



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Assessing Bioaccumulation and Trophic Transfer of Contaminants

Description

ERDC Environmental Laboratory (EL) expertise supports the Corps of Engineers and other agencies in assessing bioaccumulation and trophic transfer of contaminants for dredged material evaluations, risk assessments, development of remediation goals, and assessment of remediation success. Bioaccumulation is the net accumulation of a chemical in an organism from various sources. Trophic transfer refers to dietary bioaccumulation and is considered the major mechanism for contaminant accumulation in organisms higher up in the food web. ERDC-EL assesses bioaccumulation and trophic transfer of contaminants through direct sampling from contaminated field sites or through laboratory-based studies. ERDC-EL can also predict trophic transfer via mathematical modeling.

Capabilities

ERDC-EL can conduct studies for Corps of Engineers Districts and other federal agencies on a reimbursable basis to assess aquatic biota for the bioaccumulation of chemicals present in sediment and water. Laboratory bioaccumulation testing is conducted with field-collected sediments or water or sediment spiked with specific chemicals using marine and freshwater invertebrates or fish. ERDC-EL can also evaluate invertebrates and fish for uptake, elimination, biotransformation, and trophic transfer of relevant contaminants.



Supporting Technology

ERDC-EL has developed and improved methods and tools for predicting bioaccumulation using sediment chemistry data and biological effects using bioaccumulation data (i.e., tissue residue benchmarks). ERDC-EL's field study experience includes in situ deployment of organisms and development of remediation technologies to minimize bioaccumulation. Bioaccumulation studies have been conducted for a variety of chemicals including pesticides, PAHs, PCBs, metals, and explosives. Laboratories include exposure facilities with temperature and light control systems and state-of-the-art chemistry facilities.

Benefits

Bioaccumulation and trophic transfer assessment expertise supports dredged material evaluations, risk assessments, development of remediation goals, and assessment of remediation success. These assessments can result in significant cost savings at dredging projects and in managing contaminated sediment.

Success Stories

Development of the web-based Biota-Sediment Accumulation Factor (BSAF) Database and the Environmental Residue-Effects Database (ERED). The databases can be accessed at: <http://el.erd.c.usace.army.mil/programs.cfm?Topic=dots&Option=Data>

Support to USACE Districts through the biological evaluation of contaminants present in sediments proposed for dredging and site-specific assessments and use of bioaccumulation and trophic transfer models for use in decision-making and dredged material management.

Development of methodology for measuring bioaccumulation in small invertebrates (e.g., amphipods and midges).

Point of Contact

Dr. Guilherme Lotufo; Email: guilherme.lotufo@usace.army.mil

