



Project Summary

Biological Remediation of Contaminated Sediments, with Special Emphasis on the Great Lakes: A Workshop Report

Chad T. Jafvert and John E. Rogers (Editors)

These proceedings describe a workshop held July 17-19, 1990 in Manitowoc, WI, at which biological remediation of contaminated sediments was discussed. For the purpose of the workshop, contaminated sediments of primary interest were those within six of the Areas of Concern (AOC) identified by the U.S./Canada International Joint Commission's Great Lakes Water Quality Board; five of which are priority concerns of the U.S. Environmental Protection Agency's Assessment and Remediation of Contaminated Sediments (ARCS) program.

The workshop was organized around four topic areas: (1) Overview of the Areas of Concern; (2) Biological degradation of PCBs; (3) Biological degradation of PAHs; and (4) Biological treatment of metal species. For the first topic area, presentations were made describing site characteristics of the Ashtabula River, OH; Buffalo River, NY; Sheboygan River, WI; Grand Calumet River, IN; Saginaw River and Bay, MI; and Hamilton Harbor, Ontario, Canada. For the remaining topic areas, presentations were made by investigators actively involved in either bench, pilot, or full-scale studies concerning these areas. In this document extended abstracts written by the presenters are given, as well as brief summaries of the presentations and discussion sessions.

This Project Summary was developed by EPA's Environmental Research Laboratory, Athens, GA, to announce key findings of the research project

that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Overview

The current state-of-the-science of biological remediation of contaminated sediments was discussed in a workshop held July 17-19, 1990, in Manitowoc, MI. Special emphasis was devoted to remediation alternatives for sediments within the Great Lakes Basin. The workshop was supported by the U.S. EPA's Great Lakes National Program Office, through the Assessment and Remediation of Contaminated Sediments (ARCS) Program, by Environment Canada, and by EPA's Biosystems Technology Development Program. More than 60 scientists from state and federal agencies, academia, and the private sector from the United States, Canada, and The Netherlands participated.

For the purpose of the workshop, the sediments of primary interest were those within the Areas of Concern identified by the U.S./Canada International Joint Committee's Great Lakes Water Quality Board. Most of the 42 Areas of Concern are located in harbors, bays, or river mouths; 25 are located within U.S. waters, 12 within Canadian waters, and 5 within international channels. Remedial Action Plans currently are being developed for these areas under the 1987 revision of the Great Lakes Water Quality Agreement. A major purpose of EPA's ARCS Program is to evaluate remediation alternatives for the cleanup of these sites with special emphasis given to five sites. These five are Ashtabula River, OH; Buffalo River,



NY; Sheboygan River, WI; Grand Calumet River, IN; and Saginaw River and Bay, MI.

Presentations were organized around four topic areas.

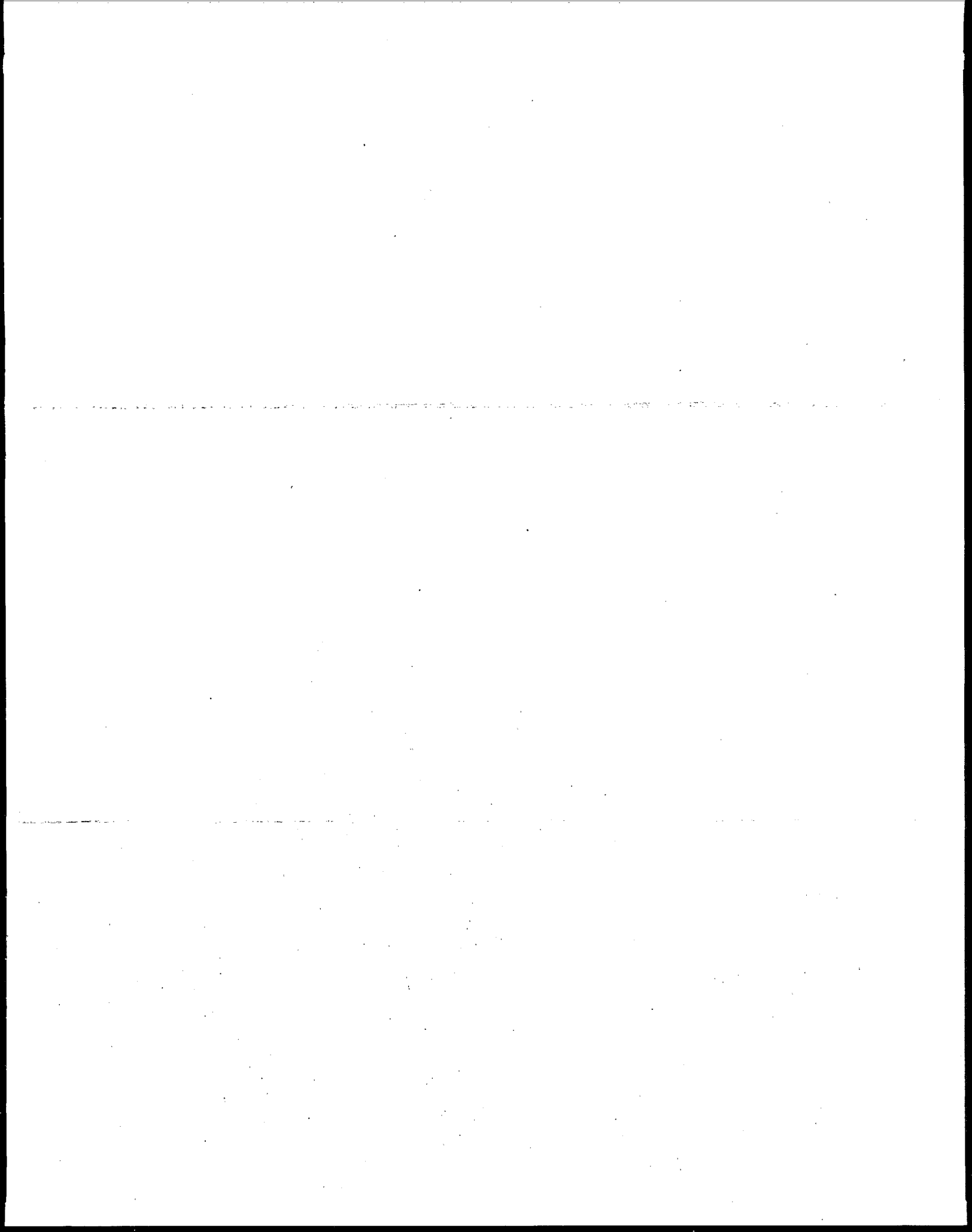
- Areas of Concern: Buffalo River Remedial Action Plan Strategy (J.C. McMahon), Fields Brook Superfund Site/Ashtabula River Area (P. Sanders), Coal Tar Contamination Near Rundle Reef, Hamilton Harbor (T. Murphy et al.), Indiana Harbor/Grand Calumet River AOC (R. Brunner), Saginaw River/Bay AOC (G. Goudy), and Sheboygan River and Harbor (B. L. Eleder).
- Polychlorinated Biphenyls: Aerobic Biodegradation of PCBs (R. Unterman), Anaerobic Dechlorination and Bioremediation of PCBs (J. F. Quensen et al.), Dechlorination and Biodegradation of PCBs (J. F. Quensen et al.), Dechlorination and Biodegradation of Chlorinated Biphenyls in Anaerobic Sediments (G-Y. Rhee and B. Bush), PCB Dechlorination in the Sheboygan

River (W. C. Sonzogni), Anaerobic and Aerobic Biodegradation of Endogenous PCBs (D. A. Abramowicz and M. J. Brennan), and Remediation Pilot Study in the Sheboygan River (D. S. Foster).

- Polychlorinated Aromatic Hydrocarbons: Use of a *Mycobacterium* sp. in the Remediation of Polycyclic Aromatic Hydrocarbons (C. E. Cerniglia), Fungal Degradation of PAHs (J. Glasser), Recent Studies on the Microbial Degradation of PAHs and Their Relevance to Bioremediation (J. Mueller), and Biological Remediation of Contaminated Sediments in The Netherlands (H. J. van Veen and G. J. Annokkee).
- Metals: Bacterial Leaching of Metals from Various Matrices Found in Sediments, Removing Inorganics from Sediment Associated Waters Using Bioaccumulation and/or Biofix Beads (P. Altringer and S. Giddings), Biological Treatment of Metal-contaminated Water (H. Edenborn), Bioleaching of Ores (E. G. Baglin), Mechanisms of Bacterial

Metals Removal from Solids (A. E. Torma and P. A. Pryfogle), and Linking Biological and Hydrogeochemical Mechanisms of Sediment Leaching (R. H. Lambeth and B. C. Williams).

Biological remediation to treat contaminated sediments may take several forms. Each form (or process design) has its own list of factors or parameters that must be considered when optimizing treatment. Hence, there are generally no simple answers to questions regarding the feasibility of biological remediation alternatives. Sediments generally are not contaminated with single compounds or even classes of compounds. Additionally, the interactions among the various organisms responsible for the decomposition of anthropogenic compounds and the sediment matrix are unknown in many cases. The intent, then, of the Proceedings is to provide some conclusions that will benefit scientists and engineers who must make choices among diverse treatment technologies.



The EPA Editors, Chad T. Jafvert (also the EPA Project Officer, see below) and John E. Rogers, are with the Environmental Research Laboratory, Athens, GA 30613-7799.

The complete report, entitled "Biological Remediation of Contaminated Sediments, with Special Emphasis on the Great Lakes: A Workshop Report," (Order No. PB 91-161 673/AS; Cost: \$15.00 subject to change) will be available only from:

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