Industrial Pretreatment Program

Chapter 5

Local Limits Evaluation

Updated

April 2019

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Industrial Pretreatment Program

Training Log

Chapter	605	Local Limits Evaluation

My signature below certifies that I have been trained to perform the functions described in the referenced procedure and that I am familiar with the procedure and the attachments referenced herein.

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LOCAL LIMITS EVALUATION

EXECUTIVE SUMMARY

This report has been prepared to document the development of revised local limits in compliance with NPDES Permits No. GA0038776 and GA0023191 issued to the City of Winder, GA effective in 2017. Part III, Section A.2.c of these permits requires the City of Winder to conduct an evaluation of the technically based local limits and determine if there is need to revise these limits to continue to meet the NPDES Permit limits and Georgia water quality standards.

The local limits are intended to control and regulate the discharge of pollutants to a publicly owned treatment works (POTW) that may:

- Pass through the POTW's treatment system and result in a violation of effluent limitations or receiving water standards
- Interfere with the biological treatment processes, such that regulatory compliance is impacted
- Contaminate the POTWs sludge, impacting the beneficial reuse of biosolids
- Endanger POTW worker health and safety
- Interfere with the POTW's collection or treatment works, such that regulatory compliance or operating costs are significantly affected

The Office of Wastewater Management of the U.S. Environmental Protection Agency (EPA) has issued a guidance document, the *Local Limits Development Guidance* Manual (EPA 833-R-04-002A, July 2004) also known as the 2004 Manual, that is used as the basis for this evaluation

In accordance with the 2004 Manual, allowable headworks loadings (AHL) were calculated for pollutants based on environmental limiting criteria that guard against interference or the pass through of a pollutant in quantities or concentrations that would result in a violation of the WPCP's discharge permit. The limiting criteria used in this evaluation included the Georgia Water Quality Standards (391-3-6-.03, July 23, 2018); sludge quality based criteria per Federal regulations 40 CFR Part 503; activated sludge and nitrification inhibition based criteria per EPA literature. The most stringent or protective AHL was selected as the WPCP's maximum allowable headworks loading (MAHL). The MAHL is the maximum daily mass loading of a pollutant in pounds per day that can be accepted by the WPCP. Any pollutant loading which is greater than the MAHL would be predicted to cause adverse impact to the WPCP's process treatment systems, receiving water quality, worker health and safety, sludge quality or potentially pass through the treatment facility and cause an NPDES violation or water quality issue in the receiving stream.

The 2004 Manual lists 15 pollutants that EPA recommended be evaluated for development of local limits. For most of these pollutants the MAHL and a corresponding Maximum Allowable Industrial Loading are calculated using the methodology in the Manual. For conventional (BOD, TSS and Nitrogen) the MAHL was set based on the design capacity of the WPCPs and the ability of the facility to assimilate loading of these pollutants.

The MAHL arrives at the plant from several sources. Per EPA standards, the portion of each pollutant MAHL that can be allocated to industrial users is termed the maximum allowable industrial loading (MAIL). The MAIL is equal to the total MAHL, less the loading contributed by uncontrolled sources (LUNC) within the collection system including domestic, commercial and infiltration and inflow (I&I), and less an amount held in reserve as a safety factor (SF).

Since no industrial customers currently discharge to the Marburg Creek WPCP, the estimated industrial flow is set to 0.050 mgd as a placeholder for this evaluation. Table 1, below, summarizes the City's current local limits and the recommended revised local limits based on the EPA 2004 manual.

Table 1
Current and Proposed Local Limits

Pollutant	Current Limits		Calculated Limits		Combined
	Instantaneous Maximum (mg/L)	Composite Daily Maximum (mg/L)	Cedar Creek (mg/L)	Marburg Creek (mg/L)	**Recommended Revised Local Limits Daily Max (mg/L)**
Arsenic	0.350	0.175	0.305	1.593	**0.305**
Cadmium	0.486	0.243	0.001	0.004	**0.004**
Chromium (VI)	1.460	0.730	0.256	0.942	**No Limit**
Chromium (T)	1.460	0.730	0.249	0.921	**0.249**
Copper	3.554	1.777	0.816	0.363	**0.082**
Cyanide	0.482		0.055	0.217	**0.055**
Lead	0.914	0.457	0.061	0.228	**0.010**
Mercury	0.030	0.015	0.0005	0.0005	**0.0003**
Molybdenum			-	-	**No Limit**
Nickel	2.370	1.185	0.202	0.750	**0.202**
Selenium			0.034	0.134	**0.034**
Silver	2.290	1.145	0.161	0.858	**0.161**
Zinc	9.750	4.875	1.045	2.395	**0.720**
BOD					**250**
TSS					**250**
Ammonia					**30**
Phosphorus					**4.0**

The calculated values shown in Table 1 are based on the uniform allocation of the MAIL across the industrial flow base, which consists of the known industrial users for Cedar Creek. Since all pollutants of concern are not discharged at this uniform concentration level this added level of conservative calculation tends to decrease the allowable concentration. The City may consider the allocation of this unused loading by issuing mass based permits for industrial, and in particular new industrial users.

For both the administrate simplicity and the clarity, it is recommended that Winder continue the practice of having one local limit for both facilities. However, it is recommended that the daily maximum value apply to a daily sample whether the sample collected be a grab or composite. Since

industrial samples are required to be composite, where applicable, this should not be a problem for industrial customers.

INTRODUCTION

Publically Owned Treatment Works (POTWs) are responsible for limiting, where necessary, the character and volume of pollutants being discharged into their wastewater treatment system in order to protect the treatment facility against pass through and interference, adverse water quality impacts on the receiving stream, adverse sludge quality impacts, and worker health and safety problems. In addition, the POTW must control the quantity of conventional pollutants that it is designed to treat to levels that the system can process and still operate within permit limits.

POTWs control the discharge of toxic pollutants by non-domestic sources to their wastewater treatment facility through the development and implementation of Pretreatment Standards, called local limits. The Office of Wastewater Management of the U.S. Environmental Protection Agency (EPA) has issued a guidance document, the *Local Limits Development Guidance* Manual (EPA 833-R-04-002A, July 2004) also known as the 2004 Manual, that is used as the basis for this evaluation. In general, this document outlines the following steps:

1. Determine the pollutants of concern
2. Gather relevant information
    a. Water quality limits, sludge quality limits
    b. Process inhibition levels
    c. Process removal efficiency
    d. Domestic or background loadings
3. Determine the allowable headworks loading at the WPCP
4. Determine the allowable industrial loading to the WPCP
5. Allocate the loading to safety factor, existing industries, and future needs
6. Address acceptance, approval and implementation of revised limits.

The National Pollutant Discharge Elimination System NPDES Permits No. GA0038776 and GA0023191 issued to the City of Winder Water Pollution Control Plants (WPCP) by the Georgia Environmental Protection Division contained the requirement that the City conduct a technically based headworks loading evaluation to determine the need to revise the limits contained in the Winder Sewer Use Ordinance.

This document serves to meet the requirements as for a headworks loading evaluation as described in the NPDES permit.

FACILITY DESCRIPTION

City of Winder Collection System

The City of Winder' sanitary sewer collection system conveys flow from the City of Winder to the two Water Pollution Control Plants, located on Miles Patrick Road and Monroe Highway, Winder, GA. The Winder sewer system serves the residents, businesses and industry located in Winder. In general, the sewers on the north side of May Street flow to the Cedar Creek (Miles Patrick Road) WPCP and sewers on the south site of May Street flow to Marburg Creek (Monroe Highway.)

Cedar Creek Water Pollution Control Plant

The Cedar Creek WPCP has been designed to provide secondary treatment including ammonia and phosphorus removal in the activated sludge facility. The WPCP has a design capacity of 4.0 mgd. The plant treated an average of 1.434mgd in 2018. The plant currently receives all of the industrial wastes from businesses which are located north of May Street.

The preliminary treatment consists of two mechanical bar screens. Wastewater gravity flows into the plant and through the vertical loop reactor aeration system and secondary clarifiers. The primary treatment stage contains three vertical loop reactors which are a hybrid of diffused aeration and oxidation ditch treatment that can be operated in series or in parallel. The wastewater flows from the reactors to three secondary clarifiers and then gravity flows through the cloth media disc filters. From the filters the treated wastewater flows through the UV banks, effluent flow monitoring and is discharged to Cedar Creek in the Oconee River Basin.

Marburg Creek Water Pollution Control Plant

The Marburg Creek WPCP has been designed to provide secondary treatment including ammonia removal in the modified SBR activated sludge facility. The WPCP has a design capacity of 1.5, with 0.60 mgd permitted to discharge and 0.90 mgd permitted for land application. The plant treated an average of 0.0.51 mgd in 2018. The plant currently receives none of the industrial wastes from the City of Winder.

The preliminary treatment consists of a mechanical bar screen with a manual bypass screen. Wastewater gravity flows into and through the plant to the discharge. The biological treatment system consists of three aeration cells. Generally, flow enters the plant into Tank 4, which is aerated then to Tank 5, which is also aerated, then to Tank6 which is not aerated such that the solids are allowed to separate from the sludge and the clarified effluent gravity flows to further treatment. After a set amount of time (generally 5 hours) the flow is reversed and directed to Tank 6 which is aerated, through Tank 5 to Tank 4 which is not unaerated and serves as a clarifier. From whichever tank is serving as the clarifier, effluent is directed the cloth disc filters, through the UV banks then to a wetwell. The tank is then pumped to the LAS or to the reject pond or gravity flows to Marburg Creek in the Oconee River Basin.

The plant is designed to treat up to 1.5 mgd on a daily average. Of this total, 0.6 mgd is permitted to discharge into Marburg Creek and 0.9 mgd is permitted for public access reuse application. The primary customer for this reuse water is a golf course located near the plant.

Solids Handling

At the Cedar Creek WPCP sludge removed from the clarifiers is pumped to the aerobic digesters for storage and stabilization. At the Marburg Creek WPCP sludge removed from the either Tank 4 or Tank 6 is pumped to an aerobic digester. At both facilities, sludge from the digesters is pumped to a belt press and dewatered before being transported to landfill for final disposal.

POLLUTANTS OF CONCERN

The purpose of developing local limits is to prevent interference of WPCP treatment operations, protect worker health and safety, prevent pass-through of conventional and toxic pollutants, prevent adverse impacts a sludge quality, and maintain discharge permit and regulatory compliance. This is accomplished by identifying which pollutants of concern (POCs) need to be controlled to meet these goals and to meet Federal, State, and local requirements. The EPA has identified 15 pollutants that it considers potential POCs. These include the ten original POCs; Arsenic, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Silver, and Zinc and the five new POCs; Ammonia, BOD, Molybdenum, Selenium and Total Suspended Solids.

In addition to the EPA's list of national pollutants, several other pollutants are regulated under the Winder Sewer Use Ordinance. As these parameters are currently included in the Sewer Use Ordinance, are not identified by EPA as priority or toxic pollutants and no operational activities indicate a reconsideration of these limits is necessary they have not been included in this evaluation with the exception of phosphorus which is included in this evaluation.

The pollutants of concern are listed in Table 2 below:

Table 2

Pollutants of Concern

Non-Conventional Pollutants			Conventional
Arsenic	Cadmium	Chromium	BOD
Copper	Cyanide	Lead	TSS
Mercury	Molybdenum	Nickel	Ammonia
Selenium	Silver	Zinc	Phosphorus

EVALUATION OF AVAILABLE DATA

This section summarizes the available POC data that was used in the development of technically based local limits for the Winder WPCPs. The City of Winder has limited site-specific data for non-conventional pollutants. The limited industrial dischargers, limited pollutants from those dischargers and the overall exceptional performance of the wastewater plants minimize the need to characterize the waste stream significantly beyond parameters that are regulated. Priority pollutants that might potentially be regulated under the pretreatment program are not routinely measured in the plant influent and only as required in the plant effluents.

As such, site-specific values for domestic loadings and plant or process removal efficiencies cannot be determined. Likewise, specific process inhibition levels cannot be determined as there has been no indication of process upsets due to industrial, or other, loadings.

For removal efficiency and process inhibition data from the EPA publication *Local Limits Development Guidance*, July 2004 were utilized. The exception is for arsenic toxicity to the activated sludge process which is taken from the research footnoted in Table 4 below. Domestic loadings are based on sampling at water pollution control plants that receive no industrial wastewater and are located in the southeastern United States.

Activated sludge removal efficiencies at both WPCPs used the median value. Where process inhibition levels showed a range of values, an average of the high and low values was used as the possible inhibition level in Winder. Both activated sludge and nitrification data were used to consider process inhibition in the aeration system.

Domestic loadings were taken from a series of nine samples collected at WPCPs in Georgia and Alabama that do not receive any industrial wastes. Where the data indicated values below detection limits, the value was assumed to be one-half the detection limit for purposes of estimating the domestic loading of these pollutants.

While the Biosolids from the Winder WPCP are currently landfilled, the EPA guidelines in 40 CFR 503, Table 3 (clean sludge) were considered in establishing headworks loading limits to allow the City to consider other options for solids disposal in the future. Since molybdenum does not have a limit in Table 3, the ceiling limit was used for this pollutant only. While these limits were used in the calculations this parameter was not considered as the limited factor in establishing the MAHL since it is not part of the current Biosolids practice. This data has been presented to Winder for consideration if land application is considered in the future.

Waste quality criteria for acute and chronic (1Q10 and 7Q10) conditions and human health (annual average) were taken from the GA EPD rules, Section 391-3-6-.03, revised July 23, 2018.

METHODOLOGY

The general methodology used to calculate local limits is described in the EPA *Local Limits Development Guidance* (2004). The source of data used in the calculations is discussed below. Actual calculations were made using an Excel spreadsheet. A copy of the input data and the Allowable Headworks Loading calculations for all parameters recommended for local limits are shown following the example calculations.

Flow and Loading Data

Plant actual flow information is an average daily flow for 2018. Cedar Creek and Marburg Creek are permitted to discharge 4.0 mgd and 0.6 mgd, respectively. About 36% of the permitted flow was utilized at Cedar Creek and about 34% at Marburg Creek. Industrial permitted flows account for about 23% of the current plant flow at Cedar Creek with no industrial flow at Marburg Creek. Marburg Creek is provided an allowance of industrial flows at 0.05 mgd and this proportion of industrial flows is projected to be consistent for the foreseeable future. Stream flows were taken from the fact sheet prepared by EPD and included with the NPDES permits for the facilities. Sludge calculations used total annual production of Biosolids in 2018 and assumed a linear increase up to plant permit limits. Only the Marburg discharge flow is considered in the water quality evaluations. Flow information is summarized in Table 3 below:

Table 3
Flows and Loadings

	Cedar Creek	**Marburg Creek**
Stream 7Q10 – Acute	1.2 cfs	1.2 cfs
Stream 1Q10 – Chronic	1.1 cfs	1.1 cfs
Stream Annual Average	24 cfs	13.2 cfs
Plant Flow – Permit Limit	4.0 mgd	0.60 mgd
Plant Flow – 2018 Average	1.43 mgd	0.51 mgd
Industrial Flow – 2018 Permitted	0.33 mgd	0.05 (assumed)
Industrial Flow – At permit flow	1.13 mgd	0.16 mgd
Sludge Production – 2018	215 tons/year	56 tons/year
Sludge Production – At permit flow	599 tons/year	166 tons/year

Note: Marburg combined flow = 1.5 mgd

Water Quality Criteria

Acute, Chronic, and human health water quality criteria are established for priority pollutants by the Environmental Protection Division for all waters of the State. These standards and the ability of the plant to remove these pollutants are utilized to determine a loading at the headworks of the plant that will not pass thru the plant and cause the receiving stream to exceed the standard. The water quality criteria for the pollutants of concern are shown in Table 4 at the end of this section.

Since the concentration of most pollutants of concern are below detection limits for both the influent and effluent of the POTW treatment plant, determination of site specific removal efficiencies was not conducted. Instead, values from the table in the 2004 Manual were used. For the Winder WPCP the

median values from the range of removal rates in the Manual were used based on the high quality of treatment that the facilities provide including chemical precipitation and filtration. The removal rates for pollutants of concern are shown in Table 4.

Process Inhibition Criteria

The loading of pollutants on the plant must be such that the pollutant will not interfere with the ability of the plant to remove BOD or ammonia. Since there have been no instances when the failure of the BOD or ammonia removal process could be attributed to influent priority pollutant loadings, no local limits can be established. For these inhibition levels, generally the lowest value shown as inhibitory to the process in the 2004 Manual were used to determine loadings that might interfere with the activated sludge ability to remove carbonaceous demand and ammonia. The inhibition criteria used are shown in Table 4.

Sludge (Biosolids) Protection

Conservative pollutants that are removed from the flow as it passes through the treatment process will accumulate in the sludge. These pollutants are removed at the rate discussed above under water quality criteria. Since the sludge from the facility is landfilled, the headworks loading is not restricted by the 503 regulations. These limits were considered but are not used as a factor in establishing the local limits for Winder. These limits are shown in Table 4.

NPDES Permit Limits

Each facility has a permit limit for one priority pollutant. Similar to the water quality criteria, these limits must be considered as adjusted by the removal of the pollutant through the treatment process, but without the dilution allowed for water quality criteria. These limits are shown in Table 4.

Table 4

Removal Rates

	Removal Rates (1)	Process Inhibition		Water Quality Criteria (3)			Back - ground (4)	NPDES Permit (5)
	Activated Sludge	Activated Sludge	Nitrification	7Q10 (Chronic)	1Q10 (Acute)	Annual Average	Domestic	
	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	45%	6	1.5	0.15	0.34	0.05	0.0025	
Cadmium	67%	15	5.2	0.00043	0.00094		0.004	
Chromium VI	82%	1.0	5.0	0.011	0.016			
Chromium (T)	82%	1.0	1.0	0.016	0.011		0.025	
Copper	86%	1.0	0.25	0.005	0.007		0.0227	0.0159 (Marburg)
Cyanide	69%	0.25	0.4	0.0052			0.005	
Lead	61%	5.0	0.5	0.0012	0.03		0.0008	
Mercury	60%	0.5	0.4	1.2E-05	0.00029		0.0005	
Molybdenum	82%	-	-					
Nickel	42%	1.75	2.5	0.029	0.26		0.0025	
Selenium	50%	-	-	0.005			0.0025	
Silver	75%	-	-			0.0025	0.0028	
Zinc	79%	2.5	0.25	0.065	0.065		0.052	0.0903 (Cedar)

1. **Removal Efficiencies:** Local Limits Development Guidance Appendices US EPA, Office of Wastewater Management, July 2004, Appendix R
2. **Inhibition Levels:** Local Limits Development Guidance Appendices US EPA, Office of Wastewater Management, July 2004, Appendix G
3. **In-Stream Standards:** GA DNR Rules, Section 391-3-6-.03, July 28, 2018
4. **Background:** Influent testing of facilities with no industrial wastewater loadings. Rockdale Co, GA Snapping Shoals WPCP, Opelika AL, Westside WPCP, Average of 9 samples analyzed. Mercury from Mercury Characterization Study, Eastside and Westside POTWs, Opelika AL, 2018
5. **NPDES Values:** Current NPDES Permits issued by the GA EPD

ALLOWABLE HEADWORKS LOADING CALCULATIONS

The allowable headworks loading is determined for each of the criteria discussed above. The lowest of these values is then selected as the maximum allowable loading on the facility that will protect the plant based on all criteria. Calculations are performed by an Excel spreadsheet. Sample calculations for each of these criteria are provided below.

Acute Water Quality Criteria

The allowable headworks loading based in acute water quality criteria is the mass of a particular constituent that can be discharged from the POTW as still protect the receiving stream during a low flow condition that occurs at a frequency of one day in a ten year period. This calculation is shown below for arsenic at Cedar Creek:

$$ALH_{WQ\ Acute} = \frac{8.34[C_{wq}(Q_{str\ 1Q10} + Q_{potw})-(C_{str}*Q_{str})]}{1-R_{POTW}}$$

Where:

$AHL_{WQ\ Acute}$ = Allowable Headworks Loading based on Acute Water Quality Criteria
C_{wq} = Numerical acute water quality limit in 391-3-6-.03
$Q_{str\ 1Q10}$ = One day per 10 year low flow in the receiving stream (1Q10)
Q_{potw} = Permitted flow limit for the Winder WPCP
C_{str} = Concentration of the pollutant upstream of the discharge
R_{POTW} = Removal rate from the headworks to the effluent of the POTW
8.34 = Conversion Factor

For Arsenic the calculation is:

$$ALH_{WQ\ Acute} = \frac{8.34[0.34(0.71 + 4.0)-(0*0.71)]}{1-0.1} = 24.31 \text{ lbs/day}$$

Chronic Water Quality Criteria

The allowable headworks loading based in chronic water quality criteria is the mass of a particular constituent that can be discharged from the POTW as still protect the receiving stream during a low flow condition that occurs at a frequency of seven days in a ten-year period. This calculation is shown below for arsenic at Cedar Creek:

$$ALH_{WQ\ Chronic} = \frac{8.34[C_{wq}(Q_{str\ 7Q10} + Q_{potw})-(C_{str}*Q_{str})]}{1-R_{POTW}}$$

Where:

$AHL_{WQ\ Chronic}$ = Allowable Headworks Loading based on Chronic Water Quality Criteria
C_{wq} = Numerical chronic water quality limit in 391-3-6-.03
$Q_{str\ 1Q10}$ = Seven day per 10 year low flow in the receiving stream (7Q10)
Q_{potw} = Permitted flow limit for the Winder WPCP
C_{str} = Concentration of the pollutant upstream of the discharge
R_{POTW} = Removal rate from the headworks to the effluent of the POTW
8.34 = Conversion Factor

For Arsenic the calculation is:

$$ALH_{WQ\ Chronic} = \frac{8.34[0.15(0.78 + 4.0)-(0*0.78)]}{1-0.1} = 10.87\ lbs/day$$

Human Health Water Quality Criteria

The allowable headworks loading based in human health water quality criteria is the mass of a particular constituent that can be discharged from the POTW as still protect the receiving stream during annual average flow condition in the stream. This calculation is shown below for arsenic at Cedar Creek:

$$ALH_{WQ\ HH} = \frac{8.34[C_{wq}(Q_{str\ Avg} + Q_{potw})-(C_{str}*Q_{str})]}{1-R_{POTW}}$$

Where:

$AHL_{WQ\ HH}$ = Allowable Headworks Loading based on Human Health Water Quality Criteria
C_{wq} = Numerical water quality limit in 391-3-6-.03
$Q_{str\ Avg}$ = Annual average flow in the receiving stream
Q_{potw} = Permitted flow limit for the Winder WPCP
C_{str} = Concentration of the pollutant upstream of the discharge
R_{POTW} = Removal rate from the headworks to the effluent of the POTW
8.34 = Conversion Factor

For Arsenic the calculation is:

$$ALH_{WQ\ HH} = \frac{8.34[0.01(15.58+ 4.0)-(0*15.58)]}{1-0.1} = 2.970 lbs/day$$

Process Inhibition – Activated Sludge

The allowable headworks loading for priority pollutants that might inhibit the activated sludge process are the inhibition level of the pollutant entering the aeration system, which is the level entering the facility. Inhibition levels for protection of the activated sludge process are shown below for arsenic at Cedar Creek:

$$ALH_{A/S} = \frac{8.34(C_{inhib\text{-}AS})(Q_{potw})]}{1\text{-}R_{prim}}$$

Where:

$AHL_{A/S}$ = Allowable Headworks Loading based on Activated Sludge Inhibition
$C_{inhib\text{-}AS}$ = Inhibition level of a pollutant entering the aeration system
Q_{potw} = Permitted flow limit for the Winder WPCP
R_{prim} = Removal rate of the pollutant through primary treatment
8.34 = Conversion Factor

For Arsenic the calculation is:

$$ALH_{A/S} = \frac{8.34(6.0)(4.0)}{1\text{-}0.0} = 200.16 \text{ lbs/day}$$

Process Inhibition – Nitrification

The allowable headworks loading for priority pollutants that might inhibit the nitrification process are the inhibition level of the pollutant entering the aeration system. Inhibition levels for protection of the nitrification process are shown below for arsenic at Cedar Creek:

$$ALH_{nit} = \frac{8.34(C_{inhib\text{-}nit})(Q_{potw})}{1\text{-}R_{prim}}$$

Where:

AHL_{nit} = Allowable Headworks Loading based on nitrification Inhibition
$C_{inhib\text{-}nit}$ = Inhibition level of a pollutant entering the aeration (nitrification) system
Q_{potw} = Permitted flow limit for the Winder WPCP
R_{prim} = Removal rate of the pollutant through primary treatment
8.34 = Conversion Factor

For Arsenic the calculation is:

$$ALH_{nit} = \frac{8.34(1.5)(4.0)}{1\text{-}0.0} = 50.04 \text{ lbs/day}$$

NPDES Permit

The allowable headworks loading for priority pollutants that would pass through the POTW at concentrations that would exceed the NPDES Permit limit for that parameter. NPDES Permit criteria for zinc at Cedar Creek are shown below:

$$ALH_{NPDES} = \frac{8.34 * (C_{npdes}) * (Q_{potw})}{1 - R_{potw}}$$

Where:

AHL_{NPDES} = Allowable Headworks Loading based on NPDES Permit Limits
C_{npdes} = NPDES Permit Limit
Q_{sotw} = Permitted flow for the Winder POTW
R_{potw} = Removal rate of the pollutant through the treatment plant
8.34 = Conversion Factor

For Zinc the calculation is:

$$ALH_{NPDES} = \frac{8.34 * 0.0903 * 4.0}{1 - 0.79} = 14.34 \text{lbs/day}$$

Maximum Allowable Headworks Loading

Actual local limits calculations were made using an Excel spreadsheet. The results of these calculations for all pollutants of concern for each facility are shown in Table 5. Each of the values shown in Table 5 is projected to adversely impact the corresponding criteria if that loading is exceeded at the headworks of the WPCP. The lowest value for each pollutant of concern within that table is considered the Maximum Allowable Headworks Loading (MAHL) that would not cause adverse impacts for all the selected criteria and is shown in the right column.

Table 5
Maximum Allowable Headworks Loadings

	Process Inhibition		Water Quality Criteria			NPDESs	**MAHL**
	Activated Sludge	Nitrification	1Q10 (Acute)	7Q10 (Chronic)	Annual Average		
	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day*	**lb/day**
Cedar Creek							
Arsenic	200.16	50.04	24.31	10.87	2.970		**2.970**
Cadmium	166.80	173.47	0.12	0.052			**0.052**
Chromium (T)	33.36	33.36	3.50	2.436			**2.436**
Copper	33.36	8.34	1.97	1.424			**1.424**
Cyanide	8.34	13.34		0.669			**0.669**
Lead	166.80	16.68	3.02	0.123			**0.123**
Mercury	16.68	13.34	0.14	0.0012			**0.0012**
Nickel	58.38	83.40	17.62	1.99			**1.99**
Selenium				0.40			**0.40**
Silver					1.6		**1.63**
Zinc	83.40	8.34	12.17	12.34		14.34	**8.34**
Marburg Creek							
Arsenic	75.06	18.77	16.94	7.84	3.55		**3.55**
Cadmium	62.55	65.05	.08	.013			**0.013**
Chromium (T)	12.51	12.51	2.44	1.76			**1.76**
Copper	12.51	3.13	1.37	1.03		1.42	**1.03**
Cyanide	3.13	5.00		0.48			**0.48**
Lead	62.55	6.26	2.11	0.44			**0.44**
Mercury	6.26	5.00	0.10	0.001			**0.001**
Nickel	21.89	31.28	12.28	1.44			**1.44**
Selenium				0.29			**0.29**
Silver					1.95		**1.95**
Zinc	31.28	3.13	8.48	8.90			**3.13**

Note: Since Sludge is landfilled, Biosolids criteria are not included in determining MAHL

MAXIMUM ALLOWABLE INDUSTRIAL LOADING

The portion of each pollutant MAHL that can be allocated to industrial users is termed the maximum allowable industrial loading (MAIL). The MAIL is equal to the total MAHL, less the loading contributed by uncontrolled sources within the collection system including domestic, commercial and I&I (L_{UNC}), less an amount held in reserve as a safety factor (SF).

$$MAIL = MAHL\ (1\text{-}SF) - L_{UNC}$$

Where:

MAIL = Maximum Allowable Industrial Loading
MAHL = Maximum Allowable Headworks Loading
SF = Safety Factor
LUNC = Loading from Uncontrollable Sources

For Arsenic at Cedar Creek the calculation is:

$$MAIL = 2.970\ (1 - 0.10) - 0.064 = 2.61\ lb/day$$

Allocation of Local Limits

The calculation of the technically-based local limits is based on a uniform concentration allocation of the MAIL across a flow base consisting of the projected industrial flow at design plant flow plus an additional 10% flow allowance for new industries.

Since not all industries discharge all pollutants, the use of the uniform concentration allocation provides an additional safety measure in setting a local limit concentration. However, the uniform concentration limits are included in the Sewer Use Ordinance and are clear to industrial users and prospective users and make determination of compliance with the limits straightforward for both the industrial users and the City of Winder.

The MAIL in pounds per day as calculated in the equation above is divided by the uniform industrial flow to estimate the MAIL concentration limit. Where the calculated concentration limits were below background levels, those pollutants should not be allowed at measurable quantities into the POTW. The lowest MAIL concentration calculated for the two plants is used to set the recommended local limit as discussed in the next section.

The City of Winder will reserve the option of providing industries a mass allocation of pollutants that are within the MAHL for the POTW. The advantage of mass allocation is that industries can seek to reduce water consumption and the hydraulic loading on the WPCP without concern that the conservation measures may lead to non-compliance with the industrial user permit. The City may also choose to permit an industry at a higher mass limit, within the capabilities of the POTWs.

The MAIL in pounds per day and the corresponding concentration limits are shown in Table 6. EPA recommends use of a daily maximum limits when the criteria is short term or when protecting against

a short-term event. Since the MAIL for most pollutants is based on stream protection at 7Q10 flows, the concentration limits in Table 6 are the Recommendations and will be established as daily maximum values.

These values are shown in Table 6 and discussed following the table.

Table 6
Maximum Allowable Industrial Loading

	Limiting Facility	MAHL	Uncontrolled Sources	MAIL	**MAIL**
		lb/day	lb/day	lb/day	**mg/L**
Arsenic	Cedar Creek	2.970	0.064	2.609	**0.305**
Cadmium	Cedar Creek	0.052	0.009	0.038	**0.004**
Chromium (T)	Cedar Creek	2.436	0.064	2.128	**0.249**
Copper	Cedar Creek	1.424	0.583	0.698	**0.082**
Cyanide	Cedar Creek	0.669	0.128	0.473	**0.055**
Lead	Cedar Creek	0.123	0.029	0.082	**0.010**
Mercury*	Cedar Creek	0.001	0.007	-0.006	**0.0003**
Nickel	Cedar Creek	1.993	0.064	1.729	**0.202**
Selenium	Cedar Creek	0.399	0.064	0.295	**0.034**
Silver	Cedar Creek	1.633	0.092	1.378	**0.161**
Zinc	Cedar Creek	8.340	1.346	6.160	**0.720**

*Set to background level

Arsenic

The existing local limits for arsenic are 0.350 and 0.175 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.305 mg/L. It is recommended that a local limit for arsenic be set at 0.305 mg/L for the allowable loading for protection of water quality, human health.

Cadmium

The existing local limits for cadmium are 0.486 and 0.243 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.004 mg/L. It is recommended that the local limit for cadmium be set at 0.004 mg/L for the protection of water quality.

Chromium, Total

The existing local limits for chromium are 1.460 and 0.730 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.249 mg/L. EPD has no established chronic or acute standards for total chromium and the standards for chromium VI were used to determine the MAIL. It is recommended that the local limit of 0.249 be established as a limit for the protection of water quality and that the current limit for Chromium IV be deleted.

Copper

The existing local limits for copper are 3.554 and 1.777 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.082 mg/L. It is recommended that the local limit for copper be set at 0.082 mg/L for the protection of water quality.

Cyanide

The existing local limits for cyanide is 0.482 for instantaneous samples and the calculated MAIL concentration is 0.055 mg/L. It is recommended that the local limit for cyanide be set at 0.055 mg/L for the protection of water quality.

Lead

The existing local limits for lead are 0.914 and 0.457 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.010 mg/L. It is recommended that the local limit for lead be set at 0.010 mg/L for the protection of water quality.

Mercury

The existing local limits for mercury are 0.030 and 0.015 for instantaneous and 24-hour composite samples and the calculated MAIL is less than the MAHL for this pollutant. It is recommended that the local limit for mercury be set at 0.0003, the background level used in the calculations, for the protection of water quality.

Molybdenum

The is no current local limit for molybdenum and it has not been detected in the effluent of either POTW. In addition, the primary limitation for molybdenum is for Biosolids protection and Winder currently landfills its sludge. It is recommended that no limit be established for molybdenum.

Nickel

The existing local limits for nickel are 2.370 and 1.185 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.202 mg/L. It is recommended that the local limit for nickel be set at 0.202 mg/L for the protection of water quality.

Selenium

There is currently no local limit on selenium. It is recommended that a local limit of 0.034 mg/L be established for both plants for selenium based on the protection of water quality.

Silver

The existing local limits for silver are 2.290 and 1.145 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.161 mg/L. It is recommended that the local limit for silver be set at 0.161 mg/L for the protection of water quality.

Zinc

The existing local limits for zinc are 9.750 and 4.875 for instantaneous and 24-hour composite samples and the calculated MAIL concentration is 0.720 mg/L. It is recommended that the local limit for zinc be set at 0.720 mg/L for the protection of nitrification.

Summary

These items are summarized in Table 1.

CONVENTIONAL POLLUTANTS

The Winder POTWs are designed to remove BOD, TSS and ammonia in finite amounts. The allowable headworks loading for these parameters is the design loading of each. The capacity to allocate these pollutants to new industrial, business and residential customers is what remains between the design capacity and the current utilization as shown in Table 7 below.

Table 7
Conventional Pollutant Loadings

Pollutant	Design Capacity	2018 Influent Loading	% of Design Utilized	Projected at Design Flow	Remaining Capacity
Cedar Creek					
Flow – mgd	4.00	1.334	33%	4.00	0.0
BOD – ppd	10000	1100	11%	3300	6700
TSS – ppd	10000	2100	21%	6300	3700
NH3-N – ppd	1000	238	24%	710	290
Marburg Creek					
Flow – mgd	1.50	0.51	34%	1.50	0.0
BOD – ppd	3125	980	31%	2900	240
TSS – ppd	3125	1170	37%	3440	-0-
NH3-N – ppd	500	100	20%	300	200

As shown in Table 7, the WPCPs are operating at just about 33% of their hydraulic capacity and generally somewhat less of the pollutant loading limits except for TSS at Marburg Creek. Assuming the same trend as the plant reaches its flow capacity there is still available capacity for higher than current strength wastes as shown in the last column of the table.

Since there is limited capacity at the facilities, particularly concerning the TSS at Marburg Creek, this loading should be allocated to industrial users based on careful consideration by the City of the impact on the treatment plant and the treatment plant capacity.

For this reason, it is recommended that the City establish prohibited levels of conventional pollutants at domestic levels and that any discharge above these levels only allowed by Industrial User permit after thoughtful deliberation of the impact on the POTW treatment plants. The recommenced domestic concentrations are:

- BOD 250 mg/L
- TSS 250 mg/L
- NH3-N 30 mg/L
- Total P 4 mg/L