FINAL
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Total Maximum Daily Load

Nutrients and Organic Enrichment / Low DO For Bridge and Elam Creek and Tuscumbia River Canal

North Independent Streams Basin

Alcorn and Prentiss Counties, Mississippi

Prepared By

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FOREWORD

This report has been prepared in accordance with the schedule contained within the federal consent decree dated December 22, 1998. The report contains one or more Total Maximum Daily Loads (TMDLs) for water body segments found on Mississippi's 1996 Section 303(d) List of Impaired Water bodies. Because of the accelerated schedule required by the consent decree, many of these TMDLs have been prepared out of sequence with the State's rotating basin approach. The implementation of the TMDLs contained herein will be prioritized within Mississippi's rotating basin approach.

The amount and quality of the data on which this report is based are limited. As additional information becomes available, the TMDLs may be updated. Such additional information may include water quality and quantity data, changes in pollutant loadings, or changes in landuse within the watershed. In some cases, additional water quality data may indicate that no impairment exists.

Conversion Factors

To convert from	To	Multiply by	To convert from	To	Multiply by
$mile^2$	acre	640	acre	ft^2	43560
km^2	acre	247.1	days	seconds	86400
m^3	ft^3	35.3	meters	feet	3.28
ft^3	gallons	7.48	ft^3	gallons	7.48
ft^3	liters	28.3	hectares	acres	2.47
cfs	gal/min	448.8	miles	meters	1609.3
cfs	MGD	0.646	tonnes	tons	1.1
m^3	gallons	264.2	µg/l * cfs	gm/day	2.45
m^3	liters	1000	µg/l * MGD	gm/day	3.79

Fraction	Prefix	Symbol	Multiple	Prefix	Symbol
10^{-1}	deci	d	10	deka	da
10^{-2}	centi	c	10^2	hecto	h
10^{-3}	milli	m	10^3	kilo	k
10^{-6}	micro	µ	10^6	mega	M
10^{-9}	nano	n	10^9	giga	G
10^{-12}	pico	p	10^{12}	tera	T
10^{-15}	femto	f	10^{15}	peta	P
10^{-18}	atto	a	10^{18}	exa	E

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Table 1. Listing Information

Name	ID	County	HUC	Monitored Cause
Tuscumbia River Canal	MS203TE	Prentiss, Alcorn	08010207	Nutrients and Organic Enrichment / Low DO
Near Cuba from headwaters to the Tennessee line				
Bridge Creek	MS203BE	Alcorn	08010207	Nutrients and Organic Enrichment / Low DO
At Corinth from headwaters to the Tuscumbia River Canal				
Elam Creek	MS204E	Alcorn	08010207	Nutrients and Organic Enrichment / Low DO
At Corinth from headwaters to Bridge Creek				

Table 2. Water Quality Standards

Parameter	Beneficial use	Water Quality Criteria
Nutrients	Aquatic Life Support	Waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions, in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses.
Dissolved Oxygen	Aquatic Life Support	DO concentrations shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l. Natural conditions are defined as background water quality conditions due only to non-anthropogenic sources. The criteria herein apply specifically with regard to substances attributed to sources (discharges, nonpoint sources, or instream activities) as opposed to natural phenomena. Waters may naturally have characteristics outside the limits established by these criteria. Therefore, naturally occurring conditions that fail to meet criteria should not be interpreted as violations of these criteria.

Table 3. Total Maximum Daily Load for Nutrients in Tuscumbia River Canal

	WLA lbs/day	LA lbs/day	MOS	TMDL lbs/day
Total Nitrogen	830	1010	Implicit	1840
Total Phosphorous	180	83	Implicit	263

Table 4. Total Maximum Daily Load for Total Biological Oxygen Demand (ultimate)

	WLA lbs/day	LA lbs/day	MOS	TMDL lbs/day
TBODu	2280	133	Implicit	2413

Table 5. Point Source Loads for Tuscumbia River Canal

Facility	Flow MGD	TN lbs	TP lbs	TBODu lbs
Corinth POTW	6.0	576	125*	1608
Booneville POTW	2.0	192	42*	479*
Rienzi POTW	0.6	58	13*	161*
Kossuth School	0.0275	2.6	1.3	21
Biggersville School	0.015	1.4	0.7	11

* Indicates a reduction from estimated current load

EXECUTIVE SUMMARY

This TMDL has been developed for Tuscumbia River Canal, including Bridge and Elam Creeks, which were placed on the Mississippi 2008 Section 303(d) List of Impaired Water Bodies. These streams were originally listed due to evaluated causes of sediment, organic enrichment / low dissolved oxygen, and nutrients. Subsequent biological monitoring concluded the streams were impaired for biological impairment. The stressor identification process pointed to organic enrichment and nutrient enrichment as probable primary stressors. Sediment will be addressed in a separate TMDL report. This TMDL will provide an estimate of the total biochemical oxygen demand (TBODu), total nitrogen (TN) and total phosphorus (TP) allowable in this watershed.

Mississippi does not have water quality standards for allowable nutrient concentrations. MDEQ currently has a Nutrient Task Force (NTF) working on the development of criteria for nutrients. An annual concentration of 0.7 mg/l is an applicable target for TN and 0.10 mg/l for TP for water bodies located in ecoregion 65. MDEQ is presenting these preliminary target values for TMDL development which are subject to revision after the development of numeric nutrient criteria.

The Tuscumbia River Canal Watershed is located in HUC 08010207. The listed portion of Tuscumbia River Canal is near Cuba from the headwaters to the Tennessee line. Bridge and Elam Creeks are both tributaries to Tuscumbia River Canal. The location of the watershed for the listed segment is shown in Figure 1.

The Tuscumbia River Canal Watershed evaluation indicated that the impairment is due to phosphorus from point and nonpoint sources. The limited nutrient data and estimated existing ecoregion concentrations indicate reductions of phosphorus can be accomplished with installation of best management practices and point source reductions. Additionally, the TMDL will require the total nitrogen to be capped at the current estimate for each point source in the watershed.

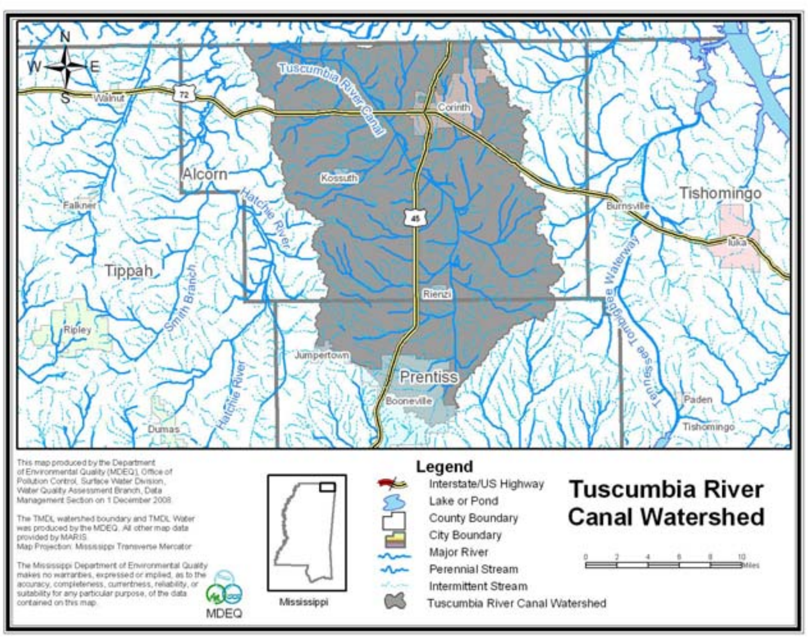


Figure 1. Tuscumbia River Canal

INTRODUCTION

1.1 Background

The identification of water bodies not meeting their designated use and the development of total maximum daily loads (TMDLs) for those water bodies are required by Section 303(d) of the Clean Water Act and the Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (40 CFR part 130). The TMDL process is designed to restore and maintain the quality of those impaired water bodies through the establishment of pollutant specific allowable loads. This TMDL has been developed for the 2008 §303(d) listed segments.

1.2 Listing History

The impaired segments were listed due to evaluating the watershed for potential impairment. Biological sampling indicated the probable primary stressors are organic enrichment and nutrient enrichment. There was a special study completed in 2006 in and around Corinth. Results from that study were used to calibrate the STREAM model used for WLA development for these facilities.

There are no state criteria in Mississippi for nutrients. These criteria are currently being developed by the Mississippi Nutrient Task Force in coordination with EPA Region 4. MDEQ proposed a work plan for nutrient criteria development that has been mutually agreed upon with EPA Region 4 and is on schedule according to the approved timeline for development of nutrient criteria (MDEQ, 2007).

1.3 Applicable Water Body Segment Use

The water use classifications are established by the State of Mississippi in the document *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2007). The designated beneficial use for the listed segments is Fish and Wildlife.

1.4 Applicable Water Body Segment Standards

The water quality standard applicable to the use of the water body and the pollutant of concern is defined in the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2007). Mississippi's current standards contain a narrative criteria that can be applied to nutrients which states "*Waters shall be free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated use* (MDEQ, 2007)."

1.5 Nutrient Target Development

In the 1999 Protocol for Developing Nutrient TMDLs, EPA suggests several methods for the development of numeric criteria for nutrients (USEPA, 1999). In accordance with the 1999

Protocol, "*The target value for the chosen indicator can be based on: comparison to similar but unimpaired waters; user surveys; empirical data summarized in classification systems; literature values; or professional judgment*."

For this TMDL, MDEQ is presenting preliminary targets for TN and TP. An annual concentration 0.7 mg/l is an applicable target for TN and 0.1 mg/l for TP for water bodies located in ecoregion 65. However, MDEQ is presenting these preliminary target values for TMDL development which are subject to revision after the development of nutrient criteria, when the work of the NTF is complete.

WATER BODY ASSESSMENT

2.1 Water Quality Data

The data for Tuscumbia River Canal are presented in Appendix B. The data were used to calibrate the STREAM model for the WLA development for the point sources.

2.2 Assessment of Point Sources

There are 3 significant NPDES point sources in the watershed along with 2 schools with smaller flows. The TMDL limits for the permits are shown in Table 6 and 7. The 2 schools are included in the calculations for these TMDLs, however, because of their small contributions to the watershed, they are not included in the recommendation for nutrient permit limits at this time.

Table 6. TBODu Calculations for WLA

Permit	Facility	Flow MGD	CBODu	NBODu	TBODu
MS0021652	Corinth	6	1150.92	457.37	1608.29
MS0029084	Kossuth Sch	0.0275	10.32	10.48	20.80
MS0030589	Biggersville Sch	0.015	5.63	5.72	11.35
MS0033961	Reinzi	0.6	115.09	45.74	160.83
MS0042030	Booneville	2	326.09	152.46	478.55
					2279.81

2.3 Assessment of Non-Point Sources

Non-point loading of nutrients and organic material in a water body results from the transport of the pollutants into receiving waters by overland surface runoff, groundwater infiltration, and atmospheric deposition. The two primary nutrients of concern are nitrogen and phosphorus. Total nitrogen is a combination of many forms of nitrogen found in the environment. Inorganic nitrogen can be transported in particulate and dissolved phases in surface runoff. Dissolved inorganic nitrogen can be transported in groundwater and may enter a water body from groundwater infiltration. Finally, atmospheric gaseous nitrogen may enter a water body from atmospheric deposition.

Unlike nitrogen, phosphorus is primarily transported in surface runoff when it has been sorbed by eroding sediment. Phosphorus may also be associated with fine-grained particulate matter in the atmosphere and can enter streams as a result of dry fallout and rainfall (USEPA, 1999). However, phosphorus is typically not readily available from the atmosphere or the natural water supply (Davis and Cornwell, 1988). As a result, phosphorus is typically the limiting nutrient in most non-point source dominated rivers and streams, with the exception of watersheds which are dominated by agriculture and have high concentrations of phosphorus contained in the surface runoff due to fertilizers and animal excrement or watersheds with naturally occurring soils which are rich in phosphorus (Thomann and Mueller, 1987).

Watersheds with a large number of failing septic tanks may also deliver significant loadings of phosphorus to a water body. All domestic wastewater contains phosphorus which comes from humans and the use of phosphate containing detergents. Table 7 presents the estimated loads from various land use types in the Pearl Basin based on information from USDA ARS Sedimentation Laboratory. (Shields, et. al., 2008)

The watershed contains mainly forest land but also has different landuse types, including urban, water, and wetlands. The land use information for the watershed is based on the National Land Cover Database (NLCD). Forest is the dominant landuse within this watershed. The landuse distribution for the Tuscumbia River Canal Watershed is shown in Table 7 and Figure 2. By multiplying the landuse category size by the estimated nutrient load, the watershed specific estimate can be calculated. Table 7 presents the estimated loads, the target loads, and the reductions needed to meet the TMDLs.

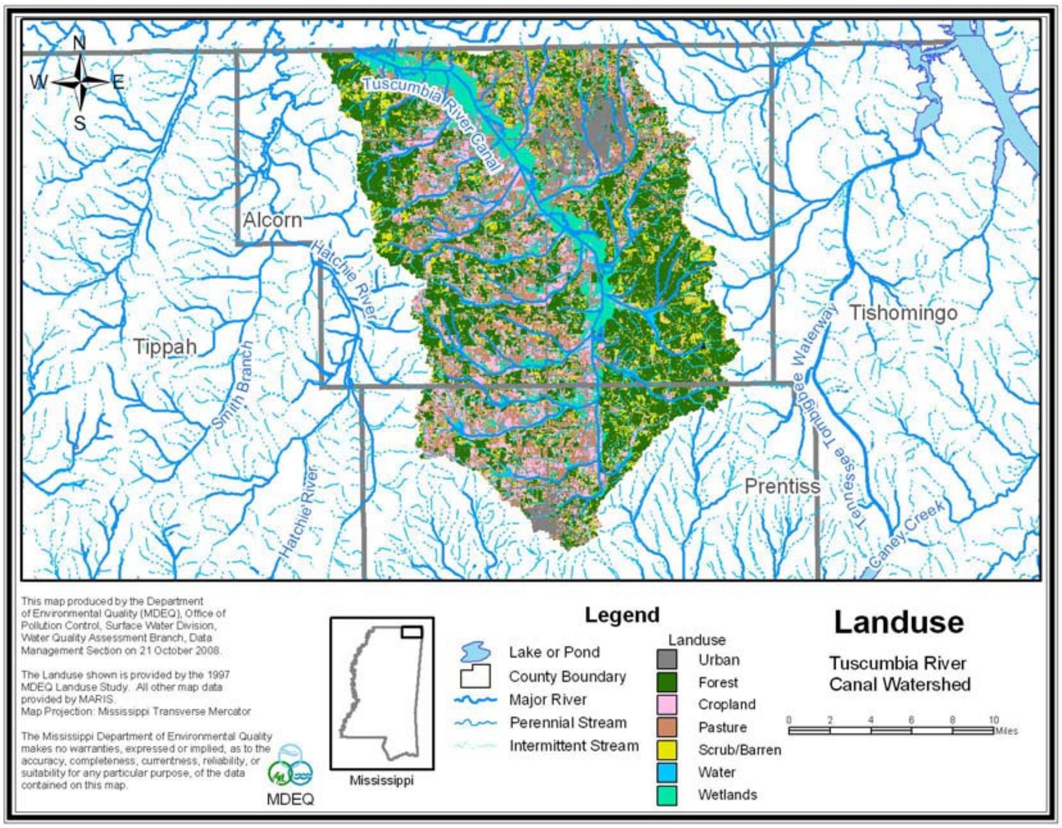
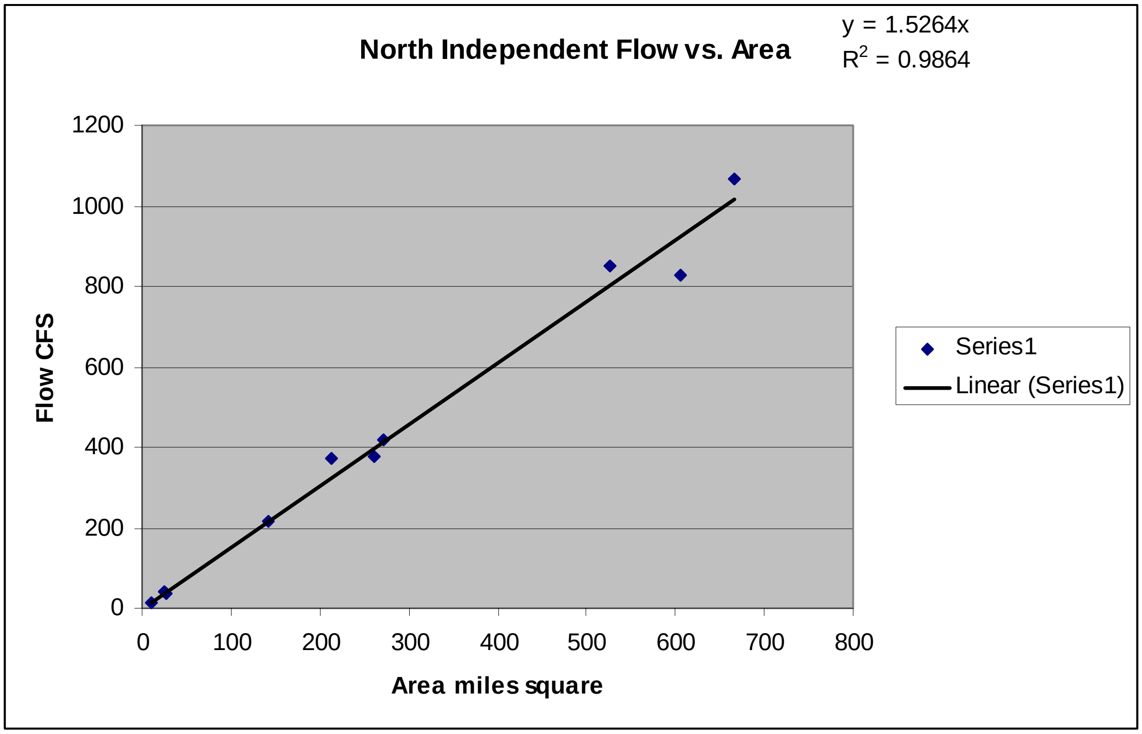


Figure 2. Tuscumbia River Canal Watershed Landuse

2.4 Estimated Existing Load for Total Nitrogen and Total Phosphorus

The average annual flow in the watershed was calculated by utilizing the flow vs. watershed area graph shown in Figure 4 below. All available gages were compared to the watershed size. A very strong correlation between flow and watershed size was developed for the North Independent Streams Basins. The equation for the line that best fits the data was then used to estimate the annual average flow for the Tuscumbia River Canal watershed. The TMDL target TN and TP loads were then calculated, using Equation 1 and the results are shown in Table 7.

Figure 3. North Independent Drainage Area to Flow Comparison



Nutrient Load (lb/day) = Flow (cfs) * 5.394 (conversion factor)* Nutrient Concentration (mg/L)
(Equation 1)

Table 7. TMDL Calculations and Watershed Sizes

Water body	**Tuscumbia River Canal**
Land Use	**TN kg/mile2**
Forest	111.3
Pasture	777.2
Cropland	5179.9
Urban	296.4
Water	257.4
Wetland	265.2
aquaculture	111.3

Land Use	**TP kg/mile2**
Forest	62.1
Pasture	777.2
Cropland	2589.9
Urban	3.1
Water	257.4
Wetland	265.2
aquaculture	62.1

	Water	**Urban**	**Scrub/Barren**	**Forest**	**Pasture/Grass**	**Cropland**	**Wetland**	**Total**	
Acres	3330.4	18380.3	22142.7	72214.5	33292.7	31794.9	23155.8	204311	
Percent	1.63%	9.00%	10.84%	35.35%	16.30%	15.56%	11.33%	100.00%	
$Miles^2$ in watershed	5.2	28.7	34.6	112.8	52.0	49.7	36.2	319.2	
Flow in cfs based on area	487.3	cfs							
TN Load kg/mi^2 annual avg	257.4	296.4	111.3	111.3	777.2	5179.9	265.2		
TP Load kg/mi^2 annual avg	257.4	3.1	62.1	62.1	777.2	2589.9	265.2		
TN Load kg/day	3.7	23.3	10.6	34.4	110.8	705.0	26.3	914.0	kg/day
TP Load kg/day	3.7	0.2	5.9	19.2	110.8	352.5	26.3	518.6	kg/day
TN target concentration	0.7	mg/l							
TP target concentration	0.1	mg/l							
TN estimated concentration	0.77	mg/l							
TP estimated concentration	0.43	mg/l							
TN target load	1839.88	lbs/day							
TP target load	262.84	lbs/day							
TN estimated load per day	2015.11	lbs/day							
TP estimated load per day	1143.23	lbs/day							
TN reduction needed	8.70%								
TP reduction needed	77.01%								

The land use calculations are based on 2004 data. The nutrient estimates are based on USDA ARS. The TMDL targets are based on EPA guidance for calculation of targets when considering all available data.

ALLOCATION

3.1 Wasteload Allocation

Total Nitrogen

The 8.7% reduction for TN shown in Table 7 is not considered to be significant and will be addressed through reductions in nonpoint sources. No point source reductions are warranted for TN.

Total Phosphorus

Reductions are needed for total phosphorus at Booneville POTW, Rienzi POTW, and Corinth POTW. The TMDL places a limit of 2.5 mg/l on these point sources. This target represents a significant reduction in the estimated load for treatment systems of this type. The distribution of point source to nonpoint source load for phosphorus is approximately 2 to 1. MDEQ determined this target based on that ratio and the significant reduction this limit will place on the current point sources.

TBODu

Modeling for TBODu in the watershed indicated that a permit limit reduction is needed at the Booneville POTW and at Rienzi POTW. Figure 4 shows the daily average modeled dissolved oxygen in the Tuscumbia River Canal based on the STREAM model after reductions were made in the model to the Booneville POTW and Rienzi POTW. See Appendix A. To meet water quality standards, the limits proposed by this TMDL for Booneville are 9-2-6 which is a minor reduction from the current permit limits of 10-2-6. The reduction needed at Rienzi POTW is from 15-5-6 currently to 10-2-6.

The critical condition for TBODu indicated by the model was at River Mile 24.9 which is above the discharge point evaluated for the Corinth POTW. The Booneville POTW and Rienzi POTW discharges were the effluent contributors to the critical condition. The TMDL calculations for TBODu were completed using the modeled 7Q10 critical condition flow.

3.2 Load Allocation

Best management practices (BMPs) should be encouraged in the watersheds to reduce potential TBODu, TN, and TP loads from non-point sources. The LAs for TN and TP were calculated by subtracting the WLA from the TMDL. For land disturbing activities related to silvaculture, construction, and agriculture, it is recommended that practices, as outlined in “Mississippi’s BMPs: Best Management Practices for Forestry in Mississippi” (MFC, 2000), “Planning and Design Manual for the Control of Erosion, Sediment, and Stormwater” (MDEQ, et. al, 1994), and “Field Office Technical Guide” (NRCS, 2000), be followed, respectively.

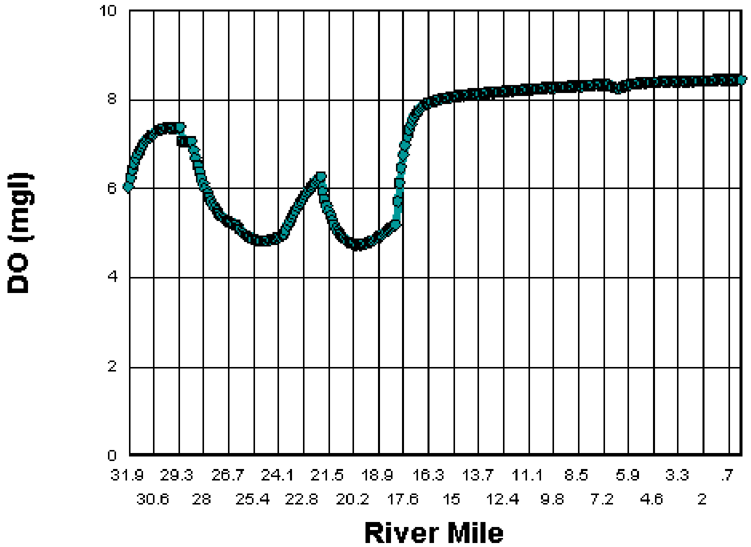


Figure 4. STREAM model output for Tuscumbia River Canal

To determine the LA for TBODu the model segment flows were multiplied by the natural background typical concentration of 2 mg/l CBODu plus the Ammonia-N concentration of 0.1 mg/l. Table 8 shows the modeled segments with the LA flow calculating the TBODu LA for this watershed, which is 133 lbs. per day.

Table 8. Calculation of TBODu Load Allocation for Critical 7Q10 flow

RM Begin	RM End	Head cfs	Dist cfs	Flow cfs	Conc mg/l	Conversion	Ammonia-N mg/l	NBOD	CBOD	TBOD
31.9	30.0	0.03	0.01	0.04	2.0	5.39	0.1	0.1	7.4	7.5
30.0	29.2	0.00	0.05	0.05	2.0	5.39	0.1	0.1	7.4	7.6
29.2	28.6	0.00	0.02	0.02	2.0	5.39	0.1	0.0	7.4	7.5
28.6	26.3	0.00	0.11	0.11	2.0	5.39	0.1	0.3	7.5	7.8
26.3	23.8	0.00	0.38	0.38	2.0	5.39	0.1	0.9	7.8	8.7
23.8	21.9	0.00	0.12	0.12	2.0	5.39	0.1	0.3	7.5	7.8
21.9	18.0	0.00	0.66	0.66	2.0	5.39	0.1	1.6	8.1	9.7
18.0	6.9	0.00	1.44	1.44	2.0	5.39	0.1	3.5	8.8	12.4
6.9	6.4	0.00	2.84	2.84	2.0	5.39	0.1	7.0	10.2	17.2
6.4	4.6	0.00	0.07	0.07	2.0	5.39	0.1	0.2	7.5	7.6
4.6	3.9	0.00	0.04	0.04	2.0	5.39	0.1	0.1	7.4	7.5
3.9	3.0	0.00	0.35	0.35	2.0	5.39	0.1	0.9	7.7	8.6
3.0	1.9	0.00	0.15	0.15	2.0	5.39	0.1	0.4	7.5	7.9
1.9	1.3	0.00	0.04	0.04	2.0	5.39	0.1	0.1	7.4	7.5
1.3	0.0	0.00	0.08	0.08	2.0	5.39	0.1	0.2	7.5	7.7
				6.39				15.7	117.2	133.0

3.3 Incorporation of a Margin of Safety

The margin of safety is a required component of a TMDL and accounts for the uncertainty about the relationship between pollutant loads and the quality of the receiving water body. The two types of MOS development are to implicitly incorporate the MOS using conservative model assumptions or to explicitly specify a portion of the total TMDL as the MOS. The MOS selected for this model is implicit.

3.4 Calculation of the TMDL

Equation 1 was used to calculate the TMDL for TP and TN. The target TN and TP concentrations were used with the average flow for the watershed to determine the nutrient TMDLs. The WLA was calculated by using the permit flow values from all of the point sources multiplied by 11.5 mg/l TN and 2.5 mg/l TP. The LA was calculated as the difference between the TMDL and the WLA. The modeled output for the critical condition indicates there is no violation of water quality standards for the limits indicated in the TMDL. The allocations in the TMDL are established to attain the applicable water quality standards.

Table 9. TMDL Loads

	WLA lbs/day	LA lbs/day	MOS	TMDL lbs/day
Total Nitrogen	830	1010	Implicit	1840
Total Phosphorous	180	83	Implicit	263
TBODu	2280	133	Implicit	2413

The nutrient TMDL loads were then compared to the estimated existing loads previously calculated in Table 7. A 77% reduction in TP loading is recommended and an 8.7% reduction in TN is recommended for nonpoint sources. Best management practices are encouraged in this watershed to reduce the nonpoint nutrient loads.

3.5 Seasonality and Critical Condition

This TMDL accounts for seasonal variability by requiring allocations that ensure year-round protection of water quality standards, including during critical conditions.

CONCLUSION

Nutrients were addressed through an estimate of a preliminary total phosphorous concentration target and a preliminary total nitrogen concentration target. Based on the estimated existing and target total phosphorous concentrations, this TMDL recommends a 77% reduction of the nonpoint phosphorous loads entering these water bodies to meet the preliminary target of 0.10 mg/l. The TMDL recommends a limit of 2.5 mg/l TP for each major point source in the watershed, which is a significant reduction (52%) from the current estimated load. The TMDL recommends an 8.7% reduction in TN from nonpoint sources, but does not recommend a limit for point sources. The TMDL recommends a cap of 11.5 mg/l TN for each major point source. The implementation of BMP activities should reduce the nutrient load entering the creeks. This will provide improved water quality for organic enrichment and the support of aquatic life in the water bodies, and will result in the attainment of the applicable water quality standards.

The WLA in the TMDL indicates a reduction is needed in Booneville POTW to 9-2-6 and in Rienzi to 10-2-6 to meet the TBODu maximum load.

4.1 Next Steps

MDEQ's Basin Management Approach and Nonpoint Source Program emphasize restoration of impaired waters with developed TMDLs. During the watershed prioritization process to be conducted by the North Independent Streams Basin Team, this TMDL will be considered as a basis for implementing possible restoration projects. The basin team is made up of state and federal resource agencies and stakeholder organizations and provides the opportunity for these entities to work with local stakeholders to achieve quantifiable improvements in water quality. Together, basin team members work to understand water quality conditions, determine causes and sources of problems, prioritize watersheds for potential water quality restoration and protection activities, and identify collaboration and leveraging opportunities. The Basin Management Approach and the Nonpoint Source Program work together to facilitate and support these activities.

The Nonpoint Source Program provides financial incentives to eligible parties to implement appropriate restoration and protection projects through the Clean Water Act's Section 319 Nonpoint Source (NPS) Grant Program. This program makes available around $1.6M each grant year for restoration and protections efforts by providing a 60% cost share for eligible projects.

Mississippi Soil and Water Conservation Commission (MSWCC) is the lead agency responsible for abatement of agricultural NPS pollution through training, promotion, and installation of BMPs on agricultural lands. USDA Natural Resource Conservation Service (NRCS) provides technical assistance to MSWCC through its conservation districts located in each county. NRCS assists animal producers in developing nutrient management plans and grazing management plans. MDEQ, MSWCC, NRCS, and other governmental and nongovernmental organizations work closely together to reduce agricultural runoff through the Section 319 NPS Program.

Mississippi Forestry Commission (MFC), in cooperation with the Mississippi Forestry Association (MFA) and Mississippi State University (MSU), have taken a leadership role in the development and promotion of the forestry industry Best Management Practices (BMPs) in Mississippi. MDEQ is designated as the lead agency for implementing an urban polluted runoff control program through its Stormwater Program. Through this program, MDEQ regulates most construction activities. Mississippi Department of Transportation (MDOT) is responsible for implementation of erosion and sediment control practices on highway construction.

Due to this TMDL, projects within this watershed will receive a higher score and ranking for funding through the basin team process and Nonpoint Source Program described above.

4.2 Public Participation

This TMDL will be published for a 30-day public notice. During this time, the public will be notified by publication in the statewide newspaper. The public will be given an opportunity to review the TMDLs and submit comments. MDEQ also distributes all TMDLs at the beginning of the public notice to those members of the public who have requested to be included on a TMDL mailing list. Anyone wishing to become a member of the TMDL mailing list should contact Kay Whittington at Kay_Whittington@deq.state.ms.us.

All comments should be directed to Kay_Whittington@deq.state.ms.us or Kay Whittington, MDEQ, PO Box 2261, Jackson, MS 39225. All comments received during the public notice period and at any public hearings become a part of the record of this TMDL and will be considered in the submission of this TMDL to EPA Region 4 for final approval.

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Appendix A – Model Output for WLAs

Tuscumbia   BEGINNING AT RIVER MILE   31.9

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)	
HEADWATER	.100	7.000	2.00	.05	
WASTE SOURCE	3.094	6.000	345.21	33.35	Boonville 9/2/6
DIST. INPUT	.010	7.000	.11	.00	

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 8.02 /DAY

TEMP=23.90 C

REAERATION BY TSIVOGLOU SLOPE= 14.3 FT/MILE ESCAPE COEF= .11 /DAY

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
31.900	3.194	6.031	2.518	20.128	1.937	.284
31.800	3.194	6.231	2.319	19.977	1.922	.284
31.700	3.195	6.400	2.150	19.825	1.907	.284
31.600	3.195	6.545	2.005	19.674	1.893	.284
31.500	3.196	6.667	1.882	19.524	1.879	.284
31.400	3.196	6.772	1.778	19.376	1.864	.284
31.300	3.197	6.862	1.688	19.228	1.850	.284
31.200	3.197	6.939	1.611	19.082	1.836	.284
31.100	3.198	7.005	1.545	18.936	1.822	.284
31.000	3.198	7.062	1.487	18.792	1.808	.284
30.900	3.199	7.112	1.438	18.649	1.794	.284
30.800	3.199	7.155	1.395	18.507	1.781	.284
30.700	3.200	7.193	1.357	18.366	1.767	.284
30.600	3.200	7.226	1.324	18.226	1.753	.284
30.500	3.201	7.255	1.295	18.087	1.740	.284
30.400	3.201	7.281	1.269	17.950	1.727	.284
30.300	3.202	7.304	1.245	17.813	1.714	.284
30.200	3.202	7.325	1.225	17.677	1.701	.284
30.100	3.203	7.344	1.206	17.543	1.688	.284
30.000	3.203	7.362	1.188	17.409	1.675	.284

Tuscumbia   BEGINNING AT RIVER MILE   30.0

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	3.203	7.362	301.16	28.97

DIST. INPUT	.050	7.000	.54	.03

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 7.13 /DAY

TEMP=23.90 C

REAERATION BY TSIVOGLOU SLOPE= 15.3 FT/MILE ESCAPE COEF= .11 /DAY

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
30.000	3.209	7.361	1.189	17.382	1.672	.236
29.900	3.209	7.356	1.194	17.226	1.657	.236
29.800	3.215	7.353	1.197	17.045	1.639	.236
29.700	3.220	7.352	1.198	16.866	1.622	.236
29.600	3.226	7.354	1.196	16.689	1.605	.236
29.500	3.231	7.358	1.192	16.514	1.588	.236
29.400	3.237	7.363	1.187	16.341	1.571	.236
29.300	3.242	7.369	1.181	16.169	1.554	.236
29.200	3.248	7.377	1.173	16.000	1.538	.236

Tuscumbia   BEGINNING AT RIVER MILE   29.2

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)	
UPSTREAM	3.248	7.377	280.62	26.97	
WASTE SOURCE	.928	6.000	115.04	10.00	Reinzi 10/2/6
DIST. INPUT	.020	7.000	.22	.01	

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 5.60 /DAY

TEMP=23.90 C

REAERATION BY TSIVOGLOU SLOPE= 13.0 FT/MILE ESCAPE COEF= .11 /DAY

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
29.200	4.179	7.071	1.479	17.536	1.639	.219
29.100	4.179	7.060	1.490	17.366	1.623	.219
29.000	4.182	7.053	1.497	17.187	1.606	.219
28.900	4.185	7.049	1.501	17.010	1.590	.219
28.800	4.187	7.048	1.501	16.835	1.573	.219
28.700	4.190	7.050	1.500	16.662	1.557	.219
28.600	4.193	7.054	1.496	16.491	1.541	.219

28.600	4.196	7.053	1.496	16.481	1.540	.219

Tuscumbia   BEGINNING AT RIVER MILE   28.6

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	4.196	7.053	373.43	34.89
DIST. INPUT	.110	7.000	1.19	.06

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 1.70 /DAY

TEMP=23.90 C

REAERATION BY TSIVOGLOU SLOPE= 5.0 FT/MILE ESCAPE COEF= .11 /DAY

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
28.600	4.201	7.053	1.497	16.465	1.538	.172
28.500	4.201	6.860	1.690	16.263	1.519	.172
28.400	4.205	6.682	1.868	16.047	1.499	.172
28.300	4.210	6.518	2.032	15.834	1.479	.172
28.200	4.214	6.367	2.183	15.624	1.459	.172
28.100	4.219	6.229	2.321	15.417	1.440	.172
28.000	4.223	6.103	2.447	15.213	1.421	.172
27.900	4.228	5.987	2.563	15.011	1.402	.172
27.800	4.233	5.882	2.668	14.813	1.383	.172
27.700	4.237	5.787	2.763	14.616	1.365	.172
27.600	4.242	5.701	2.849	14.423	1.347	.172
27.500	4.246	5.623	2.927	14.232	1.329	.172
27.400	4.251	5.552	2.997	14.044	1.311	.172
27.300	4.256	5.490	3.060	13.858	1.294	.172
27.200	4.260	5.434	3.116	13.675	1.277	.172
27.100	4.265	5.385	3.165	13.494	1.260	.172
27.000	4.269	5.341	3.209	13.315	1.243	.172
26.900	4.274	5.303	3.246	13.139	1.226	.172
26.800	4.278	5.271	3.279	12.966	1.210	.172
26.700	4.283	5.243	3.307	12.795	1.194	.172
26.600	4.288	5.220	3.330	12.626	1.178	.172
26.500	4.292	5.202	3.348	12.459	1.162	.172
26.400	4.297	5.187	3.363	12.294	1.147	.172
26.300	4.301	5.176	3.374	12.132	1.132	.172
26.300	4.306	5.177	3.372	12.121	1.131	.172

Tuscumbia   BEGINNING AT RIVER MILE   26.3

*** LOADS ***

DISSOLVED CARBONACEOUS

	FLOW (CFS)	OXYGEN (MG/L)	BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	4.306	5.177	281.85	26.29
DIST. INPUT	.380	7.000	4.10	.20

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 1.25 /DAY

TEMP=23.90 C

REAERATION BY TSIVOGLOU SLOPE= 3.8 FT/MILE ESCAPE COEF= .11 /DAY

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
26.300	4.321	5.184	3.366	12.087	1.127	.165
26.200	4.321	5.119	3.430	11.932	1.113	.165
26.100	4.335	5.068	3.482	11.746	1.095	.165
26.000	4.350	5.022	3.528	11.563	1.078	.165
25.900	4.364	4.981	3.569	11.383	1.061	.165
25.800	4.379	4.946	3.604	11.206	1.044	.165
25.700	4.394	4.915	3.635	11.031	1.027	.165
25.600	4.408	4.889	3.661	10.860	1.011	.165
25.500	4.423	4.868	3.682	10.692	.995	.165
25.400	4.437	4.850	3.700	10.526	.979	.165
25.300	4.452	4.836	3.714	10.364	.964	.165
25.200	4.467	4.826	3.724	10.204	.949	.165
25.100	4.481	4.819	3.731	10.046	.934	.165
25.000	4.496	4.815	3.735	9.891	.919	.165
24.900	4.511	4.815	3.735	9.739	.905	.165
24.800	4.525	4.816	3.734	9.590	.891	.165
24.700	4.540	4.821	3.729	9.442	.877	.165
24.600	4.554	4.828	3.722	9.298	.863	.165
24.500	4.569	4.837	3.713	9.155	.850	.165
24.400	4.584	4.848	3.702	9.015	.836	.165
24.300	4.598	4.861	3.689	8.877	.823	.165
24.200	4.613	4.876	3.674	8.742	.810	.165
24.100	4.627	4.893	3.657	8.609	.798	.165
24.000	4.642	4.911	3.639	8.478	.785	.165
23.900	4.657	4.931	3.619	8.349	.773	.165
23.800	4.671	4.952	3.598	8.222	.761	.165

Tuscumbia   BEGINNING AT RIVER MILE   23.8

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	4.671	4.952	207.40	19.20
DIST. INPUT	.120	7.000	1.29	.06

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 1.90 /DAY

TEMP=23.90 C

REAERATION BY TSIVOGLOU SLOPE= 5.8 FT/MILE ESCAPE COEF= .11 /DAY

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
23.800	4.677	4.954	3.596	8.214	.760	.167
23.700	4.677	5.052	3.498	8.110	.751	.167
23.600	4.683	5.148	3.402	7.999	.740	.167
23.500	4.689	5.239	3.311	7.890	.730	.167
23.400	4.695	5.326	3.224	7.783	.720	.167
23.300	4.701	5.409	3.141	7.677	.710	.167
23.200	4.707	5.488	3.062	7.572	.700	.167
23.100	4.713	5.563	2.987	7.469	.691	.167
23.000	4.719	5.635	2.915	7.367	.681	.167
22.900	4.725	5.704	2.846	7.267	.672	.167
22.800	4.731	5.770	2.780	7.169	.663	.167
22.700	4.737	5.833	2.717	7.071	.654	.167
22.600	4.743	5.894	2.656	6.975	.645	.167
22.500	4.749	5.952	2.598	6.880	.636	.167
22.400	4.755	6.008	2.542	6.787	.627	.167
22.300	4.761	6.061	2.489	6.695	.618	.167
22.200	4.767	6.113	2.437	6.604	.610	.167
22.100	4.773	6.162	2.388	6.515	.602	.167
22.000	4.779	6.210	2.340	6.427	.593	.167
21.900	4.785	6.256	2.294	6.340	.585	.167

Tuscumbia BEGINNING AT RIVER MILE 21.9

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)	
UPSTREAM	4.785	6.256	163.82	15.12	
WASTE SOURCE	9.282	6.000	1150.69	100.06	10/2/6 Corinth
DIST. INPUT	.660	7.000	7.12	.36	

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 1.62 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS

21.900	14.084	6.088	2.462	17.287	1.515	.148
21.800	14.084	5.913	2.637	17.039	1.493	.148
21.700	14.100	5.755	2.795	16.778	1.470	.148
21.600	14.117	5.612	2.938	16.521	1.447	.148
21.500	14.133	5.484	3.066	16.268	1.425	.148
21.400	14.150	5.370	3.180	16.019	1.403	.148
21.300	14.166	5.267	3.283	15.774	1.382	.148
21.200	14.183	5.176	3.374	15.533	1.360	.148
21.100	14.199	5.096	3.454	15.295	1.340	.148
21.000	14.216	5.026	3.524	15.061	1.319	.148
20.900	14.232	4.964	3.586	14.831	1.299	.148
20.800	14.249	4.912	3.638	14.604	1.279	.148
20.700	14.265	4.867	3.683	14.381	1.259	.148
20.600	14.282	4.829	3.721	14.161	1.240	.148
20.500	14.298	4.798	3.752	13.945	1.221	.148
20.400	14.315	4.774	3.776	13.732	1.202	.148
20.300	14.331	4.755	3.795	13.522	1.184	.148
20.200	14.348	4.741	3.809	13.316	1.165	.148
20.100	14.364	4.732	3.818	13.113	1.148	.148
20.000	14.381	4.728	3.822	12.913	1.130	.148
19.900	14.397	4.728	3.822	12.716	1.113	.148
19.800	14.414	4.732	3.818	12.522	1.096	.148
19.700	14.430	4.739	3.811	12.331	1.079	.148
19.600	14.447	4.750	3.800	12.143	1.062	.148
19.500	14.463	4.763	3.787	11.958	1.046	.148
19.400	14.480	4.779	3.771	11.776	1.030	.148
19.300	14.496	4.798	3.752	11.596	1.014	.148
19.200	14.513	4.818	3.731	11.420	.999	.148
19.100	14.529	4.841	3.709	11.246	.983	.148
19.000	14.546	4.866	3.684	11.075	.968	.148
18.900	14.562	4.892	3.657	10.906	.954	.148
18.800	14.579	4.920	3.630	10.740	.939	.148
18.700	14.595	4.950	3.600	10.577	.925	.148
18.600	14.612	4.980	3.570	10.416	.910	.148
18.500	14.628	5.012	3.538	10.258	.897	.148
18.400	14.645	5.045	3.505	10.102	.883	.148
18.300	14.661	5.078	3.472	9.949	.869	.148
18.200	14.678	5.112	3.438	9.797	.856	.148
18.100	14.694	5.147	3.403	9.649	.843	.148
18.000	14.711	5.183	3.367	9.502	.830	.148

Tuscumbia   BEGINNING AT RIVER MILE   18.0

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	14.711	5.183	754.85	65.94
DIST. INPUT	1.440	7.000	15.52	.78

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
18.000	14.724	5.184	3.366	9.496	.829	.216
17.900	14.724	5.699	2.851	9.403	.821	.216
17.800	14.737	6.119	2.431	9.304	.813	.216
17.700	14.749	6.461	2.089	9.206	.804	.216
17.600	14.762	6.740	1.810	9.109	.796	.216
17.500	14.775	6.967	1.583	9.014	.787	.216
17.400	14.788	7.153	1.397	8.919	.779	.216
17.300	14.801	7.305	1.245	8.826	.771	.216
17.200	14.814	7.429	1.121	8.733	.762	.216
17.100	14.827	7.531	1.019	8.642	.754	.216
17.000	14.839	7.615	.935	8.551	.746	.216
16.900	14.852	7.684	.866	8.462	.739	.216
16.800	14.865	7.742	.808	8.373	.731	.216
16.700	14.878	7.789	.761	8.285	.723	.216
16.600	14.891	7.829	.721	8.199	.715	.216
16.500	14.904	7.862	.688	8.113	.708	.216
16.400	14.917	7.890	.660	8.028	.700	.216
16.300	14.929	7.914	.636	7.944	.693	.216
16.200	14.942	7.934	.615	7.861	.686	.216
16.100	14.955	7.952	.598	7.779	.678	.216
16.000	14.968	7.967	.583	7.697	.671	.216
15.900	14.981	7.981	.569	7.617	.664	.216
15.800	14.994	7.993	.557	7.537	.657	.216
15.700	15.007	8.003	.547	7.459	.650	.216
15.600	15.019	8.013	.537	7.381	.643	.216
15.500	15.032	8.022	.528	7.304	.637	.216
15.400	15.045	8.030	.520	7.227	.630	.216
15.300	15.058	8.037	.513	7.152	.623	.216
15.200	15.071	8.044	.506	7.077	.617	.216
15.100	15.084	8.051	.499	7.004	.610	.216
15.000	15.097	8.057	.493	6.931	.604	.216
14.900	15.109	8.063	.487	6.858	.597	.216
14.800	15.122	8.069	.481	6.787	.591	.216
14.700	15.135	8.074	.475	6.716	.585	.216
14.600	15.148	8.080	.470	6.646	.579	.216
14.500	15.161	8.085	.465	6.577	.573	.216
14.400	15.174	8.090	.460	6.509	.567	.216
14.300	15.187	8.095	.455	6.441	.561	.216
14.200	15.199	8.100	.450	6.374	.555	.216
14.100	15.212	8.105	.445	6.308	.549	.216
14.000	15.225	8.110	.440	6.242	.543	.216
13.900	15.238	8.114	.436	6.177	.538	.216
13.800	15.251	8.119	.431	6.113	.532	.216
13.700	15.264	8.123	.426	6.050	.526	.216
13.600	15.277	8.128	.422	5.987	.521	.216
13.500	15.289	8.132	.418	5.925	.515	.216
13.400	15.302	8.137	.413	5.863	.510	.216
13.300	15.315	8.141	.409	5.803	.505	.216
13.200	15.328	8.145	.405	5.743	.499	.216
13.100	15.341	8.149	.401	5.683	.494	.216
13.000	15.354	8.153	.396	5.624	.489	.216
12.900	15.367	8.158	.392	5.566	.484	.216

12.800	15.379	8.162	.388	5.508	.479	.216
12.700	15.392	8.166	.384	5.451	.474	.216
12.600	15.405	8.170	.380	5.395	.469	.216
12.500	15.418	8.173	.377	5.339	.464	.216
12.400	15.431	8.177	.373	5.284	.459	.216
12.300	15.444	8.181	.369	5.229	.454	.216
12.200	15.457	8.185	.365	5.175	.449	.216
12.100	15.469	8.189	.361	5.122	.445	.216
12.000	15.482	8.192	.358	5.069	.440	.216
11.900	15.495	8.196	.354	5.017	.435	.216
11.800	15.508	8.200	.350	4.965	.431	.216
11.700	15.521	8.203	.347	4.914	.426	.216
11.600	15.534	8.207	.343	4.863	.422	.216
11.500	15.547	8.210	.340	4.813	.418	.216
11.400	15.559	8.214	.336	4.764	.413	.216
11.300	15.572	8.217	.333	4.714	.409	.216
11.200	15.585	8.220	.329	4.666	.405	.216
11.100	15.598	8.224	.326	4.618	.400	.216
11.000	15.611	8.227	.323	4.570	.396	.216
10.900	15.624	8.230	.319	4.523	.392	.216
10.800	15.637	8.234	.316	4.477	.388	.216
10.700	15.649	8.237	.313	4.431	.384	.216
10.600	15.662	8.240	.310	4.386	.380	.216
10.500	15.675	8.243	.307	4.341	.376	.216
10.400	15.688	8.246	.304	4.296	.372	.216
10.300	15.701	8.249	.301	4.252	.368	.216
10.200	15.714	8.252	.297	4.208	.364	.216
10.100	15.727	8.255	.294	4.165	.361	.216
10.000	15.739	8.258	.291	4.123	.357	.216
9.900	15.752	8.261	.289	4.080	.353	.216
9.800	15.765	8.264	.286	4.039	.349	.216
9.700	15.778	8.267	.283	3.997	.346	.216
9.600	15.791	8.270	.280	3.956	.342	.216
9.500	15.804	8.273	.277	3.916	.339	.216
9.400	15.817	8.276	.274	3.876	.335	.216
9.300	15.829	8.278	.271	3.836	.332	.216
9.200	15.842	8.281	.269	3.797	.328	.216
9.100	15.855	8.284	.266	3.759	.325	.216
9.000	15.868	8.287	.263	3.720	.321	.216
8.900	15.881	8.289	.261	3.682	.318	.216
8.800	15.894	8.292	.258	3.645	.315	.216
8.700	15.907	8.294	.255	3.608	.312	.216
8.600	15.919	8.297	.253	3.571	.308	.216
8.500	15.932	8.300	.250	3.535	.305	.216
8.400	15.945	8.302	.248	3.499	.302	.216
8.300	15.958	8.305	.245	3.463	.299	.216
8.200	15.971	8.307	.243	3.428	.296	.216
8.100	15.984	8.309	.240	3.393	.293	.216
8.000	15.997	8.312	.238	3.359	.290	.216
7.900	16.009	8.314	.236	3.325	.287	.216
7.800	16.022	8.317	.233	3.291	.284	.216
7.700	16.035	8.319	.231	3.258	.281	.216
7.600	16.048	8.321	.229	3.225	.278	.216
7.500	16.061	8.324	.226	3.192	.275	.216
7.400	16.074	8.326	.224	3.160	.272	.216
7.300	16.087	8.328	.222	3.128	.269	.216
7.200	16.099	8.330	.220	3.096	.267	.216
7.100	16.112	8.332	.218	3.065	.264	.216
7.000	16.125	8.335	.215	3.034	.261	.216

6.900	16.138	8.337	.213	3.003	.258	.216

Tuscumbia BEGINNING AT RIVER MILE 6.9

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	16.138	8.337	261.73	22.52
DIST. INPUT	2.840	7.000	30.61	1.53

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
6.900	16.611	8.299	.251	2.975	.254	.232
6.800	16.611	8.309	.241	2.947	.252	.232
6.700	17.085	8.287	.262	2.894	.245	.232
6.600	17.558	8.272	.278	2.844	.239	.232
6.500	18.031	8.261	.289	2.796	.233	.232
6.400	18.505	8.254	.296	2.750	.228	.232

Tuscumbia BEGINNING AT RIVER MILE 6.4

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	18.505	8.254	274.79	22.75
DIST. INPUT	.070	7.000	.75	.04

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS

6.400	18.508	8.253	.297	2.750	.228	.230
6.300	18.508	8.274	.276	2.724	.226	.230
6.200	18.512	8.292	.258	2.699	.223	.230
6.100	18.516	8.306	.244	2.674	.221	.230
6.000	18.519	8.318	.232	2.649	.219	.230
5.900	18.523	8.329	.221	2.625	.217	.230
5.800	18.527	8.337	.213	2.600	.215	.230
5.700	18.530	8.345	.205	2.576	.213	.230
5.600	18.534	8.351	.199	2.552	.211	.230
5.500	18.538	8.357	.193	2.529	.209	.230
5.400	18.541	8.362	.188	2.505	.207	.230
5.300	18.545	8.366	.184	2.482	.205	.230
5.200	18.549	8.370	.180	2.459	.203	.230
5.100	18.553	8.373	.177	2.436	.202	.230
5.000	18.556	8.376	.174	2.414	.200	.230
4.900	18.560	8.379	.171	2.391	.198	.230
4.800	18.564	8.381	.169	2.369	.196	.230
4.700	18.567	8.384	.166	2.347	.194	.230
4.600	18.571	8.386	.164	2.326	.192	.230
4.600	18.575	8.386	.164	2.326	.192	.230

Tuscumbia   BEGINNING AT RIVER MILE   4.6

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	18.575	8.386	233.27	19.29
DIST. INPUT	.040	7.000	.43	.02

*** PARAMETERS ***

CS= 8.55 MG/L   PA= .00 MG/L   RA= .00 MG/L   S= .00 MG/L

KR= .30 /DAY   KD= .30 /DAY   KN= .30 /DAY   KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
4.600	18.580	8.385	.165	2.326	.192	.260
4.500	18.580	8.387	.163	2.307	.191	.260
4.400	18.585	8.389	.161	2.288	.189	.260
4.300	18.590	8.391	.159	2.269	.188	.260
4.200	18.595	8.392	.158	2.250	.186	.260
4.100	18.600	8.394	.156	2.232	.184	.260
4.000	18.605	8.395	.155	2.214	.183	.260
3.900	18.610	8.397	.153	2.195	.181	.260

Tuscumbia BEGINNING AT RIVER MILE 3.9

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	18.610	8.397	220.62	18.23
DIST. INPUT	.350	7.000	3.77	.19

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
3.900	18.645	8.394	.156	2.195	.181	.216
3.800	18.645	8.396	.154	2.173	.179	.216
3.700	18.680	8.397	.153	2.152	.178	.216
3.600	18.715	8.397	.153	2.130	.176	.216
3.500	18.750	8.398	.152	2.109	.174	.216
3.400	18.785	8.398	.152	2.088	.172	.216
3.300	18.820	8.399	.151	2.068	.170	.216
3.200	18.855	8.400	.150	2.047	.168	.216
3.100	18.890	8.401	.149	2.027	.167	.216
3.000	18.925	8.402	.148	2.007	.165	.216
3.000	18.960	8.400	.150	2.007	.165	.216

Tuscumbia BEGINNING AT RIVER MILE 3.0

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	18.960	8.400	205.48	16.86
DIST. INPUT	.150	7.000	1.62	.08

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
3.000	18.972	8.399	.151	2.007	.165	.226
2.900	18.972	8.403	.147	1.988	.163	.226
2.800	18.985	8.405	.145	1.970	.162	.226
2.700	18.997	8.408	.142	1.951	.160	.226
2.600	19.010	8.410	.140	1.933	.158	.226
2.500	19.022	8.412	.138	1.915	.157	.226
2.400	19.035	8.413	.137	1.897	.155	.226
2.300	19.047	8.415	.135	1.879	.154	.226
2.200	19.060	8.417	.133	1.861	.152	.226
2.100	19.072	8.418	.132	1.844	.151	.226
2.000	19.085	8.420	.130	1.827	.150	.226
1.900	19.097	8.421	.129	1.810	.148	.226
1.900	19.110	8.420	.130	1.810	.148	.226

Tuscumbia BEGINNING AT RIVER MILE 1.9

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	19.110	8.420	186.77	15.28
DIST. INPUT	.040	7.000	.43	.02

*** PARAMETERS ***

CS= 8.55 MG/L PA= .00 MG/L RA= .00 MG/L S= .00 MG/L

KR= .30 /DAY KD= .30 /DAY KN= .30 /DAY KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
1.900	19.115	8.420	.130	1.810	.148	.227
1.800	19.115	8.422	.128	1.793	.147	.227
1.700	19.121	8.424	.126	1.776	.145	.227
1.600	19.127	8.425	.125	1.760	.144	.227
1.500	19.132	8.427	.123	1.743	.143	.227
1.400	19.138	8.428	.122	1.727	.141	.227
1.300	19.144	8.430	.120	1.711	.140	.227
1.300	19.150	8.429	.121	1.711	.140	.227

Tuscumbia BEGINNING AT RIVER MILE 1.3

*** LOADS ***

	FLOW (CFS)	DISSOLVED OXYGEN (MG/L)	CARBONACEOUS BOD (LBS/DAY)	TKN (LBS/DAY)
UPSTREAM	19.150	8.429	176.96	14.46

DIST. INPUT .080 7.000 .86 .04

*** PARAMETERS ***

CS= 8.55 MG/L	PA= .00 MG/L	RA= .00 MG/L	S= .00 MG/L
KR= .30 /DAY	KD= .30 /DAY	KN= .30 /DAY	KA= 7.37 /DAY

TEMP=23.90 C

REAERATION COEFFICIENT SPECIFIED

*** STREAM CONDITION ***

RIVER MILE	FLOW CFS	DO MG/L	DEFICIT MG/L	CBOD MG/L	TKN MG/L	VEL FPS
1.300	19.155	8.429	.121	1.711	.140	.225
1.200	19.155	8.431	.119	1.695	.139	.225
1.100	19.161	8.432	.118	1.679	.137	.225
1.000	19.167	8.433	.117	1.664	.136	.225
.900	19.172	8.435	.115	1.648	.135	.225
.800	19.178	8.436	.114	1.633	.133	.225
.700	19.184	8.437	.113	1.617	.132	.225
.600	19.190	8.438	.112	1.602	.131	.225
.500	19.195	8.439	.111	1.587	.130	.225
.400	19.201	8.440	.110	1.572	.128	.225
.300	19.207	8.441	.109	1.558	.127	.225
.200	19.212	8.442	.108	1.543	.126	.225
.100	19.218	8.443	.107	1.529	.125	.225
.000	19.224	8.444	.106	1.514	.124	.225

HEADWATER

RIVER	MILE	Q	DO	CBOD	TKN	TYPE	DESCRIPTION
Tuscumbia	31.90	.10	7.00	2.0	.1		

WASTE SOURCE

RIVER	MILE	Q	DO	CBOD	TKN	TYPE	DESCRIPTION
Tuscumbia	31.90	3.09	6.00	345.2	33.4	.00	Boonville 9/2/6
Tuscumbia	29.20	.93	6.00	115.0	10.0	.00	Reinzi 10/2/6
Tuscumbia	21.90	9.28	6.00	1150.7	100.1	.00	10/2/6 Corinth

SPECIFIC INPUT

RIVER	MILE	Q	DO	CBOD	TKN	TYPE	DESCRIPTION
Tuscumbia	31.90	.01	7.00	.1	.0	1.00	
Tuscumbia	30.00	.05	7.00	.5	.0	1.00	
Tuscumbia	29.20	.02	7.00	.2	.0	1.00	
Tuscumbia	28.60	.11	7.00	1.2	.1	1.00	
Tuscumbia	26.30	.38	7.00	4.1	.2	1.00	
Tuscumbia	23.80	.12	7.00	1.3	.1	1.00	
Tuscumbia	21.90	.66	7.00	7.1	.4	1.00	
Tuscumbia	18.00	1.44	7.00	15.5	.8	1.00	
Tuscumbia	6.90	2.84	7.00	30.6	1.5	1.00	
Tuscumbia	6.40	.07	7.00	.8	.0	1.00	
Tuscumbia	4.60	.04	7.00	.4	.0	1.00	

Tuscumbia	3.90	.35	7.00	3.8	.2	1.00
Tuscumbia	3.00	.15	7.00	1.6	.1	1.00
Tuscumbia	1.90	.04	7.00	.4	.0	1.00
Tuscumbia	1.30	.08	7.00	.9	.0	1.00

REACH PARAMETER

RIVER	MILE	CD	ND	CV	NV	DEPTH	VEL	S	C	KA
Tuscumbia	31.90						.28	.11	14.31	
Tuscumbia	30.00						.24	.11	15.30	
Tuscumbia	29.20						.22	.11	12.96	
Tuscumbia	28.60						.17	.11	5.00	
Tuscumbia	26.30						.16	.11	3.84	
Tuscumbia	23.80						.17	.11	5.77	
Tuscumbia	21.90						.15			1.48
Tuscumbia	18.00						.22			6.72
Tuscumbia	6.90						.23			6.72
Tuscumbia	6.40						.23			6.72
Tuscumbia	4.60						.26			6.72
Tuscumbia	3.90						.22			6.72
Tuscumbia	3.00						.23			6.72
Tuscumbia	1.90						.23			6.72
Tuscumbia	1.30						.22			6.72

REACH RATE

RIVER	MILE	TEMP	KR	KD	KN	PA	RA	S
Tuscumbia	31.90	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	30.00	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	29.20	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	28.60	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	26.30	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	23.80	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	21.90	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	18.00	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	6.90	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	6.40	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	4.60	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	3.90	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	3.00	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	1.90	23.90	.30	.30	.30	.00	.00	.00
Tuscumbia	1.30	23.90	.30	.30	.30	.00	.00	.00

SEQUENCE TABLE

RIVER	TRIBUTARY	TRIBUTARY	ORGIN	TERMINUS
Tuscumbia			31.90	30.00
Tuscumbia			30.00	29.20
Tuscumbia			29.20	28.60
Tuscumbia			28.60	26.30
Tuscumbia			26.30	23.80
Tuscumbia			23.80	21.90
Tuscumbia			21.90	18.00
Tuscumbia			18.00	6.90
Tuscumbia			6.90	6.40

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Tuscumbia                                   6.40      4.60
Tuscumbia                                   4.60      3.90
Tuscumbia                                   3.90      3.00
Tuscumbia                                   3.00      1.90
Tuscumbia                                   1.90      1.30
Tuscumbia                                   1.30       .00
DELTA=     .10
Stop - Program terminated.
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Appendix B – Tuscumbia River Monitoring Report