TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT

For Fish Consumption Guidelines due to *PCBs*

in

Gibson Creek, Terry Creek, Purvis Creek, and the Turtle River System, Georgia

and

Commercial Fishing Ban due to *PCBs*

in

Purvis Creek

(HUC 03070203)

EPA United States Environmental Protection Agency

Region 4 serving the southeast

Summary Page

Gibson Creek, Terry Creek, Purvis Creek, and the Turtle River System have been placed on the State of Georgia 303(d) list due to the Georgia Department of Natural Resources fish consumption guidelines due to PCB (polychlorinated biphenyl) contamination of fish and shellfish in these waterbodies (GAEPD, 2000). As prescribed under the Clean Water Act, a Total Maximum Daily Load (TMDL) has been developed for these listed reaches and is summarized below. The TMDL establishes the total mass of PCBs that can be discharged to the system under a prescribed set of critical conditions to meet their designated uses. The TMDLs for PCBs for the listed segments were scheduled for development in 2000 as required by Consent Decree in the Georgia TMDL Lawsuit.

There are no permitted point source dischargers with existing allocations for PCBs**. Thus, the wasteload allocation (WLA) for PCBs is zero pounds per day.** The LCP Superfund site represents a nonpoint source legacy load of PCBs (no discrete conveyance) and thus loading from the LCP site should be at concentrations equivalent to or less than the water quality standard for PCBs (0.00045 ug/l). **Thus, the load allocation (LA) allows for no loads that cause or contribute to an in-stream mixed water column PCBs concentration above 0.00045 ug/l.** The Superfund program is assessing clean-up feasibility in and around the LCP Superfund site. The Superfund program should target water column concentrations of PCBs less than 0.00045 ug/l as clean-up alternatives are developed.

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Beverly H. Banister, Director Date

Water Management Division

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Executive Summary

The State of Georgia's 2000 303(d) list identified the coastal estuarine waters of Gibson, Terry, and Purvis Creeks as well as the Turtle River System near Brunswick, Georgia as not supporting their designated use due to polychlorinated biphenyl (PCB) contamination in fish tissue. The Georgia Department of Natural Resources has issued fish consumption guidelines for these waters due to PCB contamination in fish in all listed segments. In addition, a commercial fishing ban was issued in Purvis Creek due to PCB levels in fish tissue that exceed Federal Drug Administration (FDA) action levels. Monitoring data supplied by the Georgia Environmental Protection Division indicates PCB concentrations in fish and shellfish tissues at consumption guidance levels in all segments addressed by this TMDL. PCB concentrations range from a minimum of non-detect at several locations to a maximum in Purvis Creek of 9.9 mg/kg detected in crab in 1991 (EPD Satilla River Basin fish and shellfish toxics monitoring).

This TMDL is being developed pursuant to the 2000 Georgia 303(d) list and the Consent Decree in the Georgia TMDL lawsuit that requires TMDLs to be developed for all waters on the current 303(d) list according to certain conditions prescribed in the Consent Decree.

PCB contamination in the sediments and the water column is well documented by the EPA Superfund Program in Purvis Creek. The LCP Superfund site is responsible for extensive PCB contamination related to the use of PCBs in their industrial processes before PCBs were banned. The State of Georgia revoked the discharger's permit in 1994 due to violations of the discharger's permit limits for mercury and pH. The USEPA Superfund program has being studying the extent of contamination in areas in and around Purvis Creek. PCBs have not been detected in the water column outside of the immediate LCP outfall location in Purvis Creek. There exist no other known significant sources of PCBs to the listed segments. The detection limit for PCBs is several orders of magnitude higher than Georgia's priority pollutant water quality standard protective of human health (0.00045 ug/l).

Because PCBs are a banned substance, the wasteload allocation for this substance is zero pounds per day. This TMDL identifies an instream water quality target for the Superfund program to consider as remediation goals and strategies are formulated to address PCB contamination in the listed segments. The

loading from the Superfund site is considered to be the load allocation and concentrations of PCBs from the site should not exceed 0.00045 ug/l.

Introduction

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

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

Problem Definition

On its 2000 §303(d) list, the State of Georgia has identified the following tidal estuarine waterbodies as not supporting their designated use due to the issuance of fish consumption guidelines because of polychlorinated biphenyl (PCB) contamination:

- Turtle River (State Hwy 303 to Channel Marker 9)
- Turtle River (From Channel Marker 9) and South Brunswick Rivers (Downstream to Dubignon and Parsons Creek)

- Terry Creek (South of Torras Causeway to Lanier Basin)
- Purvis Creek
- Gibson Creek
- Turtle and Buffalo Rivers (Upriver of Georgia Hwy 303)

In addition, the State listed Purvis Creek as not meeting its designated use due to the issuance of a commercial fishing ban related to PCB concentrations in fish/shellfish tissue. Figure 1 depicts the listed waters:

Figure 1 - Site Location Map

PCBs have been detected in fish tissue in the above mentioned estuarine tidal streams at levels triggering various fish consumption guidelines ranging from 1/meal per week to a total ban on consumption (Georgia Department of Natural Resources, 2000). Specific species cited include Yellowtail in Terry Creek; Blue Crab, Croaker, Black Drum, and Spotted Seatrout in Turtle and South Brunswick Rivers; Blue Crab,

Clams, Mussels, Oysters, Shrimp, and other seafood in Purvis and Gibson Creeks; and Blue Crab, Flounder, Red Drum, Croaker, Spotted Seatrout, and Black Drum in Turtle and Buffalo Rivers.

The following general background on the impact of PCBs on fish consumption is taken from EPA fact sheet entitled "Fact Sheet; PCBs Update: Impact on Fish Advisories" (EPA-823-F-99-019) (EPA, 1999).

> PCBs are a group of synthetic organic chemicals that contain 209 possible individual chlorinated biphenyl compounds. These chemically related compounds are called congeners and vary in their physical and chemical properties and toxicity. There are no known natural sources of PCBs. Although banned in the United States from further production in 1979, PCBs are distributed widely in the environment because of their persistence and widespread use. PCB mixtures found in the environment are different from the commercially produced PCB mixtures (known as Aroclors in the United States) because of differences in chemical properties, persistence, and bioaccumulation among the different congeners. The most common analytical method used to detect PCBs in the environment is based on Aroclor analysis; however, congener-specific methods have been developed and currently are being tested. PCB exposure is associated with a wide array of adverse health effects in experimental animals. Experimental animal studies have shown toxic effects to the liver, gastrointestinal system, blood, skin, endocrine system, immune system, nervous system, and reproductive system. In addition, developmental effects and liver cancer have been reported. Skin rashes and a severe form of acne have been documented in humans; however, other effects of PCB exposure in humans are not well understood. EPA has classified PCBs as probable human carcinogens (Group B2). As of 1998, 37 states have issued 679 fish advisories for PCBs. These advisories inform the public that high concentrations of PCBs have been found in local fish at levels of public health concern. State advisories recommend either limiting or avoiding consumption of certain fish from specific waterbodies or, in some cases, from specific waterbody types (e.g., all freshwater lakes or rivers).

PCB contamination in the listed estaurine segments has been attributed to contamination from the Linden Chemicals and Plastics (LCP) Superfund site. From 1955 until 1994 the facility (Allied Chemicals, Inc. 1955-1979, LCP 1978-1994) used a chlor-alkali process to produce chlorine, caustic soda, hydrochloric acid, and hydrogen gas. PCBs were used in the chlor-alkali process during part of the period. In 1994, the Georgia Environmental Protection Division revoked the facility's discharge permit. The US EPA Region 4 Emergency Response and Removal Branch has been studying the site since 1994.

Target Identification

Georgia's in-stream criterion for polychlorinated biphenyls (PCBs) is established for all waters and is deemed to be necessary and applicable to all waters of the State. Georgia's Water Quality Standard for PCBs is expressed in Georgia's Rules and Regulations for Water Quality Control, Chapter 391-3-6, Revised April 2000. Georgia Regulation 391-3-6-.03(5)(e)(iv) states that "Instream concentrations of the following chemical constituents listed by the U. S. Environmental Protection Agency as toxic priority pollutants pursuant to Section 307(a)(1) of the Federal Clean Water Act (as amended) shall not exceed criteria indicated below under annual average or higher stream flow conditions". This TMDL will, therefore, target in-stream PCB concentrations above 0.00045 ug/l. The commercial fishing ban on Purvis Creek was issued when data collected by the State in 1992 and 1993 exceeded the Federal Drug Administration (FDA) action level for PCBs of 2 mg/kg in fish fillet tissue. The State water quality in-stream target of 0.00045 ug/l is protective of the FDA action level, and thus the fish consumption guideline water quality target of 0.00045 ug/l addresses the commercial fishing ban designation in Purvis Creek.

Background

Available Monitoring Data

Monitoring data supplied by the Georgia Environmental Protection Division indicates PCB concentrations in fish and shellfish tissues at consumption guidance levels in all segments addressed by this TMDL. PCB concentrations range from a minimum of non-detect at several locations to a maximum in Purvis Creek of 9.9 mg/kg detected in crab in 1991 (EPD Satilla River Basin fish and shellfish toxics monitoring). Concentrations of PCBs in fish and shellfish have been at or above Georgia Department of Natural Resources guidance levels in several samples.

Monitoring was conducted by the US EPA Office of Emergency and Remedial Response as part of the ecological risk assessment conducted on salt marsh waters adjacent to the LCP Superfund site (EPA, April 1997). Fish tissue, sediment, and water samples were collected and analyzed for Aroclor 1268 (PCB species associated with LCP contaminated site). Sediment samples collected in 1995 identified a PCB "hot-spot" area originating at the LCP outfall location and extending 700 feet west and 1000 feet south into the Purvis Creek salt marsh and tidal basin with sediment contamination greater than 200 mg/kg dry weight.

Maximum sediment concentration at the mouth of Purvis Creek at the confluence with the Turtle River estuarine system was 5.4 mg/kg at depth. Surface water samples collected from 8 locations near the outfall ranged from non-detect (0.28 ug/l) to 66 ug/l. Fish tissue data was collected and analyzed for Aroclor 1268. The highest value was 0.41 mg/kg in a composited sample of sheephead collected in the Turtle River, and the average in all composites was 0.12 mg/kg (wet weight).

Numeric Targets and Sources - Model Development

Extensive contamination of sediments and fish/shellfish tissue in and around the outfall location has been demonstrated. As a Superfund site, the extent of contamination from the LCP Superfund site continues to be evaluated through the Superfund process. The Superfund program is evaluating remediation strategies and should target water column concentrations less than 0.00045 ug/l throughout all applicable listed segments. PCBs are priority toxic pollutants and their use and discharge is not permitted in any of the listed segments.

Total Maximum Daily Load (TMDL)

Critical Condition Determination

No discharge of PCBs external to the present Superfund legacy load to and in the listed segments is permitted.

Seasonal Variation

Seasonal variation is not applicable to this TMDL because no discharge or source external to the present Superfund legacy load of PCBs is allowed.

Margin of Safety

Water column data for PCBs does not exist or has not been detected except in Purvis Creek (method detection limit orders of magnitude higher than in-stream water quality standard). The State listed all

segments considered in this TMDL due to PCBs in fish/shellfish tissue. This TMDL will use the conservative assumption that the water column throughout all listed segments has no assimilative capacity for PCB loadings at concentrations above the water quality standard of 0.00045 ug/l. It is unknown, however, if water column concentrations in the listed segments are presently higher than 0.00045 ug/l. Superfund data suggests water column concentrations near the LCP outfall in Purvis Creek as high as 66 ug/l before remediation. Method detection limits during the Superfund collection were between 0.28 ug/l and 0.30 ug/l for water column PCBs.

TMDL Determination

The TMDL is the total amount of pollutant that can be assimilated by the receiving water body while achieving water quality standards. The components of the TMDL are the Wasteload Allocation (WLA) and the Load Allocation (LA) and taking into consideration a margin of safety (MOS) and seasonality. The WLA is the pollutant allocation to point sources while the LA is the pollutant allocation to natural background and nonpoint sources.

There are no permitted point source dischargers with existing allocations for PCBs. Thus, the wasteload allocation (WLA) for PCBs is zero pounds per day. The Superfund site represents a nonpoint source legacy load of PCBs (no discrete conveyance) and thus loading from the LCP site should be at concentrations equivalent to or less than the water quality standard for PCBs (0.00045 ug/l). Thus, the load allocation (LA) allows for no loads that cause or contribute to an in-stream mixed water column PCBs concentration above 0.00045 ug/l.

Allocation of Responsibility and Recommendations

The State should monitor the listed segments' water column concentrations for Arochlor 1268 using the lowest detection limit available. In addition, fish tissue and sediments should continue to be monitored while the Superfund program completes its recommendations and remediation strategy. Follow-up PCB monitoring should be conducted to include all species where resources are available.

The Superfund program is assessing clean-up feasibility in and around the LCP Superfund site. The Superfund program should target water column concentrations of PCBs less than 0.00045 ug/l as clean-up alternatives are being developed.

The ongoing Superfund effort will provide information that can help to quantify the PCB load being released. The Superfund program will identify the selected cleanup alternative and establish the level of cleanup expected to be achieved through implementation of the selected remedy. This information will be critical to potential future revisions of this TMDL.

EPA anticipates that future Superfund activities will result in affected waterbodies attaining water quality standards for PCBs through reductions in both point source and nonpoint source loadings to the waterbodies. CERCLA provides that the selected remedy achieve all applicable and relevant and appropriate requirements, including water quality standards. EPA expects necessary load reductions can be achieved through implementation of the selected remedy. Ongoing Superfund activities related to the Site provide reasonable assurance that the necessary reductions in PCBs can be achieved in this system. Therefore, this phase of the TMDL establishes the TMDL target at concentrations consistent with the most protective water quality criterion. Follow-up monitoring conducted in relation to ongoing Superfund activities and any other necessary monitoring will determine the necessity for additional reductions.

Atmospheric sources of PCBs are still being studied and quantified. Hazardous waste incinerators are suspected of being some of the larger sources of atmospheric PCBs on a national level. If data becomes available that suggests the load allocation from the LCP site should be reduced, then this TMDL should be revisited to account for the reduced localized assimilative capacity of the Purvis Creek tributary due to the potential inclusion of atmospheric PCB emissions in the water column PCB budget.

References

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