

**ASSESSMENT AND REMEDIATION OF CONTAMINATED SEDIMENTS (ARCS)**

# **Assessment of Sediments in the Buffalo River Area of Concern**

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## 1. INTRODUCTION

### 1.1 Overview of the ARCS Program

The 1987 amendments to the Clean Water Act, in Section 188(c)(3), authorized the U.S. Environmental Protection Agency's (EPA) Great Lakes National Program Office (GLNPO) to coordinate and conduct a 5-year study and demonstration project relating to the control and removal of toxic pollutants in the Great Lakes, with emphasis on removal of toxic pollutants from bottom sediments. Five areas were specified in the Clean Water Act as requiring priority consideration in locating and conducting demonstration projects: Saginaw Bay, Michigan; Sheboygan Harbor, Wisconsin; Grand Calumet River, Indiana; Ashtabula River, Ohio; and Buffalo River, New York (see Figure 1.1). In response, GLNPO undertook the Assessment and Remediation of Contaminated Sediments (ARCS) Program. ARCS was an integrated program for the development and testing of assessment and remedial action alternatives for contaminated sediments. Information from the ARCS Program activities is used to guide the development of Remedial Action Plans (RAPs) for the 42 Great Lakes Areas of Concern (AOCs, as identified by the International Joint Commission), as well as Lakewide Management Plans.

Although GLNPO is responsible for administering the ARCS Program, it is a multi-organization endeavor. Other participants in the ARCS program include the U.S. Army Corps of Engineers (ACE), the U.S. Fish and Wildlife Service (FWS), the National Oceanic and Atmospheric Administration (NOAA), EPA headquarters offices, EPA Regions 2, 3, and 5, Great Lakes State Agencies, numerous universities, and public interest groups.

The Management Advisory Committee provides overall advice on ARCS Program activities. The Management Advisory Committee is made up of representatives from the organizations noted above. Three technical Work Groups identify and prioritize tasks to be accomplished in their areas of expertise. These are the Toxicity/Chemistry, Risk Assessment/Modeling, and the Engineering/Technology Work Groups. The Communication/Liaison Work Group oversees technology transfer, public information, and public participation activities. The Activities Integration Committee coordinates the technical aspects of the work groups' activities.

The overall objectives of the ARCS Program are:

- To assess the nature and extent of bottom sediment contamination at selected Great Lakes Areas of Concern;
- To evaluate and demonstrate remedial options, including removal, immobilization and advanced treatment technologies, as well as the "no action" alternatives; and
- To provide guidance on the assessment of contaminated sediment problems and the selection and implementation of necessary remedial actions in the Areas of Concern and other locations in the Great Lakes.

The primary aim of the ARCS Program is to develop guidelines that *can* be used at sites throughout the Great Lakes. Another goal of the ARCS Program is to develop and demonstrate sediment remediation procedures that are scientifically sound, and technologically and economically practical. The intent is to provide the environmental manager with methods for making cost-effective, environmentally sound decisions. As a result, application of existing techniques is stressed over basic research into new ones.

It is important to stress that the ARCS Program is not a cleanup program, and will not solve the contaminated sediment problems at the five priority consideration areas. The Program will, however, provide valuable experience, methods, and guidance that could be used by other programs to actually solve the identified problems.

There are several important aspects of the management of contaminated sediments that will not be fully addressed by the ARCS Program. Regulatory requirements and socioeconomic factors in decision-making are two such aspects that will be critical in the choice of a remedial alternative (or whether to remediate at all). While not addressing such issues in depth, the ARCS Program will identify issues that need to be resolved before sediment cleanups can go forward.

## 1.2 Overview of the Buffalo River Area of Concern

This report will focus on the Buffalo River Area of Concern (see Figure 1.2). Since the 1940s, the Buffalo River has experienced pollution problems such as excess nutrients, bacteria, and toxic chemicals. Municipal wastewater treatment plants and controls on industrial discharges have reduced many waterborne pollutants. Currently, the most pressing problems are discharges of persistent toxic pollutants, careless disposal of hazardous wastes near waterbodies, combined sewer overflows (CSOs), and sediments contaminated with toxic metals, industrial organic chemicals, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs). Both surficial as well as deeper sediments throughout the Buffalo River are contaminated from years of industrial activity. Fisheries and benthic populations are severely impaired; fish consumption advisories exist for many fish species. An increased frequency of fish tumors and other deformities have also been reported. River sediments at some locations are also contaminated with cyanide and metals to levels that prohibit open lake disposal of dredge materials.

## 1.3 Purpose and Organization of the Report

The purpose of this report is to summarize and analyze the existing ARCS sediment data from the Buffalo River Area of Concern (AOC), in order to aid conclusions regarding the nature and extent of sediment contamination within the AOC. The report brings together data from two sampling surveys that have not been provided in a single source or in comparable formats. The two primary sampling surveys are the survey of the 10 Master Stations performed in October, 1989 (Survey 1) and the intensive survey of 37 sampling points performed in August, 1990 (Survey 3). Survey 2 was aborted due to sampling difficulties and the data supplanted by Survey 3.

This report uses sediment quality guidelines and criteria to analyze the relative impact of sediment contamination and does not attempt to analyze or present actual biological impact data. The sediment guidelines may not be robust measures of the absolute impact of sediment contamination but they provide a good relative measure for the probability for impacts. The guidelines and criteria that are used in this report are discussed in detail in Chapter 3.

Chapter 2 of this report provides a complete description of the sampling and analytical methods used in the collection and analysis of sediment samples from the Buffalo River. The text of Chapter 2 draws heavily from documents produced by the the ARCS Toxicity/Chemistry Workgroup.

Chapter 3 contains the summary and analysis of the data from the two sampling surveys. The data are analyzed both by chemical and by location. A complete description of the guidelines and criteria used for the analysis is presented in this chapter as well.

Chapter 4 presents the general conclusions which can be drawn from the results of the analysis.