TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For DISSOLVED OXYGEN in

BUTLER CREEK

In the Savannah River Basin

(HUC 3060106)

Richmond County, Georgia

EPA
United States
Environmental Protection
Agency

Region 4
serving the
southeast

APPROVAL PAGE

for the DISSOLVED OXYGEN TMDL for

Butler Creek in the Savannah River Basin, GA

Georgia's final 1998 303(d) list identified Butler Creek near Augusta, GA as not supporting its designated use, with the parameter of concern being dissolved oxgyen. This Total Maximum Daily Load (TMDL) is being established pursuant to the 1998 Georgia 303(d) list and the Consent Decree in the Georgia TMDL Lawsuit.

The TMDL calculation is based on the results of the USEPA's SIMPLIFIED METHOD PROGRAM FOR MULTIPLE DISCHARGES (MULTISMP) to determine allowable loads for dissolved oxygen consuming wastes that will achieve water quality standards. The NPDES permitted facilities impacted by this TMDL are the Augusta Butler Creek Water Pollution Control Plant (WPCP), DSM Chemicals, and Thermal Ceramics.

The allocation of dissolved oxygen consuming wastes to the Butler Creek watershed is expressed as the following two TMDL scenarios which both result in the attainment of water quality standards:

TMDL (scenario #1) = 4301.7 kg/day, TMDL (scenario #2) = 5319.0 kg/day

For the first TMDL scenario, CBOD5 and NH3-N concentrations discharged from the Augusta Butler WPCP should not exceed 7.0 mg/l and 1.0 mg/l respectively. This scenario also requires that CBOD5 and NH3-N loads from DSM Chemicals should not exceed 113.4 kg/day and 94.6 kg/day. In addition, CBOD5 loads from Thermal Ceramics should not exceed 63.5 kg/day.

For the second TMDL scenario, CBOD5 and NH3-N concentrations discharged from the Augusta Butler WPCP should not exceed 10.0 mg/l and 1.5 mg/l respectively. This scenario also requires that CBOD5 and NH3-N loads from DSM Chemicals should not exceed 76.3 kg/day and 25.4 kg/day. In addition, CBOD5 loads from Thermal Ceramics should not exceed 63.5 kg/day.

APPROVED BY:

Robert P. McGhee, Director

3/7/00

Date

Water Management Division

EPA-Region 4

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Introduction

Section 303(d) of the Clean Water Act (CWA) as Amended by the Water Quality Act of 1987, Public Law 100-4, and the United States Environmental Protection Agency's (USEPA/EPA) Water Quality Planning and Management Regulations [Title 40 of the Code of Federal Regulation (40 CFR), Part 130] require each State to identify those waters within its boundaries not meeting water quality standards applicable to the waters designated uses. The identified waters are prioritized based on the severity of pollution with respect to designated use classifications. Total maximum daily loads (TMDLs) for all pollutants violating or causing violation of applicable water quality standards are established for each identified water. Such loads are established at levels necessary to implement the applicable water quality standards with seasonal variations and margins of safety. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a water body, based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water-quality based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991).

Problem Definition

The final 1998 Section 303(d) list, developed by the Environmental Protection Division of the Georgia Department of Natural Resources (GAEPD), identified a 3-mile segment of Butler Creek, from Phinizy Ditch to the Savannah River, as not supporting its designated use for dissolved oxygen (DO). The primary pollutant source is oxygen consuming wastes in the form of carbonaceous biochemical oxygen demand (CBOD) and nitrogenous biochemical oxygen demand (NBOD) which originate from the Augusta Water Pollution Control Plant (WPCP) and the DSM Chemicals Augusta plant. The TMDL will be calculated under low flow summer time conditions when oxygen demanding materials impact dissolved oxygen to its greatest extent.

Target Identification

The target level for the development of the Dissolved Oxygen TMDL in the Butler Creek segment is the numeric criterion established in Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised July 6, 1999. Georgia regulations establish the freshwater criteria for Dissolved Oxygen for waters with a use classification of fishing, and it is defined as the daily average of 5.0 mg/l and no less than 4.0 mg/l at all times.

Background

This segment was determined to be impaired based on water quality data in Butler Creek which reflected a DO sag that resulted, in part, from the Augusta WPCP discharging to Phinizy Ditch. The outfall from this facility was relocated to Butler Creek, approximately 0.6 miles upstream of Butler Creek's confluence with the Savannah River, and the facility began discharging from its relocated outfall in April 1998. Although the relocation of this outfall is expected to result in the improvement of water quality in the impaired segment of Butler Creek, a desktop modeling analysis indicates that DO concentrations in this segment may fall below the daily average criterion of 5.0 mg/L during low flow critical conditions.

There are six NPDES permitted facilities located within the entire Butler Creek watershed. Two of these facilities (i.e., August Butler Creek WPCP [GA0037621] and DSM Chemicals Augusta, Inc. [GA0002160]) potentially cause or contribute to the impairment of the 303(d)-listed segment of Butler Creek as a result of biochemical oxygen demand (BOD) loading. There are two facilities within the watershed that discharge some level of BOD loading at end-of-pipe (i.e., Thermal Ceramics [GA0002488] and Monsanto Augusta, Inc. [GA0002178]). Based on the amount of BOD loading that Thermal Ceramics is currently permitted to discharge at end-of-pipe, its loading is assimilated before it reaches the impaired segment of Butler Creek. Monsanto Augusta discharges BOD at very low levels, and this loading is assimilated before it reaches the impaired segment of Butler Creek. The remaining two facilities that discharge to the watershed (i.e., Southern Aggregates Company

[GA0037231] and Peridot Chemicals [GA0002925]) do not contribute any BOD loading at end-of-pipe.

Numeric Targets and Sources - Model Development

The USEPA's SIMPLIFIED METHOD PROGRAM FOR MULTIPLE DISCHARGES (MULTISMP) was used to evaluate the impacts of the BOD loading to the impaired segment of Butler Creek. The model was parameterized using critical low flow conditions (7Q10 Flow) and summer time temperatures. The model included sediment oxygen demand (SOD), CBOD, nitrification and reaeration and predicted instream DO concentrations.

Table 1 defines the point source parameters that were input to the MULTISMP model. These values were taken from NPDES permits, NPDES permit applications, and the STORET water quality database.

Table 1 - WWTP Parameterization

Point Source	Flow (MGD)	CBOD5 (mg/L)	NH3-N (mg/L)	DO (mg/L)
Augusta WPCP	21.6 – 46.1	10	1.5	5.0
DSM Chemicals	1.345	20.7	18.6	0 – 5.0 (assumed)
Monsanto Augusta	0.061	7.0	0.56	5.0 (assumed)
Phinizy Ditch (reflects Thermal Ceramics' discharge to Rocky Creek)	2.715	2.5	0.12	6.17

The stream was parameterized as illustrated in Table 2. The upstream CBOD5, NH3-N, DO, and water temperature were obtained by reviewing STORET data as well as the GAEPD's 1991 document entitled, "Compilation of Georgia's Current Modeling Guidelines for the Development of Wasteload Allocations and NPDES Permit Limitations."

Table 2 – Stream Parameterization

Stream	CBOD5 (mg/L)	NH3-N (mg/L)	DO (mg/L)	Temp (° C)	7Q10 flow (cfs) / (cms)
Butler Creek	2.0	0.11	6.26	28	4.07 / 0.115
Phinizy Ditch	2.5	0.12	6.17	28	4.2 / 0.119
Beaverdam Ditch	1.67	0.164	6.65	28	1.66 / 0.047

The MULTISMP model kinetics and environmental parameters are given in Table 3. The CBOD decay and nitrification rates were extrapolated from a draft modeling report entitled, "A Calibrated Model of the Savannah River Freshwater System from Augusta Dam to Port Wentworth." The Tsivoglou reaeration equation used in the model was taken from GAEPD's 1991 document entitled, "Compilation of Georgia's Current Modeling Guidelines for the Development of Wasteload Allocations and NPDES Permit Limitations." This publication includes an agreement between EPA Region 4 and the GAEPD regarding assumptions to make in water quality models when site-specific data is not available, and it was signed by both parties in 1982.

Table 3 - MULTISMP Kinetics and Environmental Parameters

Parameter	Input Value
CBOD Decay	0.13 1/day
CBOD Theta	1.047 (default used in model)
SOD	1.5 g O_2/m^2/day
Nitrification	0.15 1/day
Nitrification Theta	1.08 (default used in model)
Tsivoglou escape coefficients	0.054 – 0.11 1/ft
Reaeration Theta	1.024 (default used in model)

For permitting purposes, steady-state models are applied for "critical" environmental conditions that represent extremely low assimilative capacity. For discharges to riverine systems, critical

environmental conditions correspond to drought upstream flows. The assumption behind steady-state modeling is that permit limits that protect water quality during critical conditions will be protective for the large majority of environmental conditions that occur. The MULTISMP model is a steady-state model that was used to develop the TMDL given the above-described critical conditions.

Critical Condition Determination

The most critical condition for this segment of Butler Creek (i.e., 7Q10 background flows and summer temperatures of 28° C) will be used to determine the TMDL for this segment of the river. Nitrification, CBOD, SOD and reaeration will impact dissolved oxygen. The model will predict the critical condition dissolved oxygen concentration in the 303(d)-listed segment of Butler Creek during critical conditions.

Total Maximum Daily Load (TMDL)

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while achieving water quality standards. For a TMDL for dissolved oxygen consuming wastes, the total maximum daily load is expressed as the total ultimate biochemical oxygen demand loading to the system from both point sources (the wasteload allocation) and the nonpoint or background sources (the load allocation). This TMDL will be expressed as a loading capacity based on the current outfall locations of the NPDES permitted facilities that are currently discharging to this watershed as well as the current flow volumes and BOD concentrations of the effluent discharged from each facility.

Margin of Safety

The margin of safety (MOS) is part of the TMDL development process. There are two basic methods for incorporating the MOS (USEPA, 1991):

1. Implicitly incorporating the MOS using conservative model assumptions to develop allocations, or

2. Explicitly specifying a portion of the total TMDL as the MOS; using the remainder for allocations.

The MOS is incorporated implicitly into this modeling process by selecting conservative values for model input parameters such as 7Q10 low-flow and high summer time water temperatures.

TMDL Calculation

For any given TMDL that is developed to protect dissolved oxygen for a particular waterbody, many potential allocation scenarios will result in the attainment of water quality standards. These potential allocation scenarios may result in a wide range of total loading which may be assimilated by a system. The allowable loading for any given scenario is a function of several factors including but not limited to the location of each point source within an impaired system, the distribution of flow volumes and BOD loadings from the point sources within the watershed, the effluent dissolved oxygen concentration from each point source, deoxygenation and nitrification decay rates for a particular system, and the reaeration rates for a particular system.

The TMDL calculations for the impaired segment of Butler Creek were made using the MULTISMP model. For the following two TMDL scenarios that are presented, the BOD loadings of the wastewater treatment facilities were adjusted until the predicted dissolved oxygen concentrations throughout the impaired segment of Butler Creek were not less than 5.0 mg/L. These two allocation scenarios result in different total loads which the segment can receive while still attaining water quality standards.

Since a TMDL is the sum of waste load allocations (WLA) plus load allocation (LA) and a margin of safety (MOS), the TMDL can be represented as: TMDL = WLA + LA + MOS.

Table 4 - TMDL Scenarios for ultimate total biochemical oxygen demand

Scenario	Wasteload Allocation (kg/day)	Load Allocation (kg/day)	Margin of Safety	Total Maximum Daily Load (kg/day)
1	4200.9	100.8	Implicit	4301.7
2	5218.2	100.8	Implicit	5319.0

Table 5 - NPDES Permit Requirements for TMDL Scenario 1

NPDES Permit	CBOD5 Limit	NH3-N Limit	DO minimum limit
August Butler Cr WPCP - GA0037621	7.0 mg/L	1.0 mg/L	5.0 mg/L
DSM Chemicals Augusta - GA0002160 (only includes effluent from outfalls 001 and 002)	250 lbs/day (113.4 kg/day)	208.6 lbs/day (94.6 kg/day)	-
Thermal Ceramics - GA0002488 (only includes effluent from outfalls 005v & 005p)	140 lbs/day (63.5 kg/day)	-	-

Table 6 - NPDES Permit Requirements for TMDL Scenario 2

NPDES Permit	CBOD5 Limit	NH3-N Limit	DO minimum limit
August Butler Cr WPCP - GA0037621	10.0 mg/L	1.5 mg/L	5.0 mg/L
DSM Chemicals Augusta - GA0002160 (only includes effluent from outfalls 001 and 002)	168.3 lbs/day (76.3 kg/day)	56.1 lbs/day (25.4 kg/day)	5.0 mg/L
Thermal Ceramics - GA0002488 (only includes effluent from outfalls 005v & 005p)	140 lbs/day (63.5 kg/day)	-	-

Seasonal Variation

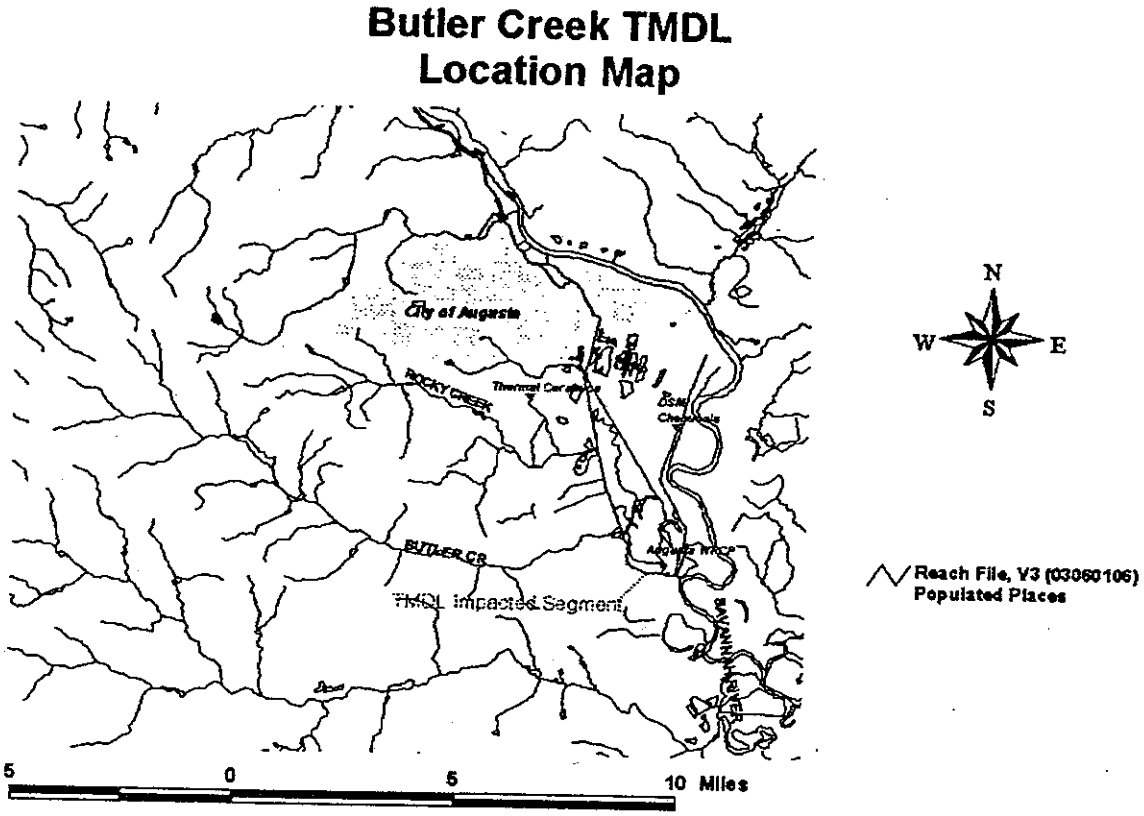
The low flow condition represents the most critical design condition and will provide year round protection. If changes in flow and water temperature were included to account for seasonal variation, higher dissolved oxygen values are expected to occur.

Allocation of Responsibility and Recommendations

It should be noted that for TMDL scenario number one, the CBOD5 and NH3-N effluent limitations for the Augusta WPCP are reduced respectively to 7.0 mg/L and 1.0 mg/L. TMDL scenario number one also requires a NH3-N loading limitation of 208.6 lbs/day for DSM Chemicals (there are currently no effluent limits for NH3-N in the NPDES permit). In addition, the existing CBOD5 loading effluent limitation for Thermal Ceramics should be retained.

TMDL scenario number two requires the DSM Chemical facility to reduce the CBOD5 and NH3-N loading to Butler Creek respectively to 168.3 lbs/day and 56.1 lbs/day. In addition, the existing CBOD5 loading effluent limitation for Thermal Ceramics should be retained.

Appendix A – Site Map



Appendix B – Units Conversion Table

From	To	Multiply by:
Million Gallons per Day (MGD)	Cubic Meters per Second (cms)	0.04381
Cubic Feet per Second (cfs)	Cubic Meters per Second (cms)	0.02832
Pounds (lbs)	Kilograms (Kg)	0.4536

Administrative Record Index

1. DSM Chemicals North America, Inc. 6 pages from EPA's NPDES Permit application, September 1993.

2. EarthJustice Legal Defense Fund. Letter from Eric E. Huber to EPA Region 4. December 7, 1999.

3. Environmental Protection Division of the Georgia Department of Natural Resources. spreadsheet which summarizes 1997 Discharge Monitoring Report data for the Augusta- J.B. Messerly WPCP, unknown date.

4. Environmental Protection Division of the Georgia Department of Natural Resources. spreadsheet which summarizes 1998 Discharge Monitoring Report data for the Augusta – Butler Creek WPCP, unknown date.

5. Environmental Protection Division of the Georgia Department of Natural Resources. Compilation of Georgia's Current Modeling Guidelines for the Development of Wasteload Allocations and NPDES Permit Limitations. January 1991.

6. Environmental Protection Division of the Georgia Department of Natural Resources. Wasteload Allocation Form for NPDES Permit Number GA0020087 for City of Augusta WPCP, November 6, 1995.

7. Environmental Protection Division of the Georgia Department of Natural Resources. *DRAFT*, NPDES Permit Number GA0002488 for Thermal Ceramics, 1997, page 2-4 of Part I.

8. Environmental Protection Division of the Georgia Department of Natural Resources. NPDES Permit Number GA0002178 for Monsanto Company, January 15, 1997, page 2 of Part I.

9. Environmental Protection Division of the Georgia Department of Natural Resources. *DRAFT*, NPDES Permit Number GA0002925 for Peridot Chemical Company, Inc., January 31,1997, page 2 of Part I.

10. Environmental Protection Division of the Georgia Department of Natural Resources. NPDES Permit Number GA0037231 for CSR Aggregates, November 26, 1997, page 2 of Part I.

11. Environmental Protection Division of the Georgia Department of Natural Resources. NPDES Permit Number GA0037621 for Augusta – Butler Creek, April 1, 1998, page 7 of Part I.

12. Environmental Protection Division of the Georgia Department of Natural Resources. Final

version of the 1998 §303(d) list, December 22, 1998.

13. Environmental Protection Division of the Georgia Department of Natural Resources. NPDES Permit Number GA0002160 for DSM Chemicals North America, Inc., February 26, 1999, page 2 of Part I.

14. Environmental Protection Division of the Georgia Department of Natural Resources. Rules and Regulations for Water Quality Control, Chapter 391-3-6-.03, Water Use Classifications and Water Quality Standards, July 6,1999.

15. Georgia Industry Environmental Coalition. Letter from Michael E. Wilder and James R. Baker to EPA Region 4. December 14, 1999.

16. Georgia Legal Watch. Letter from Douglas P. Haines to EPA Region 4. December 22, 1999.

17. Limno-Tech, Inc. MULTI-SMP: Simplified Method Program for Multiple Discharges, November 1986 (revised December 1992).

18. Monsanto Company. 3 pages from EPA's NPDES permit application, December 1986.

19. Monsanto Company. 3 pages from EPA's NPDES permit application, November 1991.

20. Monsanto Company. 4 pages from EPA's NPDES permit application, July 26, 1996.

21. PCS (permit compliance system) electronic database.

22. Sierra Club v. EPA & Hankinson USDC-ND-GA Atlanta Div. #1: 94-CV-2501-MHS

23. Thermal Ceramics. 9 pages from EPA's NPDES permit application, June 1997.

24. United States Department of Interior, Geological Survey, Low-Flow Profiles of the Upper Savannah and Ogeechee Rivers and Tributaries in Georgia, Water-Resources Investigations Report 88-4047, 1988.

25. United States Department of Interior, Geological Survey, Water Quality Data [September 9, 1997 and July 20, 1998]: 02196995 – Butler Creek at Levee at Augusta, GA, June 27, 1999.

26. United States Department of Interior, Geological Survey, Water Quality Data, Calender Year January 1997 to Decembedr 1997: 02196995 – Butler Creek at Levee at Augusta, GA, June 27, 1999.

27. USEPA. Guidance for Water Quality-based Decisions: The TMDL Process. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA/440/4-91-001, April 1991.

28. USEPA Region IV. Routine Modeling Procedures, (dated January 29, 1981 on the last page).

29. USEPA [Region 4 Water Management Division]. *DRAFT*, A Calibrated Model of the Savannah River Freshwater System from Augusta Dam to Port Wentworth, November 1996.

30. USEPA Region 4 Water Management Division. NPDES Dischargers in the Butler Creek Watershed, November 4, 1999.

31. USEPA Region 4 Water Management Division. Station 1009901 – STORET DATA, November 4, 1999.

32. USEPA Region 4 Water Management Division. Station 1009951 – STORET DATA, November 4, 1999.

33. USEPA Region 4 Water Management Division. Station 1010101 – STORET DATA, November 4, 1999.

34. USEPA Region 4 Water Management Division. Station 1010201 – STORET DATA, November 4, 1999.

35. USEPA Region 4 Water Management Division. Station 1010301 – STORET DATA, November 4, 1999.

36. USEPA Region 4 Water Management Division. USGS Station 02196995 Water Quality Data, November 4, 1999.

37. USEPA Region 4 Water Management Division. Proposed Total Maximum Daily Load (TMDL) Development for Dissolved Oxygen in Butler Creek. November 6, 1999.

38. USEPA Region 4 Water Management Division. PCS Retrieval Request Edit Report, November 8, 1999.

39. USEPA Region 4 Water Management Division. TMDL Calculations for Dissolved Oxygen Consuming Wastes in Butler Cr (Savannah River Basin), November 10, 1999.

40. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Beaverdam Ditch, DOe = 0.0 mg/L", November 10, 1999.

41. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Beaverdam Ditch, DOe = 5.0 mg/L", November 10, 1999.

42. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Beaverdam Ditch, DSMe = 15-10-5", November 10, 1999.

43. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Beaverdam Ditch, existing conditions", November 10, 1999.

44. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Butler Creek: existing (Qe=21.6)", November 10, 1999.

45. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Butler Creek: existing (Qe=46.1)", November 10, 1999.

46. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Butler Creek: Qe=21.6, 7-1-5", November 10, 1999.

47. USEPA Region 4 Water Management Division. Simplified Method Program Complete Input Listing for "Butler Creek: Qe=21.6, DSMe=15-10-5", November 10, 1999.

Response to Public Comment on the Proposed TMDL

COMMENT

The proposal includes two possible scenarios that presumably would meet water quality standards. The wasteload allocations of both involve reductions in the City of Augusta and/or DSM Chemicals August, Inc. permit limits. There is, however, no indication of when these changes will be made. Please indicate when these permits will be revised by the State of Georgia to meet the TMDL.

Mr. Eric E. Huber, EarthJustice Legal Defense Fund, 400 Magazine Street, Suite 401, New Orleans, Louisiana 70130-2453, December 7, 1999

RESPONSE

Through its oversight authority of the State's NPDES permitting program, EPA Region 4 will use best efforts to ensure that NPDES permits issued by the State are consistent with the Dissolved Oxygen TMDL for Butler Creek and the State's NPDES Reasonable Potential Procedures.

COMMENT

A more robust time varying model would simulate the diurnal temperature and loading effects.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

There exist modeling techniques that allow for the simulation and prediction of diurnal effects on dissolved oxygen and dynamic loading effects. There was not enough data available to adequately calibrate and apply a time variable model for this TMDL.

COMMENT

There are sinks of dissolved oxygen, other than biochemical oxygen demand, in natural systems. Sediment oxygen demand (SOD) was simulated but the resulting daily SOD deficit load was not included in the load allocation portion of the TMDL.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

SOD is not considered to be an external load to Butler Creek and therefore is not part of the load allocation. As noted by the commenter, however, SOD was simulated in the model as a sink for dissolved oxygen.

COMMENT

It was not clear if the TMDLs represented a 5-day or an ultimate biochemical oxygen demand (BOD) load.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

The TMDL, as indicated by Table 4 of the report, represents the total maximum daily load for "ultimate total biochemical oxygen demand."

COMMENT

Can the upstream and tributary loadings (BOD, ultimate carbonaceous oxygen demand, $NBOD_u$) be reduced or can the downstream creek channels be enhanced to increase the assimilative capacity?

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

Eliminating or reducing relatively insignificant background levels of BOD would not be a practical or effective method of increasing the assimilative capacity of Butler Creek when there are known significant point source contributors of BOD loading to the watershed.

COMMENT

The critical conditions model did not take into account the character of the waste after TMDL implementation. Advanced wastewater treatment systems have slower dissolved oxygen consumption rates and a corresponding higher f-rate. Streams with highly treated wastewater have lower deoxygenation rates than those with less treatment. With solid loads reduction, sediment oxygen demand (SOD) downstream of the discharge will be reduced. 7Q10 low flows would be expected to primarily be the result of groundwater discharge into the river/creek channels and groundwater typically has low biochemical oxygen demand, solids and dissolved oxygen concentrations. Lower deoxygenation rates, lower SOD and lower 7Q10 loading will generally result in more available capacity.

Mr. Michael E. Wilder, Water Resources Workgroup Chair, and Mr. James R. Baker, Chair, Georgia Industry Environmental Coalition, 112 Town Park Drive, Kennesaw, Georgia 30144, December 14, 1999

RESPONSE

EPA recognizes that significant changes in wastewater treatment systems may have an effect on deoxygenation rates and f-ratios. In addition, receiving stream SOD rates may be affected over the course of time as a result of changes in wastewater treatment systems. Since no site-specific information for deoxygenation rates for future conditions is available, the TMDL must be developed using current conditions.

COMMENT

There is a need for consistency in EPA's use of units and time scale of the loads and permit limits. It does not appear that the TMDL results in a determination of a daily load for the waterbody or permit, but rather average monthly loads. The implied MOS is of concern especially if daily maximum loads are not being considered.

For the BOD and ammonia values, it is not stated if these are average or maximum permit limits, or if CBOD is intended. Are the loads for the dischargers given for average or daily maximum?

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

This TMDL will be implemented in accordance with federal and state statutes, rules, and guidance documents concerning NPDES permit requirements.

COMMENT

It is hard to follow in terms of location. A simple map or drawing would assist.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The final TMDL report contains a simple map of the Butler Creek watershed.

COMMENT

It is unclear why the Augusta outfall would have been moved from Fanes Ditch to Butler Creek, which has a lower 7Q10 flow according to Table 2. How would this have improved the DO, and why was the outfall not moved to the nearby and much larger Savannah River?

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The outfall was relocated prior to the TMDL development and was completely independent of the TMDL development process.

COMMENT

On page 2, it is stated that the BOD load of two area dischargers should be assimilated before reaching the impaired segment of Butler Creek. No information such as the locations, distances, or loadings is given to support this statement. It should be remembered that the intent is to identify segments that are water quality limited for the parameters of concern, and that it need not necessarily be documented as impaired, but rather of limited capacity. It is noted that part of the basis for identifying this water for listing was the use of modeling calculations.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Instream monitoring data below Thermal Ceramics supports EPA's contention that the small amount of BOD loading from this facility is assimilated before reaching the water quality limited segment of Butler Creek. Desktop modeling predictions support EPA's contention that the small amount of BOD loading from Monsanto Augusta is assimilated before reaching the water quality limited segment of Butler Creek.

COMMENT

Table 1 gives a wide range of values for the Augusta flow and the DSM Chemicals DO. It is unclear what numbers were used in the model.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The TMDL development involved several model runs such that the final TMDL is expected to be protective of water quality for the entire range of potential Augusta WWTP flows and DSM Chemicals DO concentrations.

COMMENT

If DO data came from STORET, it may not have accounted for any diurnal fluctuations. It appears that diurnal impacts are not being addressed in the TMDL, but it is not explained how this was justified.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Diurnal dissolved oxygen concentrations would not be expected to fluctuate beyond 1 mg/L below the daily average dissolved oxygen concentration unless algal concentrations were significantly high. For the water quality limited segment, Butler Creek, there is no information to support that algal concentrations or nutrient loading to this system is significantly high.

COMMENT

Table 2 includes data for Beaverdam Creek, but it is unclear how this is involved. This table also shows the low flow of Phinizy Ditch to be greater than Butler Creek which seems unlikely if Butler Creek is downstream. This also relates to the question of the outfall re-location in terms of why would the outfall be moved to a smaller stream ? The flow given for Butler Creek (4.07 cfs) is different from the flow of 2 cfs used in the fecal TMDL document.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The Beaverdam Creek watershed, which receives wastewater from DSM Chemicals, drains to Butler Creek downstream of Phinizy Ditch. 4.07 cfs represents the 7Q10 for Butler Creek at the point where Monsanto discharges its wastewater. 2 cfs represents the 7Q10 for Butler Creek several miles upstream from the Monsanto discharge point.

The outfall was relocated prior to the TMDL development and was completely independent of the TMDL development process.

COMMENT

The data in Table 2 does not specify if the BOD is CBOD and if the given DO is average or minimum values.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The BOD5 concentrations in Table 2 represent the 5-day carbonaceous biochemical oxygen demand of the respective streams. For clarity, this term has been changed to CBOD5 in the final TMDL report. Parameters used in steady state models inherently represent average values or conditions. All of the values in Table 2, including dissolved oxygen concentrations, represent average values.

COMMENT

The Savannah River modeling study is referenced as the basis for some of the rates used. It is unclear how rates from the main river channel were used to determine rates in the tributaries.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Since site-specific deoxygenation and nitrification decay rates were unavailable for Butler Creek, EPA had no choice other than to estimate these decay rates from the limited available data. In the absence of any other decay rate information for streams within the area, EPA decided that it was reasonable to use the specific decay rate values that were available from a dissolved oxygen calibration of the main channel of the Savannah River.

COMMENT

Request copies of the State/EPA documentation for modeling, and the WLAs dated 1991 and 1982.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Copies of these documents have been provided to the commenter.

COMMENT

It is stated on page 5 that the TMDL is expressed as the ultimate BOD. It needs to be explained if this includes ammonia and if the flows and concentrations used are daily maximums.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

Page 5 of the proposed TMDL document states that the TMDL "is expressed as the total ultimate biochemical oxygen demand" loading to the watershed. The term, "total", indicates that both nitrogenous sources (e.g., NH3-N) and carbonaceous sources of oxygen demanding substances are included. As indicated in Table 4 of the proposed TMDL document, the TMDL is expressed in kilograms per day. The allowable loadings from the dischargers were developed to be protective of the daily average DO criterion of 5 mg/l.

COMMENT

It is unclear how there can be two allocation scenarios and two different proposed TMDLs that both protect the streams. It seems that both allocation scenarios would have to result in the same total, but that isn't the case. If the total load changes due to the points of discharge and decays allowing for different total loads, it needs to be explained.

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

For any given TMDL that is developed to protect dissolved oxygen for a particular waterbody, many potential allocation scenarios will result in the attainment of water quality standards. These potential allocation scenarios may result in a wide range of total loading that may be assimilated by a system. The allowable loading for any given scenario is a function of several factors including but not limited to the location of each point source within an impaired system, the distribution of flow volumes and BOD loadings from the point sources within the watershed, the effluent dissolved oxygen concentration from each point source, deoxygenation and nitrification decay rates for a particular system, and the reaeration rates for a particular system.

COMMENT

The units in Tables 5 and 6 are not uniform. Is the BOD intended to be CBOD since the ammonia is also given? Are the loads for the dischargers given for average or daily maximum?

Mr. Douglas P. Haines, Executive Director, Georgia Legal Watch, 264 North Jackson Street, Athens, Georgia 30601, December 22, 1999

RESPONSE

The units in Tables 5 and 6 of the proposed TMDL report are consistent with the existing permit limits for BOD5, NH3-N, and DO for each of the NPDES permitted facilities. The BOD5 limits in these tables represent the limits for 5-day carbonaceous biochemical oxygen demand for the respective facilities. Where appropriate, the BOD5 values have been changed to CBOD5 values in the final TMDL report. The allowable loadings from the dischargers were developed to be protective of the daily average dissolved oxygen criterion of 5.0 mg/L.

References

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