

30 August 2002

MEMORANDUM FOR: Rosemary Reily/CELRP-EC-WW

SUBJECT: Scope of Work for Chronic Sediment Toxicity Evaluation of Mahoning River Sediments

1. The following is a scope of work prepared by the Ecotoxicology and Environmental Risk Team (EERT) at the request of the Pittsburgh District for evaluation of Mahoning River sediments as part of the Mahoning River Environmental Dredging Study.

Proposed Work. The Pittsburgh District will collect contaminated sediment from the Mahoning River representing three levels of contamination (high, medium and low). The high level contaminated sediment should contain contaminant concentrations where toxicity would be expected (but not so high as to render the data irrelevant). The medium level contaminated sediment should contain contaminant concentrations that are marginally toxic and the low contaminant level sediment should contain contaminant levels that would not be expected to produce toxicity. One high, one medium and one low-level contaminated sediment will be collected. The Pittsburgh district will also provide a reference sediment for a total of four sediments. A performance control sediment, collected from Brown's Lake at Waterways Experiment Station, will be provided by the EERT. A minimum volume of 6 L is required per sediment for testing and chemistry. Sediments will be sieved prior to testing by EERT personnel to <0.425 mm for removal of debris and indigenous benthic invertebrates. If sieving is expected to result in a significant reduction in sediment volume then additional sediment may be required.

Sediments should be placed in glass sample vessels if the predominant chemical contaminant class is organic in nature or in plastic vessels if metals are the predominant chemical class. Sample vessels should be sealed with little to no headspace between the sediment and container lid. Sediments should be kept at 4 °C in the dark prior to shipping. Sample vessels should be carefully packed in an insulated shipping container (e.g., plastic cooler) along with ice packs to maintain temperature during shipping. Packing materials such as Styrofoam peanuts or paper should be used to reduce the potential for breakage of the sample vessels. The shipping container(s) should be shipped overnight to the attention of John Farrar at the address given below.

Chronic sediment testing will be conducted using the freshwater amphipod *Hyalella azteca* and the midge *Chironomus tentans*. Test methodology for both organisms will follow recommendations from the EPA (2000) guidance document "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates" (EPA/600/R-99/064). Survival and growth data from the toxicity tests will be collected and analyzed after a 28-d exposure for *Hyalella azteca* and a 20-d exposure for *Chironomus tentans*. Statistical comparison of the high, medium and low level contaminated sediment will be made to the reference sediment. Performance control sediment will be used to assess the quality of the test organisms and exposure conditions. Sediment samples collected at test initiation will be submitted to the Environmental Chemistry Branch of the Waterways Experiment Station (WES) for chemical analysis of a standard suite of inorganic

and organic contaminants (e.g., PAHs, metals, pesticides, etc.). In addition to the chronic sediment test, a reference toxicant test will also be conducted with *H. azteca*.

Abbreviated Description of Test Methods. The day before starting the test, sediment will be homogenized and added to test chambers (300 mL tall form beakers with 1.5 cm holes covered with stainless steel screen). Six replicates per sediment will be used. The overlying water in the beakers will be exchanged (one volume addition every 12h) using an automated water delivery system. Ten laboratory cultured *Hyalella azteca* or twelve *Chironomus tentans* will be added to each test chamber at test initiation. Conductivity, hardness, pH, alkalinity, and ammonia will be measured at the beginning and end of the test. Dissolved oxygen will be measured daily and should remain above 2.5 mg/L. Animals will be fed daily (1 mg YCT per chamber [*Hyalella azteca*] or 6 mg of Tetrafin per chamber [*Chironomus tentans*]). At test termination amphipods and midge larvae will be recovered from the sediment by sieving (425 µm). Survival will be recorded and animals from each replicate will be blotted dry, placed on pre-weighed pans and dried for 24 hours at 60°C for subsequent growth determination.

Data Reporting. A letter report containing test data, statistical analyses and data presentation and interpretation will be provided.

Budget

Item	Per sediment cost	Total cost
28-d <i>Hyalella azteca</i> test	\$2000	\$8,000
20-d <i>Chironomus tentans</i> test	\$2000	\$8,000
Sediment Analytical Chemistry	\$1250	\$5,000
Total		\$21,000

Timeline

- Delivery of sediments to WES. *September 19, 2002.*
- 28-d *Hyalella azteca* toxicity test. *Initiated October 3, 2002 and completed October 31, 2002.*
- 20-d *Chironomus tentans*. *Initiated October 4, 2002 and completed October 24, 2002.*
- Sediment chemical analyses. *Data expected Late-November, 2002.*
- Draft Final report for comment to CELRP. *One month after completion of chemical analyses (expected late-December, 2002).*
- Final report to CELRP. *One month after receipt of comments from CELRP.*

EERT points of contact

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