

**Lower Minnesota River Model
Technical Meeting #2, November 18, 2003
Meeting Notes**

Project Status (presented by Cathy Larson, MCES)

- An electronic or printed copy of the presentation (mostly text) is available upon request.
- The current status is much the same as reported in the 9/23/03 update.
- Progress in 2003:
 - Proposals for modeling and special field studies were submitted and refined.
 - Funding was sought and over 50% secured.
 - Monitoring programs were designed and initiated.
 - Some special studies (4 of 12) were contracted and partly completed.
- Schedule. Extended to six years (2003-2008): three-year monitoring program (2004-2006) plus one year of preparation (2003) and two years at end to complete modeling and reports (2007-2008).
- Funding. Unchanged since 9/23/03. We've raised over half of the \$1 million needed. Still no word on our request for Section-22 assistance from the USACE.
- Monitoring. In October MCES monitoring programs were modified to meet model data requirements.
- Special Studies:
 - USGS proposals: Four were contracted and partly completed (more below).
 - Oxygen dynamics assessment: A request for proposals will be issued in December.
 - Additional groundwater studies: To be determined this winter.
 - MPCA synoptic surveys: Passed this summer; low flows occurred too late.
 - USACE proposals: Waiting for Section-22 approval.
- Modeling. Waiting for Section-22 approval.
- Other News: The MPCA committed to updating the wasteload allocation study of the Lower Minnesota River and plans to use the model we're building.

River Monitoring: July-Sept 2003 (presented by Cathy Larson, MCES)

- An electronic or printed copy of the presentation (mostly graphs) is available upon request.
- We were fortunate this past summer because the dry weather delivered a test run of low-flow conditions. MCES, USGS, and MPCA crews conducted various types of monitoring during this period. Some data collected during July-September were presented.
- River flows were normal in early summer and then started to drop sharply in mid-July. Late summer flows fell to below-normal levels but were not quite on a par with recent drought years. For example, flows dipped below 1000 cfs by mid-June in 1976 and 1988 but not until August 27 in 2003.
- MCES continuously monitors dissolved oxygen (DO) concentrations in the Minnesota River at Ft. Snelling. Starting in August, the monitor recorded much wider diurnal DO fluctuations, probably due to increased algal activity. The mean daily average concentration remained above 5 mg/L, the state standard, but the daily minimum concentration approached 5 mg/L on a few dates. There didn't appear to be much room for additional stress on the river.
- The USGS conducted a mixing-study run on August 21, making lateral and vertical DO measurements at five locations. DO concentrations decreased from greater than 7 mg/L at Jordan to less than 5 mg/L at Ft. Snelling. A zone of low DO concentrations (4-5 mg/L) extended from the mouth to mile 8.5. These low DO readings were recorded in late afternoon, when concentrations are normally highest.
- On four occasions, the MCES continuous monitor recorded DO concentrations at Ft. Snelling that were 1-2 mg/L higher than USGS and MPCA measurements taken near the same time and location. The MPCA and MCES are investigating these differences.

- MCES also conducted some vertical DO profiles. On August 22 at mile 1.0, they measured 6.24 mg/L near the surface and 4.43 mg/L near the bottom, or a vertical difference of almost 2 mg/L. We need to account for vertical differences in our monitoring and modeling efforts.
- The Blue Lake and Seneca WWTPs performed much better than required during this period. The average effluent BOD5 concentration was less than 3 mg/L, compared to permit limits of 12 and 15 mg/L (monthly average), respectively. Effluent DO concentrations ranged between 8 and 10 mg/L at Blue Lake and 6 and 8 mg/L at Seneca (before aeration). MCES is required to aerate the effluent at Seneca to 16 mg/L when river flows fall under 1200 cfs. Aeration started on August 22. Many times during the summer, the two WWTPs were adding more oxygen to the river than oxygen demand.
- The quality of water entering the lower Minnesota River at Jordan was poor during August and September 2003. BOD5 concentrations ranged from 4.8 to 5.6 mg/L on four sampling dates, compared to the TMDL goal of 3.7 mg/L. Chlorophyll-a concentrations were 70-140 ug/L, indicating hypereutrophic conditions.
- In discussions after the presentation, no one challenged the proposed flow trigger of <1000 cfs for the low-flow monitoring program. No one suggested special field studies at low flows other than the work already proposed. However, we may consider resurrecting plans for a full-scale synoptic survey with flow and chemistry added. The monitoring program remains open for discussion and revisions.

Sediment Survey, Sept 2003 (presented by Gary Rott, MPCA)

- A printed copy of the handout (mostly tables) or an electronic copy of the presentation (mostly photos of sediment samples) is available upon request.
- On September 24, 2003, the MPCA conducted a visual survey of the bed sediment under low-flow conditions. They collected left, center, and right samples at miles 21.0, 18.0, 15.3, 11.2, 7.1, and 3.5. They took photos of the samples and recorded their visual observations.
- The sediment bed was a mixture of sand and silt at most sites. At the downstream sites (miles 15.3 to 3.5), the sand-silt mixture was covered with a thin layer (1/8 inch) of “gelatinous pudding-like silt.”
- Gary measured sediment oxygen demand in the Lower Minnesota River in 1980. Based on his observations this summer, he believes the potential remains for significant oxygen demand from the sediment. He was also struck by the “extreme lack of life” in the sediment, noting only a single snail shell in the samples.
- Six samples were sent to the Eau Galle lab, where Bill James measured the moisture and bulk density. Moisture content was somewhat high (>50%) in places, indicating the presence of fine-grained material.

USGS Field Studies, July-Nov 2003 (presented by Thomas Winterstein, USGS)

- Copies of the presentations are not available because the data were preliminary. However, copies of the results will be available after they are finalized and sent to MCES. Data from the three mixing-study runs are available now.
- Bed-Sediment Profiling. Personnel from the USGS Iowa District conducted a seismic profile of the sediment bed during the week of September 23. The survey was successfully completed, but due to low river flows, only the lower 26 miles of the river were navigable. In the field, they noticed that the silt layer was not thick except in the barge terminals. The Iowa District will finish processing the data in December. Because we’re most interested in the surficial sediments, they will only process the top two layers, using data from sediment cores to calibrate the profile data. This winter, MCES plans to compile a sediment-bed map from the data.
- Mixing Characteristics. The USGS completed mixing-study runs on July 29, August 21, and September 24. They recorded notable vertical differences in dissolved oxygen and turbidity, mainly at

the three downstream sites (miles 14.3, 8.5, and 3.5). The river appeared to be more uniformly mixed at the two upstream sites (miles 39.4 and 25.1). For the low-flow monitoring program, the USGS recommended that we collect depth- and width-integrated samples instead of the current single-point grab samples. For the final three mixing-study runs in 2004, we may want to add some key lab-measured variables, such as total phosphorus and chlorophyll. Collecting water samples would require an extra crew (USGS or MCES). In 2004 we should also shoot for flow conditions that help define when the river is well mixed and when it is not.

- Groundwater Inflows. The USGS conducted a seepage study on September 8 and 9. Due to the pooling effect of Lock & Dam 2, they were unable to collect good flow data for the lower 20 miles, but they did collect good data for miles 40 to 20 and the tributaries. Using data from similar studies conducted in 1968, 1997, and 1998, the USGS hopes to construct a picture of groundwater inputs during low-flow conditions for the entire 40 miles. Based on the preliminary data, groundwater inputs—that is, those not currently captured by stream monitoring—appear to be significant at low river flows. If this holds true in the final results, we should consider additional groundwater studies to quantify groundwater flows and loads.
- Stream-Flow Gaging Station at Ft. Snelling. At the time of the meeting, the USGS had not yet received the Acoustic Doppler Velocity Meter from the manufacturer. Once it's received, they'll complete construction on the gaging station. They hope it's up and running yet this year. Due to the pooling effect of Lock & Dam 2, low river flows may be difficult to estimate. For example, during the seepage study at some locations, they documented currents going downstream at mid-channel and upstream at the edges. Also, discharge estimates may be difficult when the Mississippi River is higher than the Minnesota River and backwashing occurs. The USGS will attempt to address these difficulties over time.