage Area (squaremile)	Harmonic Mean (cfs)	Annual critical low flows (cfs)		
			1Q10	7Q10	30Q10
USGS Gage (05464000)	5,146	1,277[$]	269[$]	295[$]	337[$]
Outfalls	5,163	1,281[@]	270[@]	296[@]	338[@]

[$]: USGS gage station statistic data
[@]: Estimated based on drainage area ratio method

2. TOTAL MAXIMUM DAILY LOAD (TMDL) LIMITATIONS: Please note that the results presented in this report are wasteload allocations based on meeting the State's current water quality standards in the receiving waterbody. Additional effluent limits may be applicable to this discharge based on approved TMDLs for impaired waterbodies, which may provide watershed based wasteload allocations. Information on impaired streams in Iowa and approved TMDLs can be found at the following website: http://www.iowadnr.gov/water/watershed/pubs.html#final.

3. CALCULATIONS: The wasteload allocations / permit limits for the outfalls were calculated based on the facility's Average Dry Weather (ADW) design flow of 18.0 mgd and its Average Wet Weather (AWW) design flow of 34.8 mgd.

The water quality based permit concentration limits are derived using the allowed stream flow and the ADW design flow, while loading limits are derived using the allowed stream flow and the AWW design flow.

The Mixing Zone (MZ) and Zone of Initial Dilution (ZID) for the pollutants concerned for the two outfalls are summarized in Table 2.

Table 2: MZ and ZID

Outfall	Pollutants	ZID*	MZ*
801	TDS, Chloride, Toxics, Iron[$], pH[$], Temp[@].	100% of 1Q10	100% of 7Q10
	Ammonia - N	100% of 1Q10	100% of 30Q10
	Carcinogenic with HH criteria or MCL	100% of 1Q10	100% of Harmonic Mean
009	TDS, Chloride, Toxics, Iron[$], pH[$], Temp[@].	2.5% of 1Q10	25% of 7Q10
	Ammonia - N	2.5% of 1Q10	25% of 30Q10
	Carcinogenic with HH criteria or MCL	2.5% of 1Q10	25% of Harmonic Mean

* The ZID and MZ apply to both the concentration limits calculations and loading limits calculations

[$] pH and iron limits calculation only needs ZID

[@] Temperature limits calculation only needs MZ

Toxics and TRC: The Toxics wasteload allocations will consider the procedures included in the 2000 revised WQS and the 2007 chemical criteria. The 1Q10 flow in the receiving stream is associated with the calculation of the acute limits and the 7Q10 flow is associated with the calculation of the chronic limits for non-carcinogenic pollutants. The ZID and MZ are shown in Table 2.

For carcinogenic toxics, the chronic limits calculation will have to considered the criteria for the protection of the B(WW-1) designation and the criteria for the protection of the HH designation. The calculation of the B(WW-1) chronic protection limits is associated with 7Q10, and the calculation of the HH chronic protection limits is associated with harmonic mean flow. The MZs used are shown in Table 2. The more stringent of the two sets of limits will serve as the final chronic limits.

Ammonia: Standard stream background temperatures, pH's, and concentrations of NH3-N were mixed with the discharge from the facility's effluent pH and temperature values to calculate the applicable instream WQS criteria for the protection of the Cedar River. The Cedar River is a B(WW-1) stream, therefore, early life protection will begin in March and run though September.

The monthly background temperatures, pH, and NH3-N concentrations shown in Table 3 were used for the wasteload allocation/permit limits calculations based on the Year 2000 ammonia criteria. Table 4 shows the statewide monthly effluent pH and temperature values for mechanical facilities.

Table 3: Background Temperature, pH and NH3-N Concentrations
For Use with Year 2000 Ammonia Criteria

Months	pH	Temperature (°C)	NH_3-N (mg/l)
Jan.	7.8	0.6	0.5
Feb.	7.7	1.2	0.5
March	7.9	4.3	0.5
April	8.1	11.7	0.5
May	8.1	16.6	0.5
June	8.1	21.4	0.5
July	8.1	24.8	0.0
August	8.2	23.8	0.0
Sept.	8	22.2	0.5
October	8	12.3	0.5
November	8.1	6	0.5
December	8	1.6	0.5

Table 4: Standard Effluent pH & Temperature Values for Mechanical Facilities

Months	pH	Temperature (°C)
Jan.	7.67	12.4
Feb.	7.71	11.3
March	7.69	13.1
April	7.65	16.2
May	7.67	19.3
June	7.7	22.1
July	7.58	24.1
August	7.63	24.4
Sept.	7.62	22.8
October	7.65	20.2
November	7.69	17.1
December	7.64	14.1

CBOD5/Total Dissolved Oxygen:

Results of a screening model using a CBOD5 assimilative capacity of 20 lbs/day/cfs and 7Q10 in the receiving stream as the flow available to assimilate CBOD5 show that to comply with the water quality standards for CBOD5 and DO, the allowed effluent CBOD5 limits is significantly greater than 40 mg/l, which is a level that can be easily achieved by the secondary treatment this facility provides.

***E. coli*:** The facility discharges into a Class (A1) water body. The water quality standard for *E. coli* in a Class (A1) water body is a Geometric Mean of 126 org./100 ml and a Sample Maximum of 235 org./100 ml from March 15th through November 15th.

Temperature: Iowa Water Quality Standards (IAC567.61.3.(3).b.(5).(1)) requires that (for Class B waters) "No heat shall be added to interior streams or the Big Sioux River that would cause an increase of more than 3ºC. The rate of temperature change shall not exceed 1ºC per hour. In no case shall heat be added in excess of that amount that would raise the stream temperature above 32ºC". Currently, only the "In no case shall heat be added in excess of that amount that would raise the stream temperature above 32ºC" is enforced. The criterion applies at the end of the MZ.

pH: Iowa Water Quality Standards (IAC 567.61.3.(3).a.(2) and IAC 567.61.3.(3).b.(2)) require that pH in Class A or Class B waters "Shall not be less than 6.5 nor greater than 9.0". The criteria apply at the end of the ZID.

Iron: The current iron criteria are defined in the 2005 issue paper entitled "Iron Criteria and Implementation for Iowa's Surface Waters (December 5, 2005)". An iron criterion of 1 mg/l applies at the end of the ZID for both general use and designated streams.

TDS:
The new site-specific TDS standard was adopted on June 16, 2004. The site-specific TDS approach would first consider a guideline value of 1,000 mg/l as a threshold in-stream level at which negative impacts to the uses of the receiving stream may begin to occur. Sources of TDS potentially elevating a receiving stream above 1,000 mg/l (TDS) would be required, upon application for a discharge permit or permit renewal, to clearly demonstrate that their discharge will not result in toxicity to the receiving stream. The guideline value applies to both the Zone of Initial Dilution (ZID) and the Mixing Zone (MZ)

for designated streams. The ZID and the MZ for the two outfalls are shown in Table 2. The background TDS concentration is assumed as 300 mg/l.

Chloride:
Chloride is a constituent of TDS. At higher levels, chloride could cause toxicity to aquatic life. Thus, the WLA_{acute} and $WLA_{chronic}$ are calculated to evaluate the potential negative impacts. The acute and chronic threshold values for chloride for aquatic life protection are 860 mg/l and 230 mg/l, respectively. Since the receiving stream, Cedar River, is a designated stream, it is afforded protection against both acutely and chronically toxic conditions. The ZID and the MZ for the two outfalls are shown in Table 2. The background chloride concentration is assumed as 30 mg/l.

4. PERMIT LIMITATIONS: - *Based on the Year 2006 Water Quality Standards & 2002 Permit Derivation Procedure.*

The acute and chronic WLAs are used as the values for input into the current permit derivation procedure. Under the 2002 permit derivation procedure, only for toxic parameters is the monitoring frequency considered in the calculation of final limits. See Page 1-6 for the limits.

5. WET TEST RATIOS:

If WET tests are required due to high effluent TDS and chloride levels, the dilutions shown in Table 5 are allowed for a pass/fail test. However, the department prefers that the facility conduct the WET test with 100% effluent and the test be done at a series of different dilutions according to EPA guidance. The NOAEC and the LC50 for the acute test and the NOAEC and IC25 for the chronic test should be reported.

Table 5: Wet Test Dilution Ratio

Outfall	WET test	Effluent (%)	Dilution Water (%)
801	Acute	9.3	90.7
	Chronic	8.6	91.4
009	Acute	80.5	19.5
	Chronic	27.3	72.7

All major facilities are required to conduct an annual acute WET test. The dilution ratios for the acute WET tests shown in Table 5 are applicable to the annual test.

Waterloo - Outfall 801								
Pollutant	**avg. conc**	**limit**	**part B - max**	**MDL**	**Part B above limit?**	**RP?**	**MDL above limit?**	**Other Names / Notes**
1,1,1-Trichloroethane	5.048E+00	5.04800		0.001	No	No	No	
1,1,2-Trichloroethane	4.107E-01	0.41070		0.001	No	No	No	
1,1-Dichloroethylene	2.259E+01	22.59000		0.002	No	No	No	1,1-dichloroethene
1,2,4-Trichlorobenzene	1.767E+00	1.76700		0.101	No	No	No	
1,2-Dichloroethane	2.601E-01	0.26010		0.001	No	No	No	
1,2-Dichloropropane	3.422E-01	0.34220		0.001	No	No	No	
2,3,7,8-TCDD (Dioxin)	2.247E-09	0.00000			No	No	No	NOT ON PART B
2,4,5-TP (Silvex)	2.524E-01	0.25240			No	No	No	NOT ON PART B
2,4-D	2.522E+00	2.52200			No	No	No	NOT ON PART B
3,3-Dichlorobenzidine	1.234E-02	0.01234		0.00198	No	No	No	[1,1'-Biphenyl]-4,4'-diamine,3,3'-dichloro
4,4' DDT	1.243E-05	0.00001			No	No	No	NOT ON PART B
Alachlor	4.927E-02	0.04927			No	No	No	NOT ON PART B
Aldrin	2.203E-05	0.00002			No	No	No	NOT ON PART B
Aluminum	1.082E+00	1.08200			No	No	No	NOT ON PART B
Antimony	1.413E-01	0.14130		0.001	No	No	No	
Arsenic (III)	1.232E-02	0.01232		0.002	No	No	No	
Asbestos	1.767E-01	0.17670			No	No	No	NOT ON PART B
Atrazine	7.344E-02	0.07344			No	No	No	NOT ON PART B
Barium	2.296E+01	22.96000			No	No	No	NOT ON PART B
Benzene	1.506E+00	1.50600		0.5	No	No	No	
Benzidine	3.355E+00	3.35500		0.202	No	No	No	
Benzo(a)Pyrene	2.601E-03	0.00260		0.00158	No	No	No	
Beryllium	1.010E-01	0.10100		0.001	No	No	No	
Bis(2-ethylhexyl)phthalate	8.213E-01	0.82130		0.101	No	No	No	bis(2-ethylhexyl) benzene-1,2-dicarboxylate
Bromoform	2.943E+00	2.94300		0.005	No	No	No	
Cadmium	5.623E-03	0.00562		0.0001	No	No	No	
Carbofuran	1.010E+00	1.01000			No	No	No	NOT ON PART B
Carbon Tetrachloride	1.574E-01	0.15740		0.002	No	No	No	tetrachloromethane
Chlordane	5.346E-05	0.00005			No	No	No	NOT ON PART B
Chlorobenzene	2.524E+00	2.52400		0.001	No	No	No	
Chlorodibromomethane	2.738E-01	0.27380		0.005	No	No	No	dibromochloromethane
Chloroform	3.901E+00	3.90100		0.003	No	No	No	
Chloropyrifos	5.098E-04	0.00051			No	No	No	NOT ON PART B
Chromium (VI)	1.368E-01	0.13680		0.005	No	No	No	

cis-1,2-Dichloroethylene	1.767E+00	1.76700			No	No	No	NOT ON PART B
Copper	2.097E-01	0.20970	0.0153		No	No	No	
Cyanide	6.465E-02	0.06465		0.01	No	No	No	
Dalapon	5.048E+00	5.04800			No	No	No	NOT ON PART B
Di(2-ethylhexyl)adipate	1.010E+01	10.10000			No	No	No	NOT ON PART B
Dibutyl phthalate	5.048E-03	0.00505		0.00116	No	No	No	plasticizer
Dichlorobromopropane	1.957E+00	1.95700			No	No	No	NOT ON PART B
Dichlorobromomethane	3.764E-01	0.37640		0.001	No	No	No	bromodichloromethane
Dichloromethane	1.262E-01	0.12620		0.005	No	No	No	Methylene Chloride
Dieldrin	2.380E-05	0.00002			No	No	No	NOT ON PART B
Dinoseb	1.767E-01	0.17670			No	No	No	NOT ON PART B
Diquat	5.048E-01	0.50480			No	No	No	NOT ON PART B
Endosulfan	6.963E-04	0.00070			No	No	No	NOT ON PART B
Endothall	2.524E+00	2.52400			No	No	No	NOT ON PART B
Endrin	4.476E-04	0.00045			No	No	No	NOT ON PART B
Ethylbenzene	1.338E+01	13.38000		0.001	No	No	No	
Ethylene dibromide	1.262E-03	0.00126			No	No	No	NOT ON PART B
Flouride	8.779E+01	87.79000			No	No	No	NOT ON PART B
gamma-Hexachlorocyclohexane (Lindane)	1.063E-02	0.01063			No	No	No	NOT ON PART B
Glyphosate	1.767E+01	17.67000			No	No	No	NOT ON PART B
Heptachlor	3.481E-05	0.00003			No	No	No	NOT ON PART B
Heptachlor epoxide	1.719E-05	0.00002			No	No	No	NOT ON PART B
Hexachlorobenzene	1.278E-04	0.00013		0.00147	No	No	Yes	
Hexachlorocyclopentadiene	1.010E+00	1.01000		0.101	No	No	No	1,2,3,4,5,6-hexachlorobenzene
Lead	1.118E+01	11.18000	0.000589		No	No	No	
Iron	9.565E-02	0.09565			No	No	No	NOT ON PART B
Mercury (II)	1.262E-03	0.00126	2.03E-06		No	No	No	
Methoxychlor	2.524E+00	2.52400			No	No	No	NOT ON PART B
Nickel	1.166E+00	1.16600		0.005	No	No	No	
Nitrate as N	2.524E+02	252.40000			No	No	No	NOT ON PART B
Nitrate+Nitrite as N	2.524E+02	252.40000			No	No	No	NOT ON PART B
Nitrite as N	2.524E+01	25.24000			No	No	No	NOT ON PART B
o-Dichlorobenzene	1.514E+01	15.14000		0.101	No	No	No	NOT ON PART B
Oxamyl (Vydate)	5.048E+00	5.04800			No	No	No	NOT ON PART B
para-Dichlorobenzene	1.590E+00	1.59000		0.101	No	No	No	1,4-Dichlorobenzene
Parathion	1.616E-04	0.00016			No	No	No	NOT ON PART B
Pentachlorophenol (PCP)	1.848E-01	0.18480		0.101	No	No	No	2,3,4,5,6-pentachlorophenol
Phenols	6.217E-01	0.62170		0.101	No	No	No	

Picloram	1.262E+01	12.62000			No	No	No	NOT ON PART B
Polychlorinated Biphenyls (PCBs)	2.820E-05	0.00003			No	No	No	NOT ON PART B
Polynuclear Aromatic Hydrocarbons (PAHs)	3.73E-04	0.00003			No	No	No	multiple pollutants make up this group
Selenium	6.217E-02	0.06217		0.005	No	No	No	
Silver	4.250E-02	0.04250	0.001		No	No	No	
Simazine	1.010E-01	0.10100			No	No	No	NOT ON PART B
Styrene	2.524E+00	2.52400			No	No	No	NOT ON PART B
Tetrachloroethylene	4.723E-01	0.47230		0.001	No	No	No	1,1,2,2-tetrachloroethene
Thallium	6.058E-03	0.00606		0.001	No	No	No	
Toluene	6.217E-01	0.62170		0.001	No	No	No	
Toxaphene	2.487E-05	0.00002			No	No	No	NOT ON PART B
trans-1,2-Dichloroethylene	2.388E+00	2.38800		0.001	No	No	No	(E)-1,2-dichloroethene
Trichloroethylene (TCE)	9.947E-01	0.99470		0.001	No	No	No	1,1,2-trichloroethene
Trihalomethanes (total)	2.019E+00	2.01900			No	No	No	NOT ON PART B
Vinyl Chloride	1.711E-02	0.01711		0.001	No	No	No	chloroethene
Xylenes (total)	2.524E+02	252.40000			No	No	No	NOT ON PART B
Zinc	2.411E+00	2.41100	0.0689		No	No	No	

Waterloo - Outfall 011								
Pollutant	**avg. conc**	**limit**	**part B - max**	**MDL**	**Part B above limit?**	**RP?**	**MDL above limit?**	**Other Names / Notes**
1,1,1-Trichloroethane	6.125E+01	61.25000		0.001	No	No	No	
1,1,2-Trichloroethane	1.838E+00	1.83800		0.001	No	No	No	
1,1-Dichloroethylene	1.011E+02	101.10000		0.002	No	No	No	1,1-dichloroethene
1,2,4-Trichlorobenzene	2.144E+01	21.44000		0.101	No	No	No	
1,2-Dichloroethane	1.164E+00	1.16400		0.001	No	No	No	
1,2-Dichloropropane	1.531E+00	1.53100		0.001	No	No	No	
2,3,7,8-TCDD (Dioxin)	2.970E-09	0.00000			No	No	No	NOT ON PART B
2,4,5-TP (Silvex)	3.063E+00	3.06300			No	No	No	NOT ON PART B
2,4-D	3.060E+01	30.60000			No	No	No	NOT ON PART B
3,3-Dichlorobenzidine	1.631E-02	0.01631		0.00198	No	No	No	[1,1'-Biphenyl]-4,4'-diamine,3,3'-dichloro
4,4' DDT	7.731E-05	0.00008			No	No	No	NOT ON PART B
Alachlor	5.972E-01	0.59720			No	No	No	NOT ON PART B
Aldrin	2.912E-05	0.00003			No	No	No	NOT ON PART B
Aluminum	6.473E+00	6.47300			No	No	No	NOT ON PART B
Antimony	1.715E+00	1.71500		0.001	No	No	No	
Arsenic (III)	5.513E-02	0.05513		0.002	No	No	No	
Asbestos	2.144E+00	2.14400			No	No	No	NOT ON PART B
Atrazine	8.901E-01	0.89010			No	No	No	NOT ON PART B
Barium	2.776E+02	277.60000			No	No	No	NOT ON PART B
Benzene	6.738E+00	6.73800		0.5	No	No	No	
Benzidine	2.589E+00	2.58900		0.202	No	No	No	
Benzo(a)Pyrene	1.048E-02	0.01048		0.00158	No	No	No	
Beryllium	1.225E+00	1.22500		0.001	No	No	No	
Bis(2-ethylhexyl)phthalate	1.281E+00	1.28100		0.101	No	No	No	bis(2-ethylhexyl) benzene-1,2-dicarboxylate
Bromoform	1.317E+01	13.17000		0.005	No	No	No	
Cadmium	3.497E-02	0.03497		0.0001	No	No	No	
Carbofuran	1.225E+01	12.25000			No	No	No	NOT ON PART B
Carbon Tetrachloride	7.044E-01	0.70440		0.002	No	No	No	tetrachloromethane
Chlordane	3.324E-04	0.00033			No	No	No	NOT ON PART B

Chlorobenzene	3.063E+01	30.63000		0.001	No	No	No	
Chlorodibromomethane	1.225E+00	1.22500		0.005	No	No	No	dibromochloromethane
Chloroform	1.746E+01	17.46000		0.003	No	No	No	
Chloropyrifos	7.164E-04	0.00072			No	No	No	NOT ON PART B
Chromium (VI)	1.381E-01	0.13810		0.005	No	No	No	
cis-1,2-Dichloroethylene	2.144E+01	21.44000			No	No	No	NOT ON PART B
Copper	2.322E-01	0.23220	0.0153		No	No	No	
Cyanide	1.899E-01	0.18990		0.01	No	No	No	
Dalapon	6.125E+01	61.25000			No	No	No	NOT ON PART B
Di(2-ethylhexyl)adipate	1.225E+02	122.50000			No	No	No	NOT ON PART B
Dibutyl phthalate	6.125E-02	0.06125		0.00116	No	No	No	plasticizer
Dichlorobromopropane	1.510E+00	1.51000			No	No	No	NOT ON PART B
Dichlorobromomethane	1.684E+00	1.68400		0.001	No	No	No	bromodichloromethane
Dichloromethane	1.531E+00	1.53100		0.005	No	No	No	Methylene Chloride
Dieldrin	3.145E-05	0.00003			No	No	No	NOT ON PART B
Dinoseb	2.144E+00	2.14400			No	No	No	NOT ON PART B
Diquat	6.125E+00	6.12500			No	No	No	NOT ON PART B
Endosulfan	1.899E-03	0.00190			No	No	No	NOT ON PART B
Endothall	3.063E+01	30.63000			No	No	No	NOT ON PART B
Endrin	7.423E-04	0.00074			No	No	No	NOT ON PART B
Ethylbenzene	1.223E+02	122.30000		0.001	No	No	No	
Ethylene dibromide	1.531E-02	0.01531			No	No	No	NOT ON PART B
Flouride	6.781E+01	67.81000			No	No	No	NOT ON PART B
gamma-Hexachlorocyclohexane (Lindane)	8.200E-03	0.00820			No	No	No	NOT ON PART B
Glyphosate	2.144E+02	214.40000			No	No	No	NOT ON PART B
Heptachlor	4.601E-05	0.00005			No	No	No	NOT ON PART B
Heptachlor epoxide	2.271E-05	0.00002			No	No	No	NOT ON PART B
Hexachlorobenzene	1.689E-04	0.00017		0.00147	No	No	Yes	
Hexachlorocyclopentadiene	1.225E+01	12.25000		0.101	No	No	No	1,2,3,4,5,6-hexachlorobenzene
Lead	8.631E+00	8.63100	0.000589		No	No	No	
Iron	5.948E-01	0.59480			No	No	No	NOT ON PART B
Mercury (II)	8.735E-03	0.00874	2.03E-06		No	No	No	
Methoxychlor	3.063E+01	30.63000			No	No	No	NOT ON PART B

Nickel	7.249E+00	7.24900		0.005	No	No	No	
Nitrate as N	2.762E+03	2762.00000			No	No	No	NOT ON PART B
Nitrate+Nitrite as N	2.762E+03	2762.00000			No	No	No	NOT ON PART B
Nitrite as N	3.063E+02	306.30000			No	No	No	NOT ON PART B
o-Dichlorobenzene	1.838E+02	183.80000		0.101	No	No	No	NOT ON PART B
Oxamyl (Vydate)	6.125E+01	61.25000			No	No	No	NOT ON PART B
para-Dichlorobenzene	1.106E+01	11.06000		0.101	No	No	No	1,4-Dichlorobenzene
Parathion	5.610E-04	0.00056			No	No	No	NOT ON PART B
Pentachlorophenol (PCP)	2.515E-01	0.25150		0.101	No	No	No	2,3,4,5,6-pentachlorophenol
Phenols	3.866E+00	3.86600		0.101	No	No	No	
Picloram	1.531E+02	153.10000			No	No	No	NOT ON PART B
Polychlorinated Biphenyls (PCBs)	3.727E-05	0.00004			No	No	No	NOT ON PART B
Polynuclear Aromatic Hydrocarbons (PAHs)	2.319E-03	0.00232			No	No	No	multiple pollutants make up this group
Selenium	1.666E-01	0.16660		0.005	No	No	No	
Silver	3.280E-02	0.03280	0.001		No	No	No	
Simazine	1.225E+00	1.22500			No	No	No	NOT ON PART B
Styrene	3.063E+01	30.63000			No	No	No	NOT ON PART B
Tetrachloroethylene	1.922E+00	1.92200		0.001	No	No	No	1,1,2,2-tetrachloroethene
Thallium	2.737E-02	0.02737		0.001	No	No	No	
Toluene	3.866E+00	3.86600		0.001	No	No	No	
Toxaphene	1.546E-04	0.00015			No	No	No	NOT ON PART B
trans-1,2-Dichloroethylene	8.153E+00	8.15300		0.001	No	No	No	(E)-1,2-dichloroethene
Trichloroethylene (TCE)	6.185E+00	6.18500		0.001	No	No	No	1,1,2-trichloroethene
Trihalomethanes (total)	2.450E+01	24.50000			No	No	No	NOT ON PART B
Vinyl Chloride	7.656E-02	0.07656		0.001	No	No	No	chloroethene
Xylenes (total)	3.063E+03	3063.00000			No	No	No	NOT ON PART B
Zinc	1.861E+00	1.86100	0.0689		No	No	No	

FACILITY NAME: **Waterloo 801**

WLA Date: December 7, 2020				
Ammonia-Nitrogen				
	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
January	55.9	95	9364	16,561
February	70	116.5	11372	19,558
March	102.3	127.9	15953	21,421
April	97.3	189.5	15339	31,005
May	102.9	222.1	16008	35,738
June	65.6	187.6	10258	30,397
July	35.9	148.9	5812	25,229
August	23.7	115.8	3924	19,957
September	25.7	94.8	4344	16,916
October	34.7	96.4	5820	16,990
November	56.9	91.8	9298	16,095
December	52.3	72.7	8998	13,467
E. coli				
Chloride				
Sulfate				
TRC**				
pH				
Common Metals and Cyanide				
Cadmium				
Chromium (VI)				
Copper				
Cyanide				
Lead				
Nickel				
Silver				
Zinc				

WLA Date: February 5, 2009 (2010 Permit Limits)				
Ammonia-Nitrogen				
	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
January	61.8	128.2		
February	70.3	149.4		
March	30.7	108.5	4998.7	
April	21.5	79.8	3519	14363
May	18	79.1	2962.7	14162.8
June	11.6	78.1	1931.6	13877.8
July	14.2	87.4	2283.2	
August	13	74.1	2082.2	13652.6
September	13.4	94.6	2221.8	
October	30.8	93.5	5020.2	
November	38.7	78.4	6282.3	13970.8
December	45.8	93.8		
E. coli				
Chloride				
Sulfate				
TRC**				
pH				
Common Metals and Cyanide				
Cadmium				
Chromium (VI)				
Copper				
Cyanide				
Lead				
Nickel				
Silver				
Zinc				

					FACILITY NAME:	Waterloo 011			
WLA Date: December 7, 2020					WLA Date: May 25, 2015				
Ammonia-Nitrogen					**Ammonia-Nitrogen**				
	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)		Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
January	69.4	69.4	12696	12,696.00	January	104.2	104.2	17791	17791
February	78.4	78.4	13832	13,832.00	February	120.6	120.6	20091	20091
March	68	68	12392	12,392.00	March	88.6	88.6	15404	15404
April	53.9	53.9	10546	10,546.00	April	66.5	66.5	12343	12343
May	60.5	60.5	11394	11,394.00	May	65.8	65.8	12146	12146
June	59.5	59.5	11114	11,114.00	June	64.8	64.8	10079	11864
July	64.1	64.1	11575	12,395.00	July	73	73	12696	13673
August	62	62	10982	11,823.00	August	62.2	62.2	11578	11846
September	55.2	55.2	10890	10,890.00	September	76.5	78.2	11693	14193
October	54	54	10558	10,558.00	October	77.1	77.1	13895	13895
November	52.5	52.5	10145	10,145.00	November	65.1	65.1	11956	11956
December	54.3	54.3	10655	10,655.00	December	77.5	77.5	13992	13992
E. coli					*E. coli*				
Chloride					Chloride				
Sulfate					Sulfate				
TRC**					TRC**				
pH					pH				
Common Metals and Cyanide					**Common Metals and Cyanide**				
Cadmium					Cadmium				
Chromium (VI)					Chromium (VI)				
Copper					Copper				
Cyanide					Cyanide				
Lead					Lead				
Nickel					Nickel				
Silver					Silver				
Zinc					Zinc				

Facility: WATERLOO CITY OF STP

Permitted Facility: WATERLOO CITY OF STP **Permit Status:** ACTIVE

NPDES Number:: 0790001 **SIU:** 0 **Issuance:** 04/01/2016 **Expiration:** 03/31/2021

Outfall: 801 **Monitoring Location:** EFFLUENT AFTER DISINFECTION

Parameter: AMMONIA NITROGEN (N)

Mon Period

End Date	No Discharge	Avg	Max	7Day	Min
12/31/2020		0.70839	3.58000	1.28714	
11/30/2020	NO DETECTION	0.00000			
10/31/2020	NO DETECTION	0.00000			
09/30/2020		0.06533	1.96000	0.28000	
08/31/2020		0.70806	8.62000	2.18286	
07/31/2020		0.06871	1.12000	0.16000	
06/30/2020	NO DETECTION	0.00000			
05/31/2020	NO DETECTION	0.00000			
04/30/2020	NO DETECTION	0.00000			
03/31/2020		0.50909	2.63000	0.65333	
02/29/2020		0.35000	9.80000	1.40000	
01/31/2020		0.05774	1.79000	0.25571	
12/31/2019		0.93581	20.22000	2.88857	
11/30/2019	NO DETECTION	0.00000			
10/31/2019	NO DETECTION	0.00000			
09/30/2019		1.59192	13.50000	4.90600	
08/31/2019		0.72065	12.60000	3.01571	
07/31/2019	NO DETECTION	0.00000			
06/30/2019	NO DETECTION	0.00000			
05/31/2019		0.34357	3.02000	0.68714	
04/30/2019	NO DETECTION	0.00000			
03/31/2019		3.42429	13.37000	5.04429	
02/28/2019		3.15333	16.86000	5.32143	
01/31/2019		0.28452	2.38000	0.61571	
12/31/2018		0.26074	3.08000	0.44000	
11/30/2018		0.08033	1.40000	0.20000	
10/31/2018	NO DETECTION	0.00000			
09/30/2018	NO DETECTION	0.00000			
08/31/2018		0.07935	2.46000		

Facility: WATERLOO CITY OF STP

Permitted Facility: WATERLOO CITY OF STP **Permit Status:** ACTIVE

NPDES Number:: 0790001 **SIU:** 0 **Issuance:** 04/01/2016 **Expiration:** 03/31/2021

Outfall: 801 **Monitoring Location:** EFFLUENT AFTER DISINFECTION

Parameter: AMMONIA NITROGEN (N)

Mon Period

End Date	No Discharge	Avg	Max	7Day	Min
07/31/2018	NO DETECTION	0.00000			
06/30/2018	NO DETECTION	0.00000			
05/31/2018		3.19533	27.66000	23.96500	
04/30/2018		6.62786	11.40000	6.75143	
03/31/2018		12.71826	40.74000	31.50000	
02/28/2018		27.67643	44.38000	31.12000	
01/31/2018		7.59968	18.37000	12.28857	
12/31/2017		0.05419	1.68000	0.24000	
11/30/2017	NO DETECTION	0.00000			
10/31/2017		0.80000	15.80000	4.00000	
09/30/2017	NO DETECTION	0.00000			
08/31/2017		4.36000	31.86000	15.94286	
07/31/2017		4.61032	32.09000	8.48857	
06/30/2017		0.10833	3.25000	0.46429	
05/31/2017		2.82680	10.08000	4.03286	
04/30/2017		3.81040	13.33000	9.35333	
03/31/2017		4.88000	11.62000	6.62667	
02/28/2017		29.75111	52.10000	37.28667	
01/31/2017		35.22643	46.20000	40.50667	
12/31/2016		31.12385	45.92000	37.52000	
11/30/2016		11.52923	33.60000	26.74000	
10/31/2016	NO DETECTION	0.00000			
09/30/2016		0.47500	1.90000	0.63333	
08/31/2016		0.44818	1.80000	1.12000	
07/31/2016	NO DETECTION	0.00000			
06/30/2016		2.37125	10.47000	5.65000	
05/31/2016		2.33357	4.98000	3.39667	
04/30/2016		4.34750	24.36000	24.36000	

MR Monthly Summary

n	Units	Avg	Max	7Day	Units	
		MG/L	70.18653	368.43785	124.47819	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	6.89818	206.94542	29.56363	LBS/DAY
		MG/L	91.26556	1113.58849	285.09242	LBS/DAY
		MG/L	12.55119	233.74935	33.39276	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	75.86792	411.92928	137.30976	LBS/DAY
		MG/L	37.91781	1061.69868	151.67124	LBS/DAY
		MG/L	5.95218	184.51750	26.35964	LBS/DAY
		MG/L	110.71939	2419.90938	345.70134	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	188.73590	1509.83190	584.21717	LBS/DAY
		MG/L	68.52720	1130.70384	285.32057	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	56.85932	494.92062	113.71864	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	647.30844	3209.13692	1089.03815	LBS/DAY
		MG/L	386.53494	1978.41647	615.20153	LBS/DAY
		MG/L	37.28071	323.74045	76.20699	LBS/DAY
		MG/L	45.47796	680.96767	97.28110	LBS/DAY
		MG/L	12.32719	226.28088	32.32584	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	10.11922	313.69576		LBS/DAY

MR Monthly Summary

n	Units	Avg	Max	7Dav	Units	
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	386.80486	3651.73405	2901.03647	LBS/DAY
		MG/L	675.54488	1149.46884	687.84496	LBS/DAY
		MG/L	1264.52804	4192.78154	3217.47025	LBS/DAY
	6.72000	MG/L	2572.58976	4130.19818	3023.53356	LBS/DAY
		MG/L	726.04415	1959.50218	1306.39142	LBS/DAY
		MG/L	4.54686	140.95267	20.13610	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	80.92469	1603.66524	404.62344	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	437.39619	3193.86305	1613.18571	LBS/DAY
		MG/L	444.69805	3104.51496	859.72294	LBS/DAY
		MG/L	12.26050	367.81485	52.54498	LBS/DAY
		MG/L	419.47047	1540.95178	663.07944	LBS/DAY
		MG/L	574.93796	2100.04286	1355.57482	LBS/DAY
		MG/L	698.19644	1782.18961	963.30503	LBS/DAY
	5.00000	MG/L	3420.78833	6344.94857	4567.64342	LBS/DAY
	25.76000	MG/L	4120.67670	5706.41148	4841.53902	LBS/DAY
	13.66000	MG/L	3594.50758	5476.51104	4160.13545	LBS/DAY
		MG/L	1365.43109	4052.03904	3238.07394	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	47.37954	189.51816	63.17272	LBS/DAY
		MG/L	59.30642	223.97904	153.93638	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	430.32972	2233.64048	828.67074	LBS/DAY
	0.67000	MG/L	296.04397	667.61366	384.27968	LBS/DAY
	0.22000	MG/L	557.32738	3437.50781	3437.50781	LBS/DAY

Facility: WATERLOO CITY OF STP

Permitted Facility: WATERLOO CITY OF STP **Permit Status:** ACTIVE

NPDES Number:: 0790001 **SIU:** 0 **Issuance:** 04/01/2016 **Expiration:** 03/31/2021

Outfall: 801 **Monitoring Location:** EFFLUENT AFTER DISINFECTION

Parameter: AMMONIA NITROGEN (N)

Mon Period

End Date	No Discharge	Avg	Max	7Day	Min
12/31/2020	NO DETECTION				
11/30/2020	NO DETECTION				
10/31/2020	NO DETECTION				
09/30/2020	NO DETECTION				
08/31/2020	NO DETECTION				
07/31/2020	NO DETECTION				
06/30/2020		0.53920	8.40000	1.58286	
05/31/2020	NO DETECTION	0.00000			
04/30/2020		0.29200	1.46000	0.29200	
03/31/2020		0.75900	3.08000	1.12857	
02/29/2020	NOT REQ / MP				
01/31/2020	NOT REQ / MP				
12/31/2019	NOT REQ / MP				
11/30/2019	NOT REQ / MP				
10/31/2019	NO DETECTION	0.00000			
09/30/2019		8.96000	17.92000	8.96000	
08/31/2019	NOT REQ / MP				
07/31/2019	NO DETECTION	0.00000			
06/30/2019		0.35636	1.46000	0.56000	
05/31/2019		2.13167	11.20000	3.92857	
04/30/2019		0.29200	1.46000	0.29200	
03/31/2019		7.93941	13.89000	8.16143	
02/28/2019	NOT REQ / MP				
01/31/2019	NOT REQ / MP				
12/31/2018	NO DETECTION	0.00000			
11/30/2018	NOT REQ / MP				
10/31/2018	NO DETECTION	0.00000			
09/30/2018	NO DETECTION	0.00000			
08/31/2018	NOT REQ / MP				

Facility: WATERLOO CITY OF STP

Permitted Facility: WATERLOO CITY OF STP **Permit Status:** ACTIVE

NPDES Number:: 0790001 **SIU:** 0 **Issuance:** 04/01/2016 **Expiration:** 03/31/2021

Outfall: 801 **Monitoring Location:** EFFLUENT AFTER DISINFECTION

Parameter: AMMONIA NITROGEN (N)

Mon Period

End Date	No Discharge	Avg	Max	7Dav	Mir
07/31/2018	NO DETECTION	0.00000			
06/30/2018		0.11200	2.24000	0.37333	
05/31/2018		3.64400	21.84000	8.42750	
04/30/2018		11.98313	22.85000	14.59000	
03/31/2018	NOT REQ / MP				
02/28/2018	NOT REQ / MP				
01/31/2018	NOT REQ / MP				
12/31/2017	NOT REQ / MP				
11/30/2017	NOT REQ / MP				
10/31/2017	NOT REQ / MP				
09/30/2017	NOT REQ / MP				
08/31/2017	NOT REQ / MP				
07/31/2017	NOT REQ / MP				
06/30/2017	NOT REQ / MP				
05/31/2017	NO DETECTION	0.00000			
04/30/2017		4.96000	11.31000	11.31000	
03/31/2017		1.27800	2.38000	1.33667	
02/28/2017		4.06000	7.56000	4.06000	
01/31/2017		37.80000	43.96000	37.80000	
12/31/2016	NOT REQ / MP				
11/30/2016	NOT REQ / MP				
10/31/2016	NO DETECTION	0.00000			
09/30/2016		0.54778	2.30000	1.19667	
08/31/2016	NO DETECTION	0.00000			
07/31/2016	NO DETECTION	0.00000			
06/30/2016	NO DETECTION	0.00000			
05/31/2016	NOT REQ / MP				
04/30/2016	NOT REQ / MP				

MR Monthly Summary

n	Units	Avg	Max	7Dav	Units	
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L	145.53607	2096.07552	397.73698	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	49.58230	247.91150	49.58230	LBS/DAY
		MG/L	128.37620	544.31177	200.67077	LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	915.39840	1830.79680	915.39840	LBS/DAY
		MG/L				LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	77.47329	320.62296	121.74375	LBS/DAY
		MG/L	539.09250	2789.16288	1032.22512	LBS/DAY
		MG/L	49.58230	247.91150	49.58230	LBS/DAY
	2.80000	MG/L	2159.40141	3298.03882	2486.60174	LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L				LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L				LBS/DAY

MR Monthly Summary

ı	Units	Avg	Max	7Dav	Units	
		MG/L	0.00000			LBS/DAY
		MG/L	17.46730	349.34592	58.22432	LBS/DAY
		MG/L	453.62872	2785.00622	1094.55682	LBS/DAY
	1.85000	MG/L	1469.00567	3085.05607	1904.71565	LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	730.83837	1719.55204	1719.55204	LBS/DAY
		MG/L	169.65011	330.68767	172.52096	LBS/DAY
	1.96000	MG/L	482.66249	914.86130	482.66249	LBS/DAY
	29.12000	MG/L	4843.91937	5813.03671	4843.91937	LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	81.31213	381.52998	186.45655	LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L	0.00000			LBS/DAY
		MG/L				LBS/DAY
		MG/L				LBS/DAY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

SEND VIA ELECTRONIC MAIL
RECEIPT CONFIRMATION REQUESTED

Mr. Brian Bowman
Treatment Operations Supervisor/Assistant Director
City of Waterloo
3505 Easton Avenue
Waterloo, Iowa 50702

Re: Pretreatment Audit Report
NPDES No. IA0042650

Dear Mr. Bowman:

On August 24-26, 2020, a representative of the U.S. Environmental Protection Agency performed an audit of your city's Pretreatment Program under the authority of Section 308 of the Clean Water Act. A copy of the audit report was sent to you on November 4, 2020, for your information and review.

The EPA has reviewed the findings of the audit report and has determined that your Pretreatment Program is being properly implemented. Although no further follow-up action is contemplated by the EPA at this time, please note that the EPA reserves its right to pursue appropriate enforcement actions for violations discovered during this inspection.

If you have any questions, please call me at (913) 551-7419.

Sincerely,

Paul T. Marshall
Pretreatment Coordinator
Water Branch
Enforcement and Compliance Assurance Division

cc: Ted Peterson, Iowa Dept. of Natural Resources (e-copy)
Ben Hucka, Iowa Dept. of Natural Resources (e-copy)

January 3, 2019

City of Waterloo
3505 Easton Avenue
Waterloo, IA 50702

SUBJECT: Waterloo Pretreatment Compliance Inspection
NPDES Permit # 0790001

Dear Mr. Hoambrecker, Director:

Enclosed is the report of the recent inspection of the above facility conducted by Amber Sauser of this office.

We believe you will find the report self-explanatory and strongly encourage you to take action on the requirements and recommendation listed at the end of the report. The cooperation and assistance provided by Ms. Skillings during this inspection was appreciated.

If you have any comments or questions about the inspection or report, please contact Amber Sauser at 563-927-2640 or amber.sauser@dnr.iowa.gov.

Sincerely,

Tom McCarthy for

Joe Sanfilippo
Environmental Program Supervisor

cc: DNR Records
File: WW/Waterloo
Efile: 07 WW Waterloo ins 111518 als
IDNR Records Center (w/encl.)

Introduction

On November 15, 2018, I conducted a Pretreatment Compliance Inspection (PCI) of the City of Waterloo's Pretreatment Program. Kathy Skillings, Pretreatment Coordinator was present for the audit. The review period covered by this audit was August 2016- October 2018. The enclosed PCI checklist, interview with staff, file review and visit to ConAgra were conducted as part of this audit.

Pretreatment Program

Updates to the Pretreatment Program were submitted to the Department in September of 2016. Since the previous inspection, one new treatment agreement has been developed for a new production line at Hydrite Chemical. This line is completely separate from the original discharge location.

Control Mechanism Evaluation

While accompanying Ms. Skillings on her ConAgra inspection, it was noted that the composite sampler is being utilized to collect the pH sample. This sample is then taken to the Waterloo lab for testing. It is unclear if this occurs within 15 minutes of collection. The composite samples collected from the second EQ tank. Adjustments to pH can be made in either of the EQ tanks. The effluent pumps are set to shut off if pH is out of range in either of the tanks. Pumps will resume when reading are in range. While this is appropriate operational monitoring, the compliance sample should be collected as a grab from the effluent. Follow up discussions with the system indicate that they will continue to work the ConAgra to ensure samples are collected appropriately.

Slug control plans were discussed during this inspection. It was noted that not all aspects of the slug control plan are being verified. The plan reviewed at ConAgra had most but not all of the components. However, staff noted that they likely had the required information in other plans. Items that weren't immediately available included those related to the handling and loading of materials, control of runoff (noted that these items are likely included in the storm water plan) and worker training.

Industrial User Inspections

Each system is inspected annually. During each inspection, a thorough walk through is conducted and the checklist utilized.

As noted above, the city will work with ConAgra to ensure appropriate pH sampling is being collected and reported.

Enforcement and Compliance

Enforcement determinations are being determined and recorded appropriately. Ms. Skillings continues to improve her electronic records to allow her to more easily review data.

Conclusion

The City of Waterloo continues to operate an effective pretreatment program. The following items should be addressed to ensure continued effectiveness.

- Ensure the ConAgra pH compliance sample is a grab effluent sample
- Verify all required section of the Slug Control Plan
- Continue to improve upon electronic recordkeeping.

PCI: Waterloo Pretreatment Compliance Inspection

Date(s): **November 15, 2018** **FY 2019**

POTW: Address:	**CITY OF WATERLOO** **3505 Easton Ave** **Waterloo, IA 50702**	Date of last PCI/Audit: **August 10, 2016**
Contact: Phone: Fax:	**Kathy Skillings,** Pretreatment Coordinator **319-291-4553** **319-291-4523**	NPDES Permit No.: **IA-0042650** State Permit No.: 07-90-0-01 Expiration Date: **03/31/2021**

Participants

POTW: **Kathy Skillings,** Pretreatment Coordinator	Inspectors: **Amber Sauser, IDNR, Field office #1**
Period covered by this PCI/Audit: **2017-2018**	

POTW Information

Total for ALL Treatment Plants (MGD) (Easton & Satellite)			
Design Daily Ave. **DW 18/ WW 34.8**	Actual Daily Ave. **14.2**	Design Peak: **47.1**	% Industrial Flow: 32.2%
Number of Plants: 2 (Easton/Satellite)	% Combined Sewers: NONE	Type of Treatment at Principal Plant: **Activated Sludge**	
Sludge Disposal Method: **LAND APPLICATION**	Quantity (dry/tons/Y): 2062.84 (2017)	Receiving Stream: **Cedar River**	

PART I: PROGRAM BACKGROUND INFORMATION

I.A. Approved Modifications to the Original Program

1.

Date of last NPDES permit modification: **2/26/2018**	Date of original Program approval:	**3/14/1984**
	Date NPDES Permit originally modified to require implementation **[PTIM]**:	3/14/1984

2. Approved Pretreatment Program modifications:

REQUIRED MODIFICATIONS	APPROVAL DATE	OTHER APPROVED MODIFICATIONS	APPROVAL DATE
PIRT SUO Revisions	**06/19/1997**	SIU Update	10/2014
List of SIUs [403.8(f)(6)]	**06/19/1992**	ERP Changes	2016
Enforcement Response Plan	**01/04/1993**	SUO update	2016
DSS SUO Revisions	**06/19/1997**		
LOCAL LIMITS	**3/12/2015**		

3. Is the POTW presently working on any program modifications?
Local limits will be reviewed next year as they prepare for permit renewal.

It was also noted that the EPR SNC clarification and SUO updates along with the adoption of the 13 streamlining requirements were submitted to DNR on 9/1/2016.

4. Does the POTW have any program modifications currently being reviewed by the Approval Authority?
No

I.B. Approved Program Contents

5. Authority to enforce Pretreatment Standards contained in:
Ordinance No. 4261, Article III, Chapter 3

6. Date enacted or adopted:
October 8, 1997 (update 2001)

7. Approved Control Mechanism:
PERMITS

Note: Italicized question numbers indicate that the question is data base supported.

8. What is the frequency required by the **approved program**/modifications for:

Activity	Non-categorical SIUs	Categorical SIUs*
POTW sampling of:	1/Y	1/Y
POTW inspection of:	1/Y	1/Y
SIU self-monitoring:	Varies	Varies
SIU reporting:	1/M	1/M

* For Categorical pollutants

Tyson discharges to the lagoon. City samples influent to the lagoon (pending change)
Twin City Tanning – Collects samples and bring to WWTP
ConAgra- Sampled by POTW daily
Iowa railroad Quarterly

9. What types of enforcement options are available through the approved program:

Y	Notice of Violation (NOV)
Y	Administrative Order (AO)
Y	Show Cause Hearing
Y	Establishment of Compliance Schedules
Y	Revocation of Permit
Y	Injunctive Relief
Y	Fines; Maximum $1000/day/violation
Y	Criminal Penalties
Y	Termination of Service

10. COMMENTS:

To date, the city has not had to utilize any enforcement mechanism beyond NOVs to ensure compliance.

PART II: INTERVIEW QUESTIONS

II.A. Legal Authority and Jurisdiction

11. Have any Pretreatment modifications been made to the Sewer Use Ordinance since the last PCI/Audit that have not been approved by the Approval Authority.

    Modifications made in 2015 were submitted for Department approval in 2016.

12. List by name and location any SIUs that discharge to the POTW from outlying jurisdictions.
    Black Hawk County Landfill (outside of city limits)
    John Deere PEC (Cedar Falls)

Indicate which of the above are not covered by a contract/agreement requiring them to abide by the POTWs legal authority. None

13. Does the POTW have the authority to seek fines up to $1000 per day? [403.8(f)(1)(vi)]
YES

14. If the POTW has not yet developed an Enforcement Response Plan when does the POTW feel it will complete this requirement?
N/A

15. COMMENTS:

II. B. Control Mechanism

*16.*General Information:

Type:	PERMITS	Issued to Noncategorical SIUs? [DSS: 403.8(f)(2)(i)]
Duration:	5 YEARS	YES

17. Do all SIUs have current (unexpired) control mechanisms? **{NOCM}**
YES

18.List by name those that do not and indicate which ones have not had a current control mechanism for 180 days or more. **{RNC/SNC} NONE**

II.C. Hauled Wastes

19. Does the POTW accept hauled waste? (If "no," go to question 25)
YES

a. if so describe (include approx. no. of loads per month):
This system averages approximately 12 loads of septage at the WWTP per months with an average of 370 gallons per load. With the implementation of a FOG ordinance and subsequently accepting that waste at the anaerobic lagoon, an average of 35 monthly loads at 1900 gallons per load are being received.

b. How does the POTW ensure that it does not accept hazardous waste?
Permits, manifests and random sampling

20. Does the POTW have a control mechanism for regulating waste haulers, and if so describe.
City issues a three year permit to each truck. Each truck must have a decal affixed to the vehicle and a copy of the permit available. Security cameras are also utilized. City staff are present when material is unloaded at the lagoon and each load has a manifest.

21. Does the POTW have a designated discharge point (or points) for waste haulers? [DSS: 403.5(b)(8)]
Describe: Yes either at the anaerobic lagoon (FOG waste) or WWTP designated area.

22. Are all applicable Categorical standards and Local Limits applied to IUs whose wastes are hauled to the POTW? YES, but City does not accept hauled industrial waste

22. Describe the method used to apply local limits to hauled waste.
PERMIT and Random Samples (Metals, pH, TSS, BOD)

24. COMMENTS:
City only accept grease traps from food establishment within the city limits. Manifests are required to ensure grease is coming from appropriate locations. A portable restroom service out of Nashua is the only out of county hauled waste accepted.

II.D. Industrial User Characterization

25. How often does the POTW update its Industrial Waste Survey (IWS) to identify new SIUs or changes to wastewater discharges? **With each permit cycle. During the recent permit renewal, all commercial water users received a survey.**

a. When was the last formal update: **2015**

26. What is the POTW's current industrial base?

Current	Industrial User Type	Last Reported
7	Categorical SIUs **{CIUS}**	7
10	Non-Categorical SIUs	10
17	Total all SIUs **{SIUS}**	17

II.E. Local Limits

27. Does the POTW have numerical limits for metals in its NPDES permit? If so list the metals and the limits (or attach list).
NONE. But City test for metals

28. Have there been any numerical NPDES permit violations in the last 12 months?
NO

a. Were any of the numerical NPDES violations, identified above, a result of interference or pass through? NO

1. Was the interference traceable to an industrial user?

2. Was action taken that led to elimination within 90 days of the interference or pass through? **{SNC}**

3. Was the responsible industry placed on an enforceable compliance schedule within 90 days of discovery? **{SNC}** If not, why?

29. How many times per year does the POTW regularly sample its PRINCIPAL plant for the following?

Parameter	Influent	Effluent	Sludge
Metals	1	12	6
Toxic Organics	0	0	1
Biomonitoring		1	
TCLP			0

30. List below the numerical value for the local limits derived by technical analysis. If a technical analysis was performed but the limit not adopted enter DNA in the block. (Values assumed to be mg/l unless otherwise noted). **{EVLL} {ADLL}**

POLLUTANT	DAILY MAX	POLLUTANT	DAILY MAX
ARSENIC	DNA	LEAD	DNA
CADMIUM	DNA	MERCURY	DNA
CHROMIUM	DNA	NICKEL	DNA
COPPER	DNA	SILVER	DNA
CYANIDE	DNA	ZINC	DNA

Comments:
The City evaluated its local limit in 2006. Approved by IDNR but not adopted into the SUO. The SUO was adopted by the city in 2015.

31. Are the POTW's BOD and TSS limits technically derived (ie. based on plant capacity)?
YES

32. Are BOD and TSS violations treated as violations of technically based local limits?
YES

33. If there is more than one treatment plant, were the local limits established specifically for each plant?
NO

34. Has the POTW made any changes to its Local Limits which have not been approved, and if so provide details? [403.18] NO

35. Has the POTW granted any Net/Gross allowances under 403.15? NO

36. COMMENTS:

II.F. Standards and Requirements for Industrial Users

37. Does the POTW compare local limits against federal Categorical standards and apply the most stringent standards to Categorical IUs? [403.4] **POTW uses Categorical Limits**

38. Has the POTW notified its IUs of possible RCRA obligations? [40 CFR 403.8(f)(2)] YES

39. Does the POTW allow Categorical users to use Solvent Management Plans/certification or surrogate test procedures to meet TTO requirements? Yes, except for John Deere -West Field Street where they send their TTO waste to the landfill

II.G. POTW Compliance Monitoring and Inspections

40. What is the current frequency for:

Activity	Non-categorical SIUs	Categorical SIUs*
POTW sampling of:	1/Y	1/Y
POTW inspection of:	1/Y	1/Y
SIU self-monitoring:	Varies	Varies
SIU reporting:	1/M	1/M

* For Categorical pollutants

41. List exceptions: NONE

42. List those SIUs that were not sampled by the POTW within the last 12 months. [DSS: 403.8(f)(2)(v)] NONE

43. List those SIUs that were not inspected within the last 12 months. [DSS: 403.8(f)(2)(v)]
Hydrite Chemical- Due 11/7/2018
Vets Truck Wash- Due 9/13/2018
Both of these inspections were completed prior to this report and within the calendar year.

44. How many industries were neither sampled nor inspected within the last 12 months. [DSS: 403.8(f)(2)(v)] **{NOIN}{RNC/SNC}** NONE

45. Does the POTW sample its SIUs for all regulated pollutants at least once annually? [403.8(f)(2)(v)] YES

46. Sample/Analysis Procedures: ALL METALS SENT OFF TO Test America Laboratory

Chain-of-Custody always used?: YES	Sampling method, metals: **Time Composite**
Ability to sample on short notice? YES	Sampling method, CN: GRAB
In-house analysis of toxic pollutants: NONE	Sampling method, O&G: GRAB
Do in-house analytical methods conform to 40 CFR part 136? YES	

47. How does the POTW document its industrial user inspections? CHECKLIST and Narrative Report

48. Does the POTW evaluate all SIUs at least every two years to determine the need for a slug discharge/spill control plan? [DSS: 403.8(f)(2)(v)] All SIU have Spill/ Slug Control Plans

a. Describe the method used by the POTW to evaluate the need for a slug control plan.
NA, All SIU are required to have Plans. Plans are reviewed every two years for adequacy. Plans were discussed during this inspection. It was noted that more attention should be given to the plans to ensure they have adequately all of the items noted in question 73.

II.H. IU Self Monitoring and Reporting

49. Are all Categorical IUs required to self-monitor for all pollutants regulated by the respective Categorical standard at least twice per year? [403.12(e)] **YES**

50. Were any Baseline Monitoring Reports or 90 day Compliance Reports due within the past 12 months?. If so, from whom? Were the reports submitted? **N/A**

51. Are IUs required to report spills, slug discharges, etc. to the POTW? [403.12(f)] **YES**

52. Are IUs required to report violations within 24 hours of knowledge of the violation? [403.12(g)(2)] **YES**

53. Are IUs required to resample and submit results within 30 days following a violation as per 403.12(g)(2)? **YES**

II.I. Data Management

54. Are files/records computerized? **YES**
It was recommended that notes from phone conversations be added into the file.

55. Are all records maintained for at least 3 years? [403.12(o)] **YES**

56. Are program records available to the public as required by 40 CFR 403.14(b)? **YES**

57. Does the POTW have provisions to address confidential business information? [403.14(a)] **YES**

58. How is compliance status calculated? Describe the procedure used in determining Significant Noncompliance (eg. are mo. avg. violations considered as well as daily max?).
POTW uses a spreadsheet that calculates, and highlights Violations and SNC only for the three major industries TYSON, Waterloo Industries and ConAgra. The rest are manually calculated.

II.J. Program Resources

59. What percent of the Pretreatment Coordinator's time is spent on pretreatment?
60%

60. What computer programs does the POTW use for:

Wordprocessing:	Word
Spreadsheet:	Excel
Database:	Excel

61. Does the POTW believe its annual budget adequate for implementation? Yes
    a. If not, is the level of money available for pretreatment less than that in the approved program or approved modification?

II.K. Special Questions

62. Are there any issues that the POTW would like to discuss?

PART III: FILE AND RECORDS REVIEW

Following is a table containing the POTW's Significant Industrial User inventory regulated by its Pretreatment Program. Please verify that all information in the table is correct and current. For those industries no longer regulated draw a line through the entry. Add all new industries and provide the information sought by the table. Below is a guide to the information sought by the table and suggested abbreviations.

INDUSTRY:

Provide the name of each industrial user regulated under the pretreatment program.

CAT STND:

Provide the categorical standard code number. For example, industries subject to the Metal Finishing regulation should be designated "433." For noncategorical industries indicate "NA" in this column.

REG PROCESS:

Indicate what process the industry performs to qualify for inclusion in the pretreatment program. For example, if an industry is subject to Metal Finishing regulations because it performs zinc and chromium plating indicate with "ZnCrPL" or a similar abbreviation.

TMT:

If the facility treats its wastestream(s) indicate "Y." If no treatment is provided indicate "N."

TYPE:

Indicate the type of pretreatment system (if applicable) the industry has. Suggested abbreviations: "precip" for precipitation/clarification; "precp/flt" for precipitation followed by filtration; "DAF" for dissolved air flotation; etc.

REG FLOW:

Provide the industry's average daily flow for its regulated processes in gallons per day. The abbreviation "K" stands for 1000.

TOT FLOW:

Provide the average daily total plant flow in gallons per day.

CWF:

Indicate if the industry uses the Combined Wastestream Formula to determine compliance with categorical standards. "Y" = yes, "N" = no.

COMPLIANCE STATUS FOR THE 6 MO PERIOD ENDING:

For the six month periods listed, indicate if the industry's compliance status. Use the following abbreviations:

CIn compliance with all standards: no violations.

IInfrequent noncompliance with discharge standards: the facility had some violations but not severe enough to be considered in significant noncompliance.

SNC,SIn significant noncompliance with discharge standards.

SNC,RIn significant noncompliance with reporting requirements: the industry failed by greater than 30 days to submit reports as required.

SNC,MIn significant noncompliance with self monitoring requirements: the industry did not properly report its compliance status on its self monitoring report.

SNC,C Failure to meet a compliance schedule milestone by 90 days.

SECTION VII: SIGNIFICANT INDUSTRIAL USERS

Industry Name	Cat. Stnd	Reg. Process	T M T	Type	Reg. Flow	Total Flow	C W F	Compliance Status for Six Month Period Ending:				Last Inspection
								JUN 2017	DEC 2017	JUN 2017		
ARAMARK LAUNDRY	NA	INDS. LNDRY	Y	OIL SEP.	39K	39K	NA	I	C	C		12/6/2017
BLACK HAWK CO. SANITARY LANDFILL	NA	LEACHATE	N		3K	3K	N	C	C	C		9/11/2018
CANADIAN NTL/ILL CENTERAL MAINT.	NA	CLEANING	Y	O/W SEPRTR	1.5K	1.5K	N	C	C	C		10/18/2018
CON-AGRA GROCERY PRODUCTS	NA	PUDDING			355K	355K	N	C	C	I		11/15/2018
WATERLOO PROCESSING LLC	425NS	CrTAN	Y	PRECIP	80K	80K	NN	I	I	I		10/25/2018
HYDRITE CHEMICAL CO.	415	INORG CHEM	Y	pH ADJ	40K	147K	N	C	C	I		11/7/2017
TYSON FOODS	NA	PORKSTLR	Y	DAF	3.5M	3.5M	NA	I	I	I		11/30/2018
JOHN DEERE ENGINE WORKS	433	FePHOS	Y	ULTFLTRN	18K	28K	N	I	C	C		11/14/2018
JOHN DEERE- WATERLOO WORKS	433	ZnPHOS	Y	PRECP/FLTR	15K	139K	N	C	C	C		10/24/2018
JOHN DEERE- TRACTOR CAB.	433	ZnPL	Y	PRECP/FLTR	36K	79K	N	C	I	C		10/9/2018
THE CROWN GROUP	433	FePHOS	Y	pH ADJ	10K	10K	N	C	C	I		12/8/2017
DARLING INTERNATIONAL	NA	RENDERE	Y		4K	4K	N	C	C	C		11/7/2018
ALLEN INDUSTRIAL COATING	433	FePHOS	Y	OIL SEP	7K	7K	N	C	I	C		12/13/2017
JOHN DEERE PRODUCT ENGINEERING CENTER	NA	DESIGN	Y	OIL SEP	25K	125K	N	C	C	C		10/17/2018
IOWA NATIONAL RR	NA	RR MAINT	Y	OIL SEP	0.5K	1.5K	N	I	C	I		10/4/2018
VET TRUCK WASH	NA	TRUCK WASH	Y	PRIM CLFIER	50K	50K	N	C	C	C		9/13/2017
Hydrite PAA plant	NA	Hydrogen Peroxide	Y	pH ADJ	6K	6K	N	X	X	C		New

III.B. Significant Industrial User Compliance Evaluation

63. From the above list of industries, how many are in Significant Noncompliance (SNC) with either discharge standards or reporting requirements based on the most recent six-month reporting period? **{PSNC}** None

64. List by name, those industries currently on a compliance schedule. Complete the table below.

Industry Name	Date Schedule Issued	Compliance Deadline	How Administered*

eg. Administrative Order, Permit, etc.

65. List those industries last published in the newspaper for noncompliance and provide the date (or attach a copy of the public notice). NONE

66. If an industry has been deleted from the list of Significant Industrial Users list by name below and provide the reason.
None since the previous inspection.

67. For those industries in SNC within the last 12 months complete the following table for all written enforcement actions.

IU Name	Violation	Date of POTW knowledge	Date of Action	Enforcement Action	ERP required action

68. Provide the total number of NOVs, Administrative actions, Judicial referrals, and criminal prosecutions that occurred in the last twelve months. **{FENF}** In calendar year 2017, 34 NOVs were issues for noncompliance. Five of those NOVs came from categorical systems. It was noted that the majority of the NOVs result from daily max exceedances. When those occur, letters are sent to the facility requiring a written response addressing the violation. Ms. Skillings works with the facility, as necessary, to ensure spill controls/ prevention protocols are in place.

From January 1-June 30, 2018, the following NOVs were issued.

Categorical 11 total;

1- Crown Group, Zn Daily Max
10- Waterloo Processing LLC
2- Chrome Daily Max
8- Sulfide Daily Max

NonCategorical 7 total;

2 -ConAgra Brands, Chloride Daily Max
1- Iowa National, Total Extractable Hydrocarbon
4- Tyson's Fresh Meat
2- Oil and Grease Daily Max
2- pH

69. Were all actions taken by the POTW within 30 days of knowledge of a violation? **{RNC/SNC} Yes**

70. Did all industries in SNC either return to compliance within 90 days, receive escalated enforcement action by the POTW within 90 days, or become placed on an enforceable compliance schedule within 90 days (of knowledge by the POTW) of the violation? **{RNC/SNC}**

III.C. Control Mechanism Evaluation

71. Do the POTWs control mechanisms: Permittee: MULTIPLE INDUSTRIES

REQUIRED [DSS: 403.8(f)(1)(iii)]		SUGGESTED PROVISIONS	
Specify duration (no > 5 yrs.):	Y	Cite the POTW's legal authority:	Y
Contain the correct discharge limits:	Y	Identify TTO alternatives, if applicable:	Y
Specify sample type for IU self monitoring:	Y	Require notification within 24 hrs of a violation:	Y
Adequately identify sampling location:	Y	Require resample/report in 30 days of violation:	Y
Specify sampling frequency:	Y	Specify right of entry:	Y
State applicability of civil or criminal penalties:	Y	Reserve right to revoke permit:	Y
Stipulate reporting frequency:	Y	Specify immediate slug load notification:	Y
Properly require records retention:	Y	Require submission of all sampling results:	Y
Specify limited transferability:	Y		

Result of this review from the last PCI/audit: EXCELLENT PERMITS

III.D. Industrial Inspection Evaluation

72. Do the Industrial Inspection reports contain? MULTIPLE INDUSTRIES

Name of Company contact:	Y	Evaluation of IU's monitoring procedures:	Y

Date of inspection:	Y	Verification of wastewater flow rates:	Y
Time of inspection:	Y	Determination of applicability of the CWF:	Y
Description of manufacturing process:	Y	Description of the chemical storage area:	Y
Description of treatment process, if any:	Y	Identification of potential spill conditions:	Y
Evaluation of IU's monitoring methods:	Y		Y
Verification of production rates that would affect production based standard:			Y

III.E. Slug Discharge Control Procedures

73. If the POTW has required the submittal of a Slug Control Plan does it contain: [DSS: 403.8(f)(2)(v)]
All permits require slug control plans and cover all required areas.

___x___ A description of discharge practices including non-routine batch discharges

__x____ A description of stored chemicals

__x____ Procedures for immediate notification of slug discharges with written follow-up notification

__x____ Procedures necessary to prevent adverse effects at the POTW's treatment plant:

_____ inspection and maintenance of storage areas
_____ handling and transfer of materials
_____ loading and unloading operations
_____ control of plant site runoff
_____ worker training
_____ building of containment structures
_____ measures for the control of toxic organics
___x___ measures for emergency response

74. COMMENTS
It couldn't be verified that all slug control plans include all of the information required in the inspection and maintenance records as outlined in section 73. Ms. Skilling noted she would review plans as she conducts inspections in the future to ensure all of the required information is included.

III.F. Industrial User File Review Checklists

Following are worksheets to aid in the assessment of the nature of the oversight activities and compliance status of the POTW's Significant Industrial Users. When reviewing SIU files priority should be placed on Categorical industries that either have a history of violations or that appear to be in compliance but have not installed that prescribed BAT technology to consistently meet discharge limits. While only three pages are provided the reviewer is encouraged to copy and add additional review pages for larger POTWs.

Industry Name: Con Agra
Principal Pollutants: **Chloride, BOD,pH, TSS** No. of Employees: 195
Products: Pudding, Jell-O, Sunflower Seeds

A. Does the file system for the industrial user contain:

__x___ Permit application
__x___ Current Permit
___x__ Correct limits in Permit
__ ___ Correspondence/meeting notes/phone log
_x_____ Most recent inspection report
_x_____ Evaluation for need for Slug control
_x_____ Compliance status determination
__x___ POTW sampling results
__x___ Self-monitoring reports
__x___ Enforcement documentation
_____ Solvent Management Plan
_____ Correct application of the CWF
_____ Slug Control Plan

B. Did the industry discharge any slug loads or spills to the POTW in the past 12 months? [403.12(f)] NONE

_____ Immediate notification by the IU
_____ POTW response
_____ Follow-up written notification
_____ Effect on the plant

C. In the last complete calendar year how many times did the POTW:

Sample the IU _Daily___ Inspect the IU _Once_____

D. Were all regulated pollutants analyzed by the POTW at least once in the most recent calendar year? Yes

E. If the industry is subject to Categorical Standards did its self-monitoring reports contain analysis for all regulated pollutants at least once during every six month period during the last full calendar year? N/A

F. Frequency in the IU's control mechanism for: Self-monitoring __Daily (collected by city)
Reporting __Semiannual report____

G. Did the industry comply with the sampling and reporting frequency requirements of its Control Mechanism? YES

H. Did the POTW identify all IU violations from: YES

IU Self-monitoring ___0___ POTW Compliance monitoring __3____

I. Was the IU's compliance status (i.e. SNC, Infrequent noncompliance, Consistent compliance) determined properly? Yes

J. Complete the following table for all violations in the last 12 months. (If this information has already been provided in Question 85, please indicate).

Violation	Date of Violation	Date of POTW Knowledge	Date of POTW Response	ERP Required Response	POTW Response
Chloride-Daily Max	3/19/2018	4/3/2018	4/3/2018	NOV	NOV Letter
Chloride-Daily Max	3/30/2018	4/18/2018	4/18/2018	NOV	NOV Letter
Flow-Daily Max	10/3/2018	10/5/2018	10/5/2018	NOV	NOV Letter

It was noted that chloride samples are collected by the city but analyzed by another lab.