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            CATALOG DOCUMENTATION
   EMAP-GREAT LAKES PROGRAM LEVEL DATABASE
        1994 LAKE MICHIGAN  NEARSHORE
        SEDIMENT TOXICITY TEST DATA
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1. DATA SET IDENTIFICATION

 1.1 Title of Catalog document

   EMAP-Great Lakes Program Level Database
   1994 Lake Michigan Nearshore
   Sediment Toxicity Test Data

 1.2 Authors of the Catalog entry

   Jenny Kysely, ILS

 1.3 Catalog revision date

   12 February, 1997

 1.4 Data set name

   LMTOX94

 1.5 Task Group

   Great Lakes

 1.6 Data set identification code

   505

1.7 Version

   001

1.8 Requested Acknowledgment

   These data were produced as part of the U.S. EPA's Environmental Monitoring and
   Assessment Program (EMAP). If you plan to publish these data in any way, EPA
   requires a standard statement for work it has supported:

   "Although the data described in this article has been funded wholly or in part
   by the U.S. Environmental Protection Agency through its EMAP-Great Lakes Program,
   it has not been subjected to Agency review, and therefore does not necessarily
   reflect the views of the Agency and no official endorsement should be inferred."

2. INVESTIGATOR INFORMATION

2.1 Principal Investigator

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   Great Lakes Environmental Research Lab
   NOAA
   Ann Arbor, Michigan

2.2 Investigation Participant - Sample Collection

   Tom Nalepa
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3. DATA SET ABSTRACT

3.1 Abstract of the Data Set

   The Lake Michigan Sediment Toxicity Test data set provides summary data on
   sediment toxicity tests for thirty-nine sampling stations located within the
   nearshore region of Lake Michigan. A 500-1000 mL subsample from the 0-5 cm
   layer was collected with a Ponar grab into a 1000 mL plastic jar and refrigerated
   for sediment bioassays. A 10-day sediment toxicity test was conducted using
   the amphipod Hyalella azteca and the midge Chironomus tentans. Endpoints
   measured included survival and growth.

3.2 Keywords for the Data Set

   Sediment toxicity test, nearshore region, Lake Michigan, amphipod, Hyalella
   azteca, midge, Chironomus tentans

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

   The Environmental Monitoring and Assessment Program (EMAP) was designed to
   periodically estimate the status and trends of the Nation's ecological
   resources on a regional basis. EMAP provides a strategy to identify and bound
   the extent, magnitude and location of environmental degradation and improvement
   on a regional scale based on station sites randomly located in the Great
   Lakes. Three-fold enhanced sampling sites from nearshore Lake Michigan are
   included in this data set.

4.2 Data Set Objective

   The primary objective of the sediment toxicity test is to characterize the
   benthic macroinvertebrate community. The toxicity of Lake Michigan sediments

to the amphipod Hyalella azteca and the midge Chironomus tentans was estimated in a 10-day, solid-phase bioassay.

4.3 Background Discussion

Sediment toxicity tests are the most direct measure available for determining sediment contaminant effects in benthic communities. These tests provide information of direct measurements of contaminants on aquatic biota since many chemicals are bound tightly to sediment particles or are complexed which makes them biologically unavailable.

Survival and growth in these laboratory bioassays provide evaluations of toxic contaminants without requiring interpretation of how complex mixtures might interact to affect biota.

Both Hyalella azteca and Chironomus tentans have many desirable attributes of an ideal sediment toxicity testing organism including relative sensitivity to contaminants associated with sediment, short generation time, contact with sediment, ease of culture in the lab, and tolerance to varying physico-chemical characteristics of sediments.

4.4 Summary of Data Set Parameters

A summary of replicate sediment toxicity test results were compared to summary test control data. The ten-day test was conducted with the amphipod Hyalella azteca and the midge Chironomus tentans. Each sediment sample was thoroughly mixed and added to the test chambers.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

To collect a 500-1000 mL subsample from the 0-5 cm layer from 39 sampling sites from the nearshore region of Lake Michigan. A Ponar grab was used to obtain the sediment samples which were placed in a 1000 mL plastic jar and refrigerated for sediment bioassays with two freshwater organisms.

5.1.2 Sample Collection Methods Summary

A Ponar grab sampler was used for collection of benthic macroinvertebrate samples. Approximately, a 500-1000 mL subsample was collected for toxicity testing. Samples were stored at 4 deg C and transported back to the lab for analysis.

5.1.3 Beginning Sampling Date

18 July, 1994

5.1.4 Ending Sampling Date

5 August, 1994

5.1.5 Platform

Sampling was conducted from the NOAA R/V Shanahan.

5.1.6 Sampling Equipment

A Ponar grab was used to collect sediment samples.

5.1.7 Manufacturer of Instrument

5.1.8 Key Variables

This data set does not contain any values which were measured at the time of collection. Analysis of the data after completion of the tests produced summary tests.

5.1.9 Collection Method Calibration

The sampling gear required no calibration.

5.1.10 Collection Quality Control

Prior to sampling at each station, the Ponar grab sampler was washed and rinsed with ambient water to ensure that no sediment remained from a previous station.

5.1.11 Sample Collection Method Reference

Strobel, C.J. and S.C. Schimmel, 1991. Environmental Monitoring and Assessment Program-Near Coastal. 1991 Virginian Province, Field Operations and Safety Manual. U.S. EPA , NHEERL-AED, Narragansett, RI. June 1991.

5.2 Data Processing and Sample Processing

5.2.1 Sample Processing Objective

To process sediment samples for characterization of sediment toxicity to the amphipod Hyalella azteca and the midge Chironomus tentans.

5.2.2 Sample Processing Methods Summary

Each test consisted of a 100 mL sediment sample and 175 mL of overlying water placed in a 300 mL test chamber. Tests were conducted for 10 days under a solid phase at 23 deg C with a 16L:8D photoperiod at an illuminance of about 500-1000 lux. Two freshwater test species were used, the amphipod Hyalella azteca and the midge Chironomus tentans.

Control treatments used the same water, conditions, procedures, and organisms as the other test treatments, except that none of the test material was added to the control sediment or water. The control treatments were used to provide: a) a measure of the acceptability of the test by providing evidence of the health and relative quality of the test organisms, and the suitability of the overlying water, test conditions, and handling procedures, etc.; and b) the basis for interpreting data obtained from the test sediments.

Survival and growth endpoints were determined after exposure to test sediment for 10 days. At the end of the 10 day exposure, any of the surviving test organisms in the water column or on the surface of the sediment were pipetted from the beaker before sieving the sediment. Immobile organisms isolated from the sediment surface or from sieved material were considered dead. Surviving test organisms were removed and preserved in 8% sugar formalin solution for growth measurements. Dry weight measurements were used to estimate growth. Dry weight of the test organisms were determined by pooling all living organisms from a replicate and drying the sample at about 60 to 90 deg C to a constant weight. The sample was brought to room temperature in a desiccator and weighed to obtained mean weight per surviving organism per replicate. Survival and growth in control treatments must be greater than or equal to 80% at the end of the test for acceptable test results.

5.2.3 Sample Processing Method Calibration

NA

5.2.4 Sample Processing Quality Control

Samples were stored at 4 deg C when collected and shipped on ice. Sediment
toxicity samples were stored in the dark at 4 deg C until analysis.

Sediment samples were throughly mixed and added to the test chamber.

5.2.5 Sample Processing Method Reference

U.S. EPA . 1994. Methods for Measuring the Toxicity and Bioaccumulation of
Sediment-associated Contaminants with Freshwater Invertebrates. U.S.
Environmental Protection Agency, Office of Research and Development,
Duluth, MN. EPA/600/R-94/024.

5.2.6 Sample Processing Method Deviations

None

6. DATA ANALYSIS AND MANIPULATIONS

Mean test and control replicate survival and growth were determined as a basis
for relevant data manipulations.

6.1 Name of New or Modified Values

SURVIVAL
AVERAGE GROWTH

6.2 Data Manipulation Description

6.2.1 SURVIVAL

The values under SURVIVAL represent a comparison of the mean test survival
to the mean control survival.

6.2.2 AVERAGE GROWTH

The values under AVERAGE GROWTH represent the mean dry weight per surviving
organism per replicate.

6.3 Data Manipulation Examples

6.3.1 SURVIVAL

((Mean % Test Survival / Mean % Control Survival) * 100)

6.3.2 AVERAGE GROWTH

(Mean Weight/Surviving Organism/Replicate)

7. DATA DESCRIPTION

7.1 Description of Parameters

#	Name	Type	Length	Format	Parameter Label
1	STA_NAME	Char	10	10.	Station Name
2	DATE	Num	6	YYMMDD6.	Date sample collected
3	SPECIES	Char	18	$18	Test species
4	SURV	Num	5	3.1	% Survival (Samp Mean as % of Control)
5	AVG_GRW	Num	5	1.3	Average growth (mg)

7.1.1 Precision to which values are reported

Survival values are reported to one decimal point and average growth
values are reported to three decimal points.

7.1.2 Minimum Value in Data Set

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SURV       0
AVG_GRW    0
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7.1.3 Maximum Value in Data Set

```
SURV       100
AVG_GRW    1.617
```

7.2 Data Record Example

7.2.1 Column Names for Example Records

```
STA_NAME   DATE    SPECIES          SURV    AVG_GRW
```

7.2.2 Example Data Records

```
LM94-73452  940725    Hyalella azteca    100     0.063
LM94-73472  940725    Hyalella azteca    92.5    0.069
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8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-87.922667

8.2 Maximum Longitude

-85.025

8.3. Minimum Latitude

40.666667

8.4 Maximum Latitude

46.000667

8.5 Name of Area or Region

Nearshore Lake Michigan
Stations were located within the Nearshore resource class of Lake Michigan. The
Nearshore sites were located within the 85 meter depth contour.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Measurement Quality Objectives

The required control data for sediment toxicity testing using a reference
toxicant should have LC50 values falling within 2 standard deviations of the mean.

9.2. Data Quality Assurance Procedures

QA/QC procedures for sediment toxicity tests involved sample handling and storage,
source and condition of test organisms, condition and operation of equipment,
test conditions, instrument calibration, replication, use of reference toxicants,
record keeping, and data evaluation. The organisms used in the tests were
healthy and positively identified species. If greater than 10% of the organisms
in holding containers were dead or appeared unhealthy during the 48 hours
preceding a test, the entire group was discarded.

9.3 Actual Measurement Quality

10. DATA ACCESS

10.1 Data Access Procedures

   Data can be downloaded from the EMAP Website.

10.2 Data Access Restrictions

   Not applicable.

10.3 Data Access Contact Persons

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   (218)529-5003 (FAX)
   lozano.stephen@epa.gov

10.4 Data Set Format

   Data from the Website are in ASCII fixed format.

10.5 Information Concerning Anonymous FTP

   Not accessible.

10.6 Information Concerning WWW

   Data can be downloaded from the EMAP Website.

10.7 EMAP CD-ROM Containing the Data Set

   Data are not available on CD-ROM.

11. REFERENCES

Hedtke, S., A. Pilli, D. Dolan, G. McRae, B. Goodno, R. Kreis, G. Warren,
D. Swackhamer, and M. Henry. 1992. Great Lakes Monitoring and Research
Strategy: Environmental Monitoring and Assessment Program. USEPA, Office of
Research and Development, ERL-Duluth, Duluth, Minnesota. EPA/602/R-92/001.
204 p.

12. TABLE OF ACRONYMS

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