Ohio River Bacteria TMDL Development: Summary of Data Analysis and Conceptual Model Development

United States Environmental Protection Agency

Introduction

The Ohio River is the largest tributary, by volume, to the Mississippi River and much of it is impaired due to high bacteria counts that affect the recreational uses of the river. The river is 981 miles long and 620 miles are impaired for primary contact recreation (e.g., swimming).
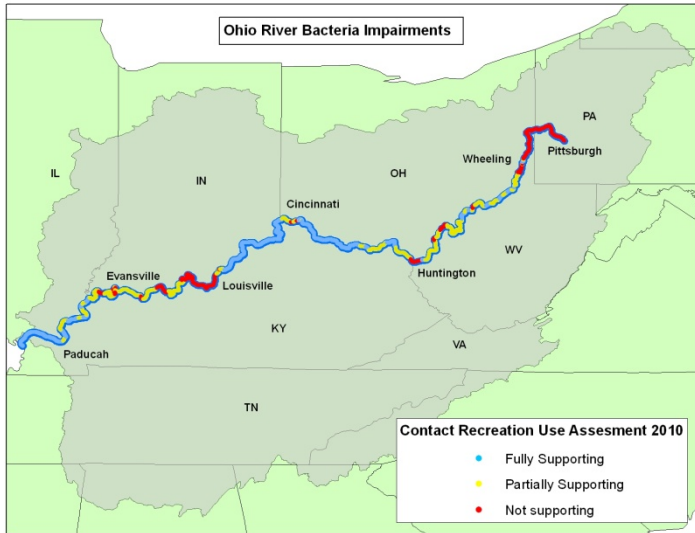

Figure 1. Ohio River Basin bacteria-impaired segments.

The Clean Water Act and U.S. Environmental Protection Agency (U.S. EPA) regulations require that Total Maximum Daily Loads (TMDLs) be developed for impaired waterbodies such as the Ohio River. The Ohio River bacteria TMDL is in the early stages of development.

U.S. EPA Region 5 has taken the lead in the development of the TMDL and has convened a TMDL Workgroup composed of representatives of affected state agencies, U.S. EPA Regional Offices, and the Ohio River Valley Water Sanitation Commission (ORSANCO). U.S. EPA Region 5 has also hired Tetra Tech, Inc. to provide technical support to the project.

Development of the TMDL will involve using a series of analytical tools. The most important tool will be a mathematical model to address the sources, fate, and transport of water and pathogen indicators in the Ohio River and portions of its tributaries. Both the discharge (i.e., flow of water) in the Ohio River and its tributaries and the pathogens loads will be modeled. The specific bacteria indicators that will be modeled are fecal coliform and *Escherichia coli* (*E. coli*).

The TMDL and water quality restoration planning process involves several steps, including watershed characterization, target identification, source assessment, and allocation of loads. The ultimate purpose of the TMDL is to identify the allowable loads of pathogen indicators (fecal coliform

bacteria and *E. coli*) that will result in full attainment of the applicable water quality standards throughout the Ohio River.

The purpose of this document is to present a conceptual model of the Ohio River in an effort to gain a more thorough understanding of the factors that affect bacteria counts. A better understanding of these factors will allow for a more focused modeling effort by identifying the key sources of bacteria and conditions under which water quality standards are not met.

The current understanding of the river is presented in this document. However, an evaluation of the currently available data for the Ohio River is ongoing. Data through 2009 have been compiled and additional data collection will occur in 2010 and 2011.

Characteristics of the Ohio River that were evaluated for the conceptual model include:

- Major tributaries of the Ohio River
- Communities along the river with urban stormwater runoff and combined sewer overflows (CSOs)
- Locks and dams
- Municipal and industrial point sources

It should be noted that better information on these characteristics of the river are still being compiled and thus were not available to inform the analysis presented here. For example, only limited CSO data are currently available but such data are expected to eventually be available before the modeling commences.

Ohio River TMDL Website

http://www.orsanco.org/index.php/bacteria-tmdl

Pertinent documents and notices related to the Ohio River bacteria TMDL will be posted at this website.

Data

Pathogen and discharge data have been collected both on the Ohio River and many of its tributaries. A plot summarizing some of the data is presented on the next page.

Ohio River

Two separate sets of data were used during the preparation of this memorandum as described below.

- **Longitudinal:** Consists of the longitudinal *E. coli* data collected in the Ohio River from 2003 through 2005 and in 2007 (refer to Figure 2).