

Lower Minnesota River Model Project

A Rapid Assessment of the Bed Sediment in the Lower Minnesota River

A cooperative project between the U.S. Geological Survey and
Metropolitan Council Environmental Services

Dates: September 1, 2003 – September 30, 2004

Cooperator: Metropolitan Council Environmental Services (MCES)

Project Chief: Thomas Winterstein

Revision Date: August 27, 2003

A. PROBLEM

An important consideration in building the water-quality model of the Lower Minnesota River is the type of bed sediment of the river. The bed sediment type is an important component in determining dissolved oxygen demand in the river and important chemical processes such as phosphorus partitioning. The Lower Minnesota River is primarily a sand-bed river, however, silts and clays deposit on the river bed in the study reach. The silt and clay deposits significantly change the sediment oxygen demand and chemical processing characteristics of the bed sediments. The location and thickness of the silt and clay deposits are not known.

B. OBJECTIVE AND SCOPE

The objective is to determine the location of the silt and clay deposits in the Lower Minnesota River from Jordan, Minnesota, to the mouth of the river during a period of reduced flow, less than about 1,500 ft³/s.

C. RELEVANCE AND BENEFITS

The completion of this task benefits the Lower Minnesota River Project by providing information needed to design the water-quality sampling portion of the project and to design the water-quality model.

D. WORKPLAN

Method for determining the location of the silt and clay deposits.

Personnel from the Iowa District of the U.S. Geological Survey will use seismic profiling equipment to determine the locations of the silt and clay deposits. The seismic equipment is

BSS+ manufactured by Specialty Devices Inc.¹ Field work conducted by the Iowa District will include the following:

- They will make transects across the Minnesota River about every 200 ft from Jordan, Minnesota, to the mouth of the river or where determined by the project chief in conjunction with MCES.
- They will make a perimeter survey of the river using global positioning system (GPS) equipment to map the left and right edges of the river.
- They will take cores of the river bed as needed to calibrate the seismic equipment. The type of bed sediment in the cores will be determined by comparing the sediment to a sand card (a card on which samples of sediment, from clay to coarse sand, are glued).

The bed-sediment will be classified from the seismic profiles as predominantly silt and smaller or sand and larger. If possible, thickness of the silts and clays will be determined from the seismic profiles.

The transects and perimeter survey will be made during a period of reduced flow, less than about 1,500 ft³/s, during fall 2003.

Personnel time required for each step:

- Project coordination: 2 weeks
- Field work: 2 weeks.
- Processing the seismic data files: 2 weeks.
- Checking the data files: 1 week

Iowa District will furnish electronic versions of the transects and perimeter survey that have been processed to the point that maps can be made from them using GIS.

D. PRODUCTS

The Iowa District will provide an electronic version of the seismic profiles that have been processed to the point that maps can be made from the data using GIS. The Minnesota District will check the data files before transmitting them to the MCES. The files will be transmitted to the MCES within 2 months after the field work is completed.

¹ Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.