TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For Toxicity due to Pesticides and Non-Priority Organics, Nutrients, Siltation, and Organic Enrichment/Low Dissolved Oxygen in the

Pearl River

Leake County downstream of Carthage, Mississippi

And

For Toxicity due to Pesticides and Siltation, and Organic Enrichment/Low Dissolved Oxygen in the

Pearl River

Leake County upstream of Carthage, Mississippi

(HUC 03180001)

Pearl River Basin, Mississippi

EPA United States Environmental Protection Agency

Region 4 serving the southeast

Summary Page

The Consent Decree between the Environmental Protection Agency (EPA) and the Sierra Club in the Mississippi Total Maximum Daily Load (TMDL) Lawsuit requires EPA to develop TMDLs for waters included on Mississippi's 1996 303(d) List of Impaired Waterbodies, according to a prescribed schedule. The 1996 Section 303(d) List includes all waters determined to be impaired based on monitored or evaluated assessments, and shows cause(s) of impairment for each listed waterbody. Mississippi's evaluated listings assume that agricultural activities in the watershed may have adversely affected water quality in these specific reaches (MSUPRLRM1 and MSUPRLRM2) of the Pearl River.

This "toxicity due to pesticides" TMDL is a phased TMDL proposed in compliance with the Consent Decree to address evaluated impairments in segments MSUPRLRM1 and MSUPRLRM2. These segments are listed for other evaluated causes and there are no pesticide or other water quality data to determine actual impairment status, the specific pollutant problem, or to determine a specific pesticide/pollutant loading reduction. If there is a demonstrated aquatic life problem due to a pesticide or a combination of pesticides, the TMDL can be best expressed in terms of aquatic life toxicity. For this reason, EPA is proposing a phased approach for TMDL development for these "evaluated" listings.

In a phased TMDL, EPA or the state uses the best information available at the time to establish the TMDL at levels necessary to implement applicable water quality standards and to make allocations to pollution sources. The phased TMDL approach recognizes that additional data and information may be necessary to validate the assumptions of the TMDL and to provide greater certainty that the TMDL will achieve the applicable water quality standard. Thus, Phase 1 identifies toxicity levels needed to protect the waterbody and Phase 2 identifies the data and information that needs to be collected to determine the specific toxicity causes and develops the appropriate levels of pollutant reduction. The Phase 2 TMDL will include targeted pollution allocation strategies for specific causes of impairment and a margin of safety that addresses uncertainty about the relationship between load allocations and receiving water quality.

EPA guidance states that TMDLs under the phased approach include allocations that confirm existing limits

or would lead to new limits or new controls while allowing for additional data collection to more accurately determine assimilative capacities and pollution allocations. (USEPA, 1991) Therefore, no new or additional source of pollutant representative of any of the cited classes of respective impairments shall be introduced into these segments until:

- actual impairment status is known;
- specific pollutants causing impairment are determined; and
- the Phase 2 TMDLs are developed for individual pollutants in these segments; or
- these segments are de-listed based on the biological or toxicity/water quality monitoring to be conducted.

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while maintaining water quality standards. For some pollutants, TMDLs are expressed on a mass loading basis (e.g., pounds per day). In accordance with 40 CFR Part 130.2(i), "TMDLs can be expressed in terms of ... mass per time, toxicity, or other appropriate measure." In addition, NPDES permitting regulations in 40 CFR 122.45(f) state that "All pollutants limited in permits shall have limitations...expressed in terms of mass except...pollutants which cannot appropriately be expressed by mass." For the toxicity TMDL for these segments of the Pearl River, the Total Maximum Daily Load is expressed in terms of chronic toxicity units (TU).

This TMDL has been established to protect the biology of the listed segments of the Pearl River against chronic toxicity due to pesticides and other pollutants that may cause toxicity to aquatic organisms. The toxicity wasteload allocation (WLA) for any dischargers to these segments of the Pearl River will be determined as follows:

Toxicity from each point source = 100 / NOEC = 100 / IWC = 100 / 100 = 1.0 TU

Where NOEC is the No Effect Concentration; IWC is the Instream Water Concentration and TU is Toxicity Units. Since these segments of the Pearl River are on the State's 303(d) List of Impaired Waters, the IWC for any new or expanding sources will be established at 100, meaning there is no instream dilution

available for assimilative capacity.

The existing toxicity contribution to these segments of the Pearl River from nonpoint sources is not known. The toxicity associated with any new nonpoint sources, therefore, cannot exceed 1.0 TU.

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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 water's designated uses. 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 consideration given to 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 Consent Decree between the Environmental Protection Agency (EPA) and the Sierra Club in the Mississippi Total Maximum Daily Load (TMDL) Lawsuit requires EPA to develop TMDLs for waters included on Mississippi's 1996 303(d) List of Impaired Waterbodies, according to a prescribed schedule. The 1996 Section 303(d) List includes all waters determined to be impaired based on monitored or evaluated assessments, and shows cause(s) of impairment for each listed waterbody. In many cases, the causes listed for monitored waterbodies are listed based on evaluated assessments. These are potential causes of impairment based on local land uses, such as agriculture. In some cases, a monitored waterbody is listed with only evaluated causes. Pursuant to the Consent Decree, EPA is responsible for developing TMDLs for all causes associated with the monitored waterbodies on the 1996 Section 303(d) List, regardless of the monitored vs. evaluated status of the particular cause. Pearl River segments MSUPRLRM1 and MSUPRLRM2 (Figure 1) are listed as monitored waterbodies on the 1996 Mississippi

Section 303(d) List. The 1998 Section 303(d) List identifies MSUPRLRM1 as a monitored segment, and MSUPRLRM2 as an evaluated segment. The format of the 1998 List was selected to differentiate monitored and evaluated pollutants on monitored segments.

Mississippi's evaluated listings assume that agricultural activities in the watershed may have adversely affected water quality in these specific reaches (MSUPRLRM2 and MSUPRLRM1) of the Pearl River. This "toxicity due to pesticides" TMDL is a phased TMDL proposed in compliance with the Consent Decree to address evaluated impairments in segments MSUPRLRM1 and MSUPRLRM2. These segments are listed for evaluated causes and there are no pesticide or other water quality data to determine actual impairment status, the specific pollutant problem or to determine a specific pesticide/pollutant loading reduction. If there is a demonstrated aquatic life problem due to a pesticide or a combination of pesticides the TMDL can be best expressed in terms of aquatic life toxicity. For this reason, EPA is proposing a phased approach for TMDL development for these "evaluated" listings. In a phased TMDL, EPA or the state uses the best information available at the time to establish the TMDL at levels necessary to implement applicable water quality standards and to make allocations to pollution sources. The phased TMDL approach recognizes that additional data and information may be necessary to validate the assumptions of the TMDL and to provide greater certainty that the TMDL will achieve the applicable water quality standard. Thus, Phase 1 identifies the toxicity level needed to protect the waterbody and Phase 2 identifies the data and information that needs to be collected to determine the specific toxicity causes and develops the appropriate levels pollutant reduction. The Phase 2 TMDL will include targeted pollution allocation strategies for specific causes of impairment and a margin of safety that addresses uncertainty about the relationship between load allocations and receiving water quality.

EPA guidance states that TMDLs under the phased approach include allocations that confirm existing limits or would lead to new limits or new controls while allowing for additional data collection to more accurately determine assimilative capacities and pollution allocations. (USEPA, 1991) Therefore, no new or additional source of pollutant representative of any of the cited classes of respective impairments shall be introduced into these segments until:

- actual impairment status is known;
- specific pollutants causing impairment are determined; and
- the Phase 2 TMDLs are developed for individual pollutants in these segments;
- or these segments are de-listed based on the biological or toxicity/water quality monitoring to be conducted.

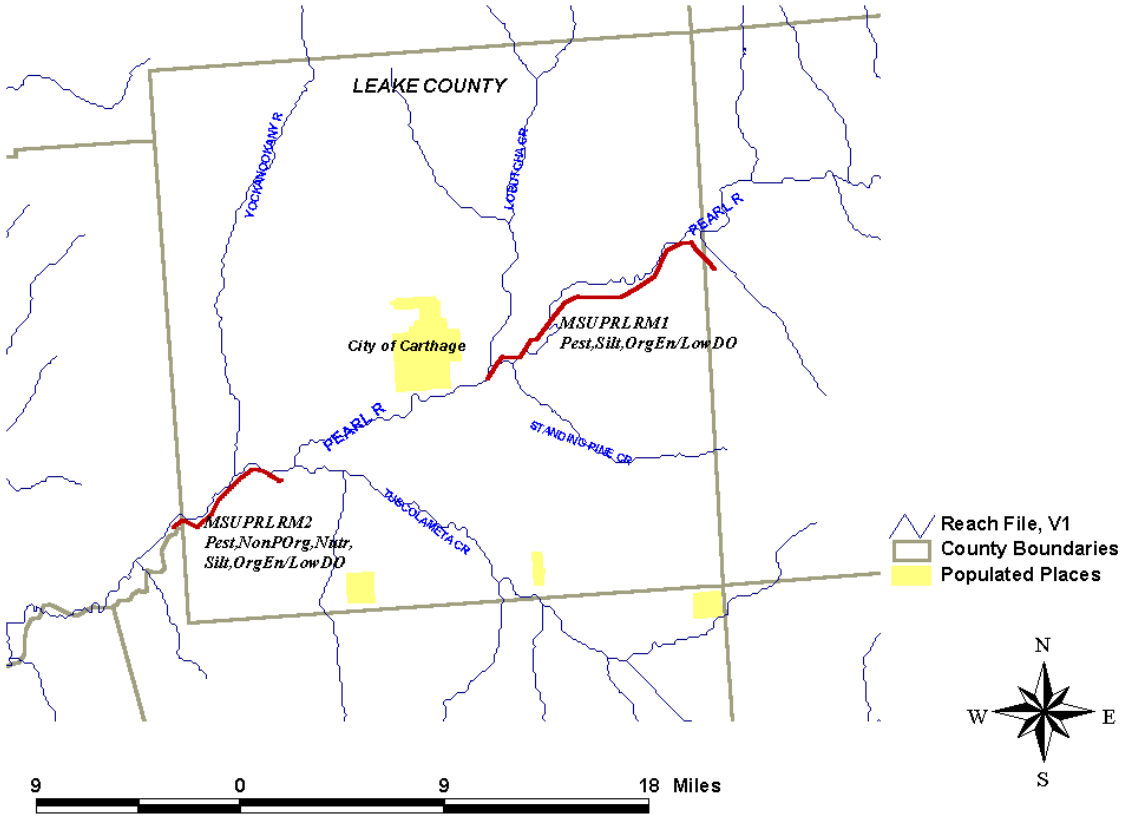

Figure 1 Pearl River Evaluated Impairments Location Map

Target Identification

Pearl River segment MSUPRLRM1 is listed for pH, pathogens, pesticides, siltation and organic enrichment/low dissolved oxygen. Available data does support the listing of Pearl River segment MSUPRLRM1 for pH and pathogens. (A TMDL has already been established for pathogens, and a TMDL for pH is currently being developed by the State). Also, available data shows that the segment was assessed as monitored for the 1998 Section 305(b) assessment based on monthly dissolved oxygen monitoring from 1993 through 1996, but no violations of the dissolved oxygen standard were identified (Figure 2). Additionally, no monitoring has been performed to assess the listed causes of pesticides and siltation.

The Phase One TMDL for Pearl River segment MSUPRLRM1 establishes a toxicity limit and a monitoring plan to: (1) perform toxicity and/or biological monitoring to determine if the segment is impaired due to pesticides and/or the other evaluated pollutants (siltation, organic enrichment/low DO); and (2) if biologically impaired, perform additional monitoring to determine the specific cause and sources of impairment. If the toxicity and/or biological monitoring suggest impairment, then the segment should be screened for all major regulated classes of pesticides and sources of siltation and organic enrichment with particular focus on land-use activities in the immediate watershed and potential point source dischargers within the watershed. Table 1 describes common pesticides used in the counties contained within the catchment basin of the two listed segments.

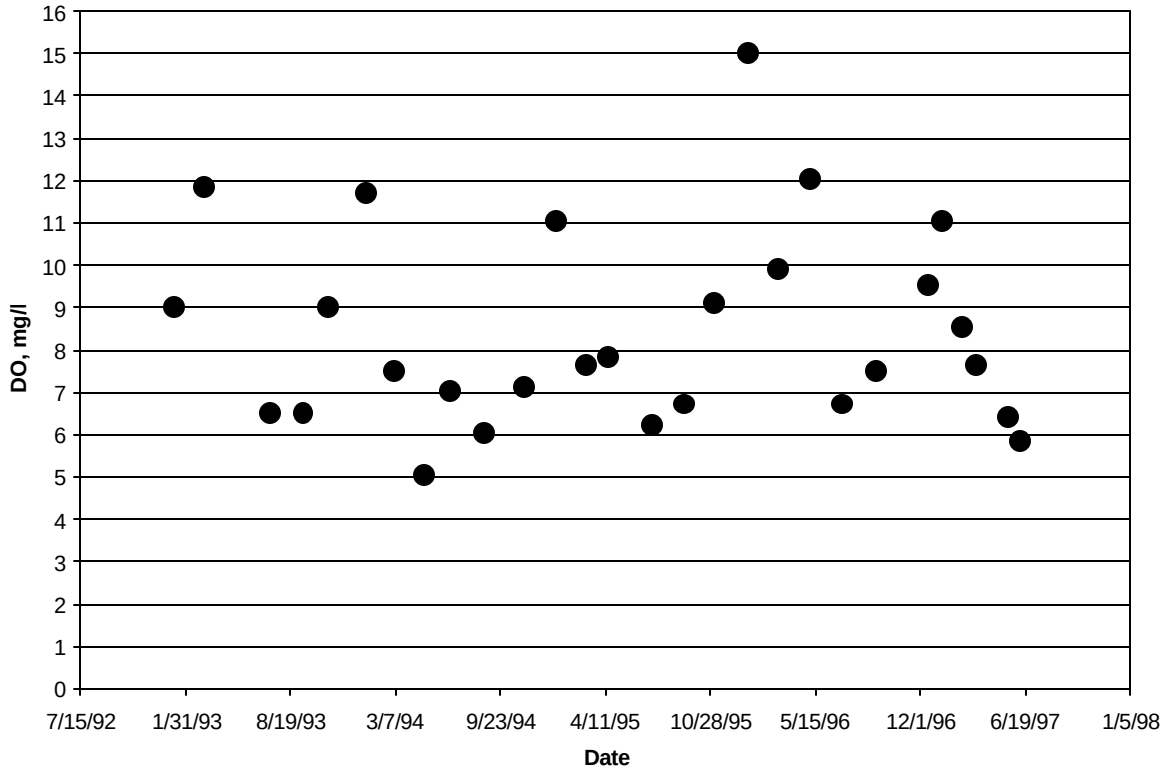

Figure 2 – DO Monitoring: Pearl River at Hwy 16 near Edinburg

Table 1 Common Pesticides Applied in Pearl River Watershed Based on County Usage (tons/square mi)

Pesticide	Choctaw	Attala	Winston	Leake	Madison	Scott	Neshoba	Kemper	Newton	Average
2.9	17	4.2	8.8	65.2	3.8	NA	NA	NA	17.0	17.0
3.5	4.9	9.6	8.3	8.3	9.8	11.2	8.1	10.8	8.9	8.9
3.3	7.5	2.7	5.3	27.1	4.9	0.5	2.4	4.3	6.8	6.8
1.5	9	2.2	4.6	34.5	2	NA	NA	NA	10.5	10.5
1.2	6.7	1.8	3.6	25.4	1.5	0.1	0.1	0.1	4.9	4.9
2.4	2.6	2.8	3.4	6.7	4.6	2	3.6	5.3	3.9	3.9
3.4	4.2	2.4	3.6	13	1.5	1.8	0.8	2.7	3.8	3.8
0.8	4.5	1.1	2.3	17.4	1	NA	NA	NA	5.3	5.3
3.4	2.6	2.6	3.8	5.4	0.9	2.6	1	3.1	2.8	2.8
0.7	3.9	1	2	14.9	0.9	NA	NA	NA	4.5	4.5
1.3	2.4	0.9	1.8	8.5	1.8	0.2	1	1.8	2.3	2.3
0.9	1.3	2.4	2.1	2.2	2.5	2.7	2.2	2.8	2.3	2.3
1.7	1.5	1.4	2.1	3.3	1	1.2	0.8	2	1.7	1.7
0.3	1.9	0.5	0.9	7.1	0.4	NA	NA	NA	2.2	2.2
0.5	0.6	0.4	0.7	1.9	0.7	0.2	0.5	0.9	0.7	0.7
0.2	1	0.3	0.5	3.9	0.2	NA	NA	NA	1.2	1.2
0.1	0.8	0.2	0.4	3.2	0.2	NA	NA	NA	1.0	1.0
0.5	0.4	0.3	0.5	1.2	0.8	0.1	0.5	0.9	0.6	0.6
0.4	0.3	0.2	0.4	0.9	0.6	0.1	0.4	0.7	0.4	0.4

Pearl River segment MSUPRLRM2 is listed for pesticides, siltation, nutrients, nonpriority organics and organic enrichment/low dissolved oxygen. However, no monitoring data are available to support these listings. The Phase One TMDL for Pearl River segment MSUPRLRM2 establishes a toxicity limit and a monitoring plan to: (1) perform toxicity and/or biological monitoring to determine if the segment is impaired due to pesticides and the other evaluated pollutants; and (2) if biologically impaired, perform additional monitoring to determine the specific causes and sources of impairment. If the toxicity and/or biological monitoring suggest impairment, then the segment should be screened for all major regulated classes of pesticides and other sources of evaluated causes of impairment (siltation, nonpriority organics, nutrients,

organic enrichment/low DO) with particular focus on land-use activities in the immediate watershed and potential point source dischargers within the watershed. Table 1 describes common pesticides used in the counties contained within the catchment basin of the two listed segments.

Phased Total Maximum Daily Load (TMDL) Approach

Since there are no data to determine impairment status for these segments and there are no specific pollutants identified for certain key "evaluated" causes, specific pollutant TMDL development is not possible at this time. For this reason, EPA is proposing a phased approach for the toxicity TMDL development for these "evaluated" listings.

The phased TMDL approach recognizes that additional data and information may be necessary to validate the assumptions of the TMDL and to provide greater certainty that the TMDL will achieve the applicable water quality standard. Thus, Phase 1 identifies the toxicity level needed to protect the waterbody and Phase 2 identifies the data and information that needs to be collected to determine the specific toxicity causes and to develop the appropriate level of pollutant reduction. The Phase 2 TMDL will include targeted pollution allocation strategies for specific causes of impairment and a margin of safety that addresses uncertainty about the relationship between load allocations and receiving water quality.

EPA guidance states that TMDLs under the phased approach include allocations that confirm existing limits or would lead to new limits or new controls while allowing for additional data collection to more accurately determine assimilative capacities and pollution allocations. (USEPA, 1991) Therefore, no new or additional source of pollutant representative of any of the cited classes of respective impairments shall be introduced into these segments until:

- actual impairment status is known;
- specific pollutants causing impairment are determined; and
- the Phase 2 TMDLs are developed for individual pollutants in these segments; or
- these segments are de-listed based on the biological or toxicity/water quality monitoring to be

conducted.

Total Maximum Daily Load (TMDL) Development

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while maintaining water quality standards. For some pollutants, TMDLs are expressed on a mass loading basis (e.g., pounds per day). In accordance with 40 CFR Part 130.2(i), "TMDLs can be expressed in terms of ... mass per time, toxicity, or other appropriate measure." In addition, NPDES permitting regulations in 40 CFR 122.45(f) state that "All pollutants limited in permits shall have limitations...expressed in terms of mass except...pollutants which cannot appropriately be expressed by mass." For the toxicity TMDL for Pearl River, the Total Maximum Daily Load is expressed in terms of chronic toxicity units (TU_cs).

Waste Load Allocations

This TMDL has been established to protect against chronic toxicity. Through its National Pollutant Discharge Elimination System (NPDES) permitting process, the MDEQ will determine whether any permitted dischargers to these segments of the Pearl River have a reasonable potential of discharging chronically toxic effluent. An allocation to an individual point source discharger does not automatically result in a permit limit or a monitoring requirement. The MDEQ NPDES permitting group will use its best professional judgment to determine whether a reasonable potential exists for these facilities to discharge chronically toxic effluent. If the NPDES permitting group determines that such a reasonable potential exists, effluent monitoring requirements or limitations will be established as appropriate.

The toxicity wasteload allocation (WLA) for any dischargers to these segments of the Pearl River will be determined as follows:

Toxicity from each point source = 100 / NOEC = 100 / IWC = 100 / 100 = 1.0 TU

Where NOEC is the No Effect Concentration; IWC is the Instream Water Concentration and TU is Toxicity Units. Since these segments of the Pearl River are on the MDEQ 303(d) impaired waters list, the IWC for any new or expanding sources will be established at 100, meaning there is no instream dilution

available for assimilative capacity.

Load Allocations

The existing toxicity contribution to these segments of the Pearl River from nonpoint sources is not known. In the event that nonpoint sources are causing or contributing to the toxicity impairment of these segments of the Pearl River, the allocation to the point sources would remain unchanged. The toxicity associated with either the nonpoint or point sources cannot exceed 1.0 TU_c.

Margin of Safety

The margin of safety in this TMDL is implicit based on the assumption that 100 IWC is used for any current or new discharges.

TMDL Monitoring Strategy

Sampling Proposal for Pearl River 303(d) listed "Evaluated" Segments

Biological monitoring and assessment will be conducted within the listed segments. If the segments in the Pearl River are determined to lack biological and thereby toxicity impairments, and no evidence of chemical data exists to support the listings, then the appropriate segments should be de-listed. If biological impairment is determined, then a comprehensive chemical monitoring effort will be conducted in accordance with existing MDEQ river basin monitoring plans. This chemical monitoring plan will be constructed in such a manner as to identify specific pollutants for TMDL development, and such Phase 2 TMDLs will be completed consistent with the State's rotating basin approach TMDL Plan.

References:

MDEQ. 1995. State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters. Office of Pollution Control.

Sierra Club v. EPA & Hankinson USDC-ND-GA Atlanta Div. #1: 97-CV-3683

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