

TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For Zinc in Eastanollee Creek

Stephens County, Georgia

Savannah River Basin

(HUC 03060102)

July 2, 2001



Total Maximum Daily Load (TMDL) Summary

Under the authority of Section 303(d) of the Clean Water Act, 33 U.S.C. 1251 et seq., as amended by the Water Quality Act of 1987, P.L. 100-4, the U.S. Environmental Protection Agency is hereby establishing a TMDL for zinc for the protection of aquatic life in the Eastanollee Creek watershed.

On its 1998 and 2000 §303(d) list, the State of Georgia identified 14 miles of Eastanollee Creek, from Toccoa to Lake Hartwell, in the Savannah River basin as not supporting its designated uses for the parameter zinc. Although EPA Region 4 established a zinc Total Maximum Daily Load (TMDL) for the Eastanollee Creek watershed in March 2000, a revised TMDL was proposed on December 29, 2000 and included the following changes:

- The Toccoa Water Pollution Control Plant will be included in the wasteload allocation.
- Zinc loads from nonpoint sources are included in the TMDL.
- The acute criterion for zinc will be addressed.
- The wasteload allocation was established using a metals translator consistent with Georgia's water quality standards.
- The description of implementation of the wasteload allocation will address GAEPD's Reasonable Potential Procedures.

In addition, this final TMDL report reflects three notable changes from the TMDL that was proposed for public review and comment on December 29, 2000. Based on a re-examination of the State of Georgia's water quality rules and regulations, EPA determined that the use of the metals translator in scenario two of the proposed TMDL report should not have necessarily resulted in a requirement for the permitted dischargers to conduct a site-specific study on metals translators. This final TMDL report does not include a scenario with such a requirement. The TMDL also includes a clarification of the time averaging periods for which the allocations apply. Specifically, consistent with Georgia's water quality standards, the TMDL to protect the chronic criteria is established as a 96-hour average allocation and the TMDL to protect the acute criteria is established as a 1-hour average allocation. In addition the wasteload allocation is expressed in terms of both total recoverable zinc and dissolved zinc. Because the wasteload allocation and the load allocation are expressed in terms of dissolved zinc, specific TMDL values are determined for specific flow rates in Eastanollee Creek. Therefore, the zinc TMDL for Eastanollee Creek is established as follows:

TMDL Summary

CRITERION PROTECTED	WASTELOAD ALLOCATION (in terms of total recoverable zinc to be protective of the dissolved criterion)	WASTELOAD ALLOCATION (in terms of dissolved zinc for the purposes of being consistent with the load allocation)	LOAD ALLOCATION (in terms of dissolved zinc for all waters originating from nonpoint sources)	TMDL (in terms of dissolved zinc)	MARGIN OF SAFETY
Dissolved Chronic Criterion for Zinc	<p>Toccoa WPCP: 112 µg/l (as a 96-hour average) and 0.615 kg/day (as a 96-hour average)</p> <p>Coats American: 112 µg/l (as a 96-hour average) and 0.551 kg/day (as a 96-hour average)</p> <p>Total allowable load: 1.166 kg/day (as a 96-hour average)</p>	<p>Toccoa WPCP: 32.3 µg/l (as a 96-hour average) and 0.177 kg/day (as a 96-hour average)</p> <p>Coats American: 32.3 µg/l (as a 96-hour average) and 0.159 kg/day (as a 96-hour average)</p> <p>Total allowable load: 0.336 kg/day (as a 96-hour average)</p>	<p>32.3 µg/l (as a 96-hr average)</p> <p>For the 7Q10 flow, this allocation concentration corresponds to a load of 0.103 kg/day (as a 96-hr average)</p>	<p>The specific TMDL value will vary according to the flow in Eastanollee Creek</p> <p>For the 7Q10 flow, the TMDL is equal to 0.439 kg/day (as a 96-hr average)</p>	Implicit
Dissolved Acute Criterion for Zinc	<p>Toccoa WPCP: 123 µg/l (as a 1-hour avg) and 0.674 kg/day (as a 1-hour average)</p> <p>Coats American: 123 µg/l (as a 1-hour avg) and 0.604 kg/day (as a 1-hour average)</p> <p>Total allowable load : 1.278 kg/day (as a 1-hour average)</p>	<p>Toccoa WPCP: 35.4 µg/l (as a 1-hour avg) and 0.194 kg/day (as a 1-hour average)</p> <p>Coats American: 35.4 µg/l (as a 1-hour avg) and 0.174 kg/day (as a 1-hour average)</p> <p>Total allowable load : 0.368 kg/day (as a 1-hour average)</p>	<p>35.4 µg/l (as a 1-hr avg)</p> <p>For the 1Q10 flow, this allocation concentration corresponds to a load of 0.104 kg/day (as a 96-hr average)</p>	<p>The specific TMDL value will vary according to the flow in Eastanollee Creek</p> <p>For the 1Q10 flow, the TMDL is equal to 0.472 kg/day (as a 96-hr average)</p>	Implicit

Original signed by Doug Mundrick for
Beverly H. Banister, Water Management Division Director

July 2, 2001
Date

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Introduction

On March 7, 2000, EPA Region 4 established a zinc Total Maximum Daily Load (TMDL) for the Eastanollee Creek watershed. In a letter dated June 5, 2000, the Environmental Protection Division of the Georgia Department of Natural Resources (GAEPD) informed EPA Region 4 that the TMDL established in March did not consider the City of Toccoa Water Pollution Control Plant (WPCP) as a source of zinc to Eastanollee Creek. In this letter, GAPED requested that EPA modify the TMDL so that it would include the City of Toccoa WPCP in the wasteload allocation. Upon reevaluation of the TMDL, EPA Region 4 determined that a revision would be necessary to include the City of Toccoa WPCP. Furthermore, EPA Region 4 determined in its reevaluation that additional aspects of the TMDL should be modified to improve the TMDL. As a result, EPA Region 4 re-proposed the zinc TMDL for Eastanollee Creek on December 29, 2000 to include the following changes:

- The Toccoa Water Pollution Control Plant is included in the wasteload allocation.
- Zinc loads from nonpoint sources are included in the TMDL.
- The acute criterion for zinc is addressed.
- The wasteload allocation is established using a metals translator consistent with Georgia's water quality standards.
- The description of implementation of the wasteload allocation addresses GAEPD's Reasonable Potential Procedures.

In addition, this final TMDL report reflects three notable changes from the TMDL that was proposed for public review and comment on December 29, 2000. Based on a re-examination of the State of Georgia's water quality rules and regulations, EPA determined that the use of the metals translator in scenario two of the proposed TMDL report should not have necessarily resulted in a requirement for the permitted dischargers to conduct a site-specific study on metals translators. This final TMDL report does not include a scenario with such a requirement. The TMDL also includes a clarification of the time averaging periods for which the allocations apply. Specifically, consistent with Georgia's water quality standards, the TMDL to protect the chronic criteria is established as a 96-hour average allocation and the TMDL to protect the acute criteria is established as a 1-hour average allocation. In addition the wasteload allocation is expressed in terms of both total recoverable zinc and dissolved

zinc. Because the wasteload allocation and the load allocation are expressed in terms of dissolved zinc, specific TMDL values are to be determined for specific flow rates in Eastanollee Creek.

The State of Georgia assesses its water bodies for compliance with water quality standards criteria established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into three categories; supporting, partially supporting, or not supporting their designated uses depending on water quality assessment results. These water bodies are found on Georgia's 305(b) list as required by that section of the CWA that defines the assessment process, and are published in *Water Quality in Georgia* every two years.

Some of the 305(b) partially and not supporting water bodies are also assigned to Georgia's 303(d) list, also named after that section of the CWA. These water bodies are considered to be water quality limited and can not meet their designated use standards. Water bodies on the 303(d) list are required to have a TMDL established for the water quality constituent(s) in violation of the water quality standard. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality based controls to be developed to reduce pollution and restore and maintain water quality. The TMDL establishes the allowable loadings to the water body, thereby providing the basis for addressing the water quality impairment.

On its 2000 §303(d) list, the State of Georgia identified 14 miles of Eastanollee Creek, from Toccoa to Lake Hartwell, in the Savannah River basin as not supporting its designated uses for the parameter zinc. In addition, this same segment of Eastanollee Creek is listed as not supporting its designated uses for copper, fecal coliform, and toxicity. TMDLs for copper and fecal coliform were respectively established for Eastanollee Creek in February and March 2000. As mentioned above, a zinc TMDL for Eastanollee Creek was established in March 2000.

The listing of Eastanollee Creek for zinc resulted from the assessment of water quality data collected from four sampling stations along Eastanollee Creek.

Watershed Description

The Eastanollee Creek watershed is located in the Savannah River basin in northeastern Georgia in Stephens County. The watershed is part of the Southern Inner Piedmont ecoregion of the Southeastern Temperate Forested Plains and Hills. Eastanollee Creek originates near the center of

Toccoa, Georgia and flows for approximately 14 miles before entering a branch of Hartwell Lake (see Figure 1).

Eastanollee Creek receives wastewater discharged from five point sources, two of which discharge zinc loads. The City of Toccoa WPCP is a major municipal point source that is currently permitted to discharge up to 1.45 million gallons per day (MGD) of wastewater to Eastanollee Creek just downstream of the Rose Lane bridge crossing. Coats American is a major point source which discharges an average of 1.3 MGD of wastewater to Eastanollee Creek just upstream of the Rose Lane bridge crossing. The City of Toccoa WPCP and Coats American have historically discharged zinc to Eastanollee Creek. Eastanollee Elementary School, Stephens County High School, and Dogwood Lane Mobile Home Park are minor point sources which discharge a combined total of 0.037 MGD of wastewater to the Eastanollee Creek watershed. However, wastewater discharged from these minor point sources is not expected to contain any level of zinc. Therefore, these minor point sources will not be included in the wasteload allocation.

On its 2000 §303(d) list GAEPD indicates that in addition to the zinc sources such as the City of Toccoa's WPCP and Coats American, potential causes of zinc impairment in Eastanollee Creek include urban runoff. Overflowing manholes are specifically mentioned as a problem.

The 1-day, 10-year minimum (1Q10) statistical flow value of Eastanollee Creek, in the vicinity of the outfalls of the major point sources, is 1.2 cubic feet per second (cfs). In addition, the 7-day, 10-year minimum (7Q10) statistical flow value associated with this part of Eastanollee Creek is 1.3 cfs. Therefore, during either 1Q10 or 7Q10 low-flow conditions, the streamflow is expected to consist of approximately 75-80% wastewater from the five facilities which discharge to Eastanollee Creek.

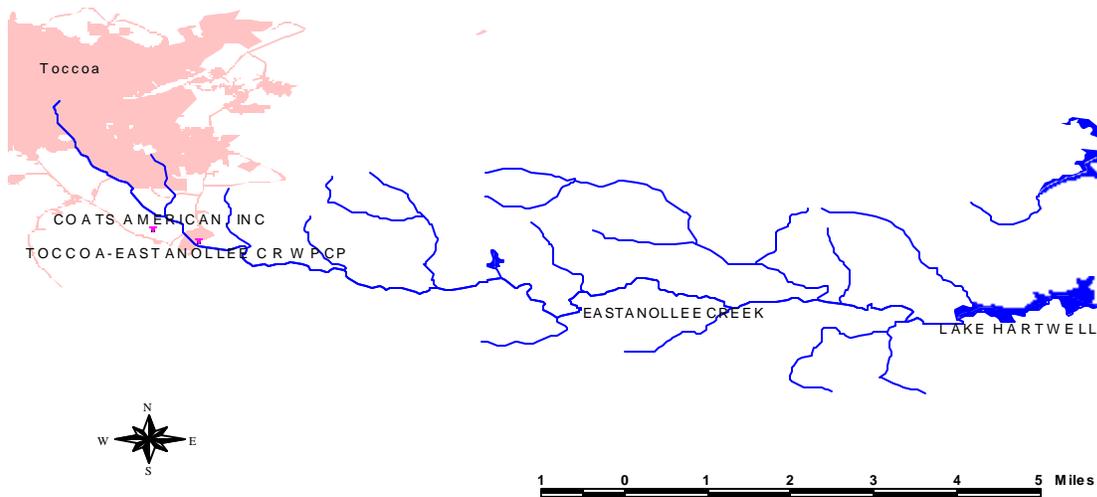


Figure 1. Eastanollee Creek Watershed

Target Identification

Numeric Target

The water use classification for Eastanollee Creek is fishing. The fishing classification, as stated in Georgia's Rules and Regulations for Water Quality Control Chapter 391-3-6-.03(6)(c), is established to protect the "[p]ropagation of Fish, Shellfish, Game and Other Aquatic Life; secondary contact recreation in and on the water; or for any other use requiring water of a lower quality."

Metals effluent permit limitations are required to be expressed as total recoverable metal per 40 CFR §122.45(c). Therefore, the wasteload allocation component of the TMDL will be expressed as the allowable concentration and load of total recoverable zinc that will be protective of the dissolved zinc chronic criterion and the allowable concentration and load of total recoverable zinc that will be protective of the dissolved zinc acute criterion. However, in order to calculate TMDLs for specific flow values in Eastanollee Creek and considering that the load allocation is expressed in terms of dissolved zinc, the wasteload allocation will also be expressed in terms of dissolved zinc.

Chapter 391-3-6-.03 of Georgia's Rules and Regulations requires that instream concentrations of dissolved zinc shall not exceed the acute criterion indicated below under 1Q10 or higher stream flow conditions and shall not exceed the chronic criterion indicated above under 7Q10 or higher stream flow

conditions. Georgia's Rules and Regulations defines the acute criteria as the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects. It also defines the chronic criteria as the highest concentration of a pollutant to which the aquatic life can be exposed for an extended period of time (4 days) without deleterious effects.

In addition, Georgia's Rules and Regulations establishes criteria for metals which applies to all waters in the State. The established chronic criterion and acute criterion for dissolved zinc are as follows:

$$\text{acute criteria for dissolved zinc} = (e^{(0.8473[\ln(\text{hardness})] + 0.8604)})(0.978) \mu\text{g/l}$$

$$\text{chronic criteria for dissolved zinc} = (e^{(0.8545[\ln(\text{hardness})] + 0.7614)})(0.986) \mu\text{g/l}$$

where hardness is expressed as mg/l as CaCO_3 .

In accordance with Georgia Regulation 391-3-6-.03(5)(e)(ii), EPA's "Guidance Document of Dynamic Modeling and Translators August 1993" or other appropriate guidance from EPA may be used to determine the relationship between the total recoverable concentration of a metal and the dissolved form of a metal. In addition, Georgia Regulation 391-3-6-.06(4)(d)5.(ii)(b)(2) allows methods from this EPA guidance document to be used to translate dissolved criteria concentrations into total recoverable permit limits. EPA's June 1996 document, "The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion", includes EPA's most recent technical guidance concerning this relationship for various metals including zinc. This relationship, for an individual metal such as zinc, can be characterized as a metals translator. EPA's June 1996 guidance document for metals translators includes default linear partition coefficient values for zinc that may be used when site-specific data is not available.

Sources

Eastanollee Creek's use support determination was made for zinc based on water quality samples that were collected from four sampling stations between 1989 and 1998. The measured concentrations are tabulated in Table 1. It is important to note that the Collier Road bridge crossing is located upstream of both of the major point source discharges. The Rose Lane bridge crossing is located downstream of the Coats American outfall and upstream of the City of Toccoa WPCP outfall. The Meadow Brook Drive and Yow Mill Road bridge crossings are located downstream of both major point sources.

Table 1. Zinc Data Collected From Eastanollee Creek

Date	Station location description	Measured total recoverable zinc concentration (µg/l)	Measured dissolved zinc concentration (µg/l)	Measured Total Hardness (mg/l as CaCO ₃)	Acute criterion (µg/l)	Chronic Criterion (µg/l)
10/5/94	Collier Road	76	-	24.5	35.4	32.3
10/5/94	Just downstream Coats American	44	-	29.4	40.6	37
10/21/91	Rose Lane	91	-	24	35.4	32.3
10/5/94	Rose Lane	89	-	27.4	38.2	34.9
7/6/89	Meadow Brook Dr	45	-	21	35.4	32.3
8/30/89	Meadow Brook Dr	25	-	36	48.2	44
10/19/89	Meadow Brook Dr	64	-	40	52.7	48.1
12/6/89	Meadow Brook Dr	120	-	34	45.9	41.9
7/2/90	Meadow Brook Dr	21	20	28	38.9	35.5
10/31/90	Meadow Brook Dr	26	41	32	43.6	39.8
7/21/97	Yow Mill Road	12	-	20.7	35.4	32.3
9/30/98	Yow Mill Road	14	-	17.5	35.4	32.3

The City of Toccoa WPCP, the Coats American facility, and urban runoff have been identified as the potential causes for the zinc impairment of Eastanollee Creek on the State's §303(d) list. Concerning the major point sources, data included in the facilities' Discharge Monitoring Reports indicate concentrations of zinc greater than that allowed by the State's water quality standards. In addition, the "City of Toccoa's overflowing manholes" were mentioned on the State's §303(d) list. Zinc loads from manholes originating from the City's collection system could potentially directly enter Eastanollee Creek, or could enter the creek indirectly through urban runoff. Based on the available data, it is currently unknown whether zinc loads from other types of urban sources exist. However, based on the single available sample collected at the Collier Road bridge crossing, it is apparent that there may be

no assimilative capacity available in the portion of Eastanollee Creek located upstream from the major point sources.

TMDL Development Approach

The TMDL development approach is determined according to the available information concerning the causes of impairment. It is apparent based on the available information that the major point sources cause or contribute to the zinc impairment of Eastanollee Creek. However, it is not known the degree to which nonpoint sources contribute to the impairment. As a result, allocations will be given to the point sources and nonpoint sources which individually require the attainment of water quality standards before these loads reach Eastanollee Creek. Specifically, the concentration of zinc in effluent discharged from the point sources shall not exceed the water quality criteria established by the State. Furthermore, the concentration of zinc in waters originating from nonpoint sources shall not exceed the water quality criteria established by the State.

For TMDL purposes, steady-state models are applied for "critical" environmental conditions that represent extremely low assimilative capacity. For effluent-dominated riverine systems, critical environmental conditions typically correspond to drought upstream flows. The assumption behind steady-state modeling is that effluent concentrations that protect water quality during critical conditions will be protective for the large majority of environmental conditions that occur.

Since the potential nonpoint source contributions to the zinc impairment of Eastanollee Creek are not well understood, it is difficult to define appropriate critical conditions for the nonpoint source loads. However, the load allocation will require that zinc concentrations in waters originating from any and all nonpoint sources shall not exceed the water quality standards at all times. In addition, the wasteload allocation will require that zinc concentrations in waters originating from the point sources shall be consistent with the State's water quality standards at all times. Therefore, water quality standards will be protected for the large majority of environmental conditions that are expected to occur.

Based on the available hardness data measured in Eastanollee Creek (see Table 1), nearly 50% of the values are below 25 mg/l as CaCO₃. A hardness value of 25 mg/l as CaCO₃, the minimum value used for metals criteria calculations, corresponds to a dissolved zinc chronic criterion of 32.3 µg/l and a dissolved zinc acute criterion of 35.4 µg/l.

Consistent with the suggestions of the EPA's 1996 metals translator guidance document, the translator for converting total recoverable zinc concentrations to dissolved zinc concentrations is determined using the methods documented in EPA's "Technical Guidance Manual for Performing

Waste Load Allocations – Book II: Streams and Rivers”. The partition coefficient for zinc found in the EPA’s Technical Guidance Manual is expressed as:

$$K_d = K_{po} * TSS^{+a}$$

where K_d = partition coefficient for zinc in L/kg

K_{po} = 1.25×10^6

TSS = total suspended solids concentration in mg/l

a = -0.7038

It is important to note that the authors of EPA’s Technical Guidance Manual derived the above K_{po} coefficient and the ‘a’ exponent based on the statistical analysis of 2253 data records collected from rivers and streams distributed throughout the United States.

The partitioning of zinc between solid and dissolved phases can be determined as a function of the partition coefficient for zinc and the concentration of solids in the water column. This function is expressed as: $C_t/C_d = 1 + K_d * TSS * (10^{-6} \text{ kg/mg})$

where C_t = total zinc concentration in $\mu\text{g/l}$

C_d = dissolved zinc concentration in $\mu\text{g/l}$

Instream TSS data for Eastanollee Creek is extremely limited. Based on the available data, the instream average TSS concentration is estimated to be 10 mg/l. Applying a value of 10 mg/l to the above relationship, the expected ratio of total zinc to dissolved zinc (i.e., the translation factor) is 3.47.

Allocation

A TMDL is the sum of the individual WLAs for point sources and load allocations (LA) for nonpoint sources and natural background (40 CFR 130.2). The sum of these components may not result in an excursion of water quality standards for that water body. To protect against excursions, the TMDL must also include a margin of safety (MOS), either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the water quality response of the receiving water body. Conceptually, a TMDL can be expressed as follows:

$$\text{TMDL} = \Sigma\text{WLAs} + \Sigma\text{LAs} + \text{MOS}$$

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while maintaining water quality standards. For pollutants such as metals, TMDLs can be expressed on a mass loading basis (e.g., kilograms per day) or a concentration basis (e.g., $\mu\text{g/l}$). In accordance with 40 CFR Part 130.2(i), "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." For this particular TMDL, the allocation will be expressed in terms of concentration and mass loading. It is important to note that the specific mass loading value expressed by the load allocation is applicable only for the critical low-flow conditions. However, the allowable concentration specified by the load allocation applies for any flow condition. Consistent with Chapter 391-3-6-.03 of Georgia's Rules and Regulations, the allocation established to protect the chronic zinc criterion is expressed as a 96-hour average and the allocation established to protect the acute zinc criterion is expressed as a 1-hour average.

Wasteload Allocation

As is stated in the "TMDL Development Approach" section of this report, the dissolved zinc chronic criterion is equal to $32.3 \mu\text{g/l}$ and the dissolved zinc acute criterion is equal to 35.4

Allowable concentrations to protect dissolved zinc chronic and acute criterion:

Using a translation factor equal to 3.47, the allowable instream total recoverable concentrations are $112 \mu\text{g/l}$ and $123 \mu\text{g/l}$ in order to respectively protect against chronic and acute effects of zinc. **Since there is no dilution available from background or nonpoint sources, the effluent concentration from each point source cannot exceed the allowable instream total recoverable chronic and acute concentrations of $112 \mu\text{g/l}$ and $123 \mu\text{g/l}$. In addition, the effluent concentration from each point source cannot exceed the dissolved zinc chronic and acute concentrations of $32.3 \mu\text{g/l}$ and $35.4 \mu\text{g/l}$.**

Allowable loading to protect the dissolved zinc chronic criterion:

allowable loading = sum of the allowable loadings from the individual point sources

where the allowable loading from an individual point source is calculated as follows:

allowable loading from each point source = (allowable effluent conc.) x (effluent flow rate) x (unit conversion factor)

allowable loading from Toccoa WPCP = (allowable effluent conc.) x 1.45×10^6 gallons/day x 3.785×10^{-9} l*kg/(ug*gallons)

allowable loading from Coats American = (allowable effluent conc.) x 1.3×10^6 gallons/day x 3.785×10^{-9} l*kg/(ug*gallons)

1. allowable total recoverable zinc loading from the Toccoa WPCP	= 0.615 kg/day
2. allowable total recoverable zinc loading from Coats American	= 0.551 kg/day
3. allowable dissolved zinc loading from the Toccoa WPCP	= 0.177 kg/day
4. allowable dissolved zinc loading from Coats American	= 0.159 kg/day
allowable total recoverable zinc loading to protect the chronic zinc criterion	= 1.166 kg/day
allowable dissolved zinc loading to protect the chronic zinc criterion	= 0.336 kg/day

Allowable loading to protect the dissolved zinc acute criterion:

allowable loading from each point source = (allowable effluent conc.) x (effluent flow rate) x (unit conversion factor)

1. allowable total recoverable zinc loading from the Toccoa WPCP	= 0.674 kg/day
2. allowable total recoverable zinc loading from Coats American	= 0.604 kg/day
3. allowable dissolved zinc loading from the Toccoa WPCP	= 0.194 kg/day
4. allowable dissolved zinc loading from Coats American	= 0.174 kg/day
allowable total recoverable zinc loading to protect the acute zinc criterion	= 1.278 kg/day
allowable dissolved zinc loading to protect the acute zinc criterion	= 0.368 kg/day

Load Allocation

The dissolved concentration of zinc in waters originating from nonpoint sources which drain to Eastanollee Creek shall not exceed Georgia's water quality criteria for zinc. **In order to be protective of Georgia's chronic criterion, the concentration of dissolved zinc originating from nonpoint sources shall not exceed an average of 32.3 µg/l during a 96-hour time interval. In order to be protective of Georgia's acute criterion, the concentration of dissolved zinc originating from nonpoint sources shall not exceed an average of 35.4 µg/l during a 1-hour time interval.**

These concentration allocations can be expressed as allowable loads for specific flow values. If the total flow originating for nonpoint sources is equal to the 7Q10 statistical flow value, then the allowable mass loading of dissolved zinc from nonpoint sources to be protective of the chronic criterion would be determined as follows:

Allowable loading from nonpoint sources = (allowable chronic concentration) x (7Q10 flow rate) x (unit conv. factor)

Allowable loading from nonpoint sources = 32.3 µg/l x 1.3 cfs x 0.002447 L*kg*sec/(ft³*µg*day) = 0.103 kg/day

If the total flow originating for nonpoint sources is equal to the 1Q10 statistical flow value, then the allowable mass loading of dissolved zinc from nonpoint sources to be protective of the acute criterion would be determined as follows:

Allowable loading from nonpoint sources = (allowable acute concentration) x (1Q10 flow rate) x (unit conv. factor)

Allowable loading from nonpoint sources = 35.4 µg/l x 1.2 cfs x 0.002447 L*kg*sec/(ft³*µg*day) = 0.104 kg/day

It is important to note that the allowable loading from nonpoint sources will be greater for higher flow rates. The allowable mass loading is directly proportional to the flow rate and the allowable dissolved zinc concentration.

TMDL Summary

This TMDL can be summarized as follows:

Table 2. TMDL SUMMARY

CRITERION PROTECTED	WASTELOAD ALLOCATION (in terms of total recoverable zinc to be protective of the dissolved criterion)	WASTELOAD ALLOCATION (in terms of dissolved zinc for the purposes of being consistent with the load allocation)	LOAD ALLOCATION (in terms of dissolved zinc for all waters originating from nonpoint sources)	TMDL (in terms of dissolved zinc)	MARGIN OF SAFETY
Dissolved Chronic Criterion for Zinc	<p>Toccoa WPCP: 112 µg/l (as a 96-hour average) and 0.615 kg/day (as a 96-hour average)</p> <p>Coats American: 112 µg/l (as a 96-hour average) and 0.551 kg/day (as a 96-hour average)</p> <p>Total allowable load: 1.166 kg/day (as a 96-hour average)</p>	<p>Toccoa WPCP: 32.3 µg/l (as a 96-hour average) and 0.177 kg/day (as a 96-hour average)</p> <p>Coats American: 32.3 µg/l (as a 96-hour average) and 0.159 kg/day (as a 96-hour average)</p> <p>Total allowable load: 0.336 kg/day (as a 96-hour average)</p>	<p>32.3 µg/l (as a 96-hr avg)</p> <p>For the 7Q10 flow, this allocation concentration corresponds to a load of 0.103 kg/day (as a 96-hr average)</p>	<p>The specific TMDL value will vary according to the flow in Eastanollee Creek</p> <p>For the 7Q10 flow, the TMDL is equal to 0.439 kg/day (as a 96-hr average)</p>	Implicit
Dissolved Acute Criterion for Zinc	<p>Toccoa WPCP: 123 µg/l (as a 1-hour avg) and 0.674 kg/day (as a 1-hour average)</p> <p>Coats American: 123 µg/l (as a 1-hour avg) and 0.604 kg/day (as a 1-hour average)</p> <p>Total allowable load : 1.278 kg/day (as a 1-hour average)</p>	<p>Toccoa WPCP: 35.4 µg/l (as a 1-hour avg) and 0.194 kg/day (as a 1-hour average)</p> <p>Coats American: 35.4 µg/l (as a 1-hour avg) and 0.174 kg/day (as a 1-hour average)</p> <p>Total allowable load : 0.368 kg/day (as a 1-hour average)</p>	<p>35.4 µg/l (as a 1-hr average)</p> <p>For the 1Q10 flow, this allocation concentration corresponds to a load of 0.104 kg/day (as a 96-hr average)</p>	<p>The specific TMDL value will vary according to the flow in Eastanollee Creek</p> <p>For the 1Q10 flow, the TMDL is equal to 0.472 kg/day (as a 96-hr average)</p>	Implicit

Seasonal Variation

The wasteload allocation and load allocation provide for year-round protection of the water quality standards for zinc and therefore adequately account for seasonal variability.

Margin of Safety

The MOS is a required component of TMDL development. As specified by section 303(d) of the CWA, the margin of safety must account for any lack of knowledge concerning the relationship between effluent limitations and water quality. There are two basic methods for incorporating the MOS: 1) Implicitly incorporate the MOS using conservative assumptions to develop allocations; or 2) Explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations.

The MOS was implicitly incorporated into the TMDL for Eastanollee Creek through the use of conservative assumptions in the development of the wasteload allocation and load allocation. Specifically, these assumptions include the use of the low hardness value of 25 mg/l as CaCO₃ and the assumption that there is no assimilative capacity available in Eastanollee Creek upstream of the NPDES permitted dischargers.

Recommendations

An allocation to an individual point source discharger does not automatically result in a permit limit or a monitoring requirement. Through its NPDES permitting process, the State of Georgia will determine whether the City of Toccoa WPCP and Coats American have a reasonable potential of discharging zinc levels equal to or greater than the allocated concentration and load. The results of this reasonable potential analysis will determine the specific type of requirements in each facility's NPDES permit. As part of its analysis, the State's NPDES permitting group will use its most current EPA-approved NPDES Reasonable Potential Procedures to determine whether monitoring requirements or effluent limitations are necessary. If effluent limitations or monitoring requirements are determined through a reasonable potential analysis to be necessary for any or all of these facilities, it is recommended that concentration limits or concentration monitoring requirements should be imposed in addition to any loading limits or monitoring requirements.

Metals effluent permit limitations are required to be expressed as total recoverable metal per 40 CFR §122.45(c). Therefore, if the State determines that effluent limits or monitoring requirements are necessary for either or both of permitted facilities impacted by the TMDL, these permitting

requirements would be reflected as total recoverable zinc only. As mentioned in the Target Identification Section of this report, the wasteload allocation is also expressed in terms of dissolved zinc only for the purposes of being consistent with the terms of the load allocation.

Further studies of Eastanollee Creek should be conducted in order to provide a better understanding of the zinc impairment originating from nonpoint sources. Collection of zinc samples throughout the urban areas of the watershed will provide the State with a much better understanding of the specific causes of the impairment. In addition, a stream-walk of Eastanollee Creek conducted by environmental scientists or engineers would help provide information concerning potential sources of zinc such as illegal discharges or refuse located within the stream.

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