Name of Project: Toxicity Screening of Activated Sludge Using the Microtox Toxicity Analyzer

Faculty Advisor: M. S. Switzenbaum

Student: Michael McGrath (M.S. Student)

Progress Report: May, 1987

Michael McGrath has been collecting data from the literature on both Microtox and activated sludge toxicity. In the laboratory, he has been learning to use the Gilson respirometer and BOD test. This summer he will be collecting data on the toxic response of various organic and inorganic chemicals.

Research Timetable: (2 year study)

On schedule (see January 1987 progress report)
Project: Activated Sludge Toxicity Testing with Microtox
Faculty Advisor: Dr. Michael S. Switzenbaum
Student: Mike McGrath
Progress Report: April 1988

This report summarizes work performed over the past three months on the activated sludge/Microtox project. During this time, work on the literature phase of this project continued. This work included reviewing the current literature for other toxicity screening tests and surveying publicly owned wastewater treatment plants using the Microtox Toxicity Analyzer for toxicity testing.

Tests proposed by other researchers for the screening of wastewater toxicity include dehydrogenase activity, ATP, and different types of respirometers. Each has its own particular merits. A framework for comparing the various tests has been established. (See Figure 1) At present we are examining the test methods for cost, ease of operation and maintenance, reproducibility, sensitivity, reliability, turn-around time for results, and on-line capability.

In addition to the literature review of Microtox and other proposed toxicity screening tests, a survey of publicly owned wastewater treatment plants is being conducted. We surveyed the seventeen treatment plants in the United States which own a Microtox by mailed questionnaire. A sample of the survey form is attached. Of the seventeen, we have received responses from fourteen. The results are being tabulated.

Project Completion Timetable:

April-May

Complete detailed literature review

May-June

Complete analysis of experimental results and treatment plant surveys

July-August

Prepare final report
### Ratings of Proposed Wastewater Toxicity Screening Tests

<table>
<thead>
<tr>
<th>Method</th>
<th>Online</th>
<th>Rapid</th>
<th>Simple</th>
<th>Inexpensive</th>
<th>Easy to Maintain</th>
<th>Precise</th>
<th>Sensitive</th>
<th>Reliable</th>
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<td>Fish Bioassay</td>
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<td>Dehydrogenase</td>
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<td>ATP</td>
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<td>Bod</td>
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<td>Respirometer</td>
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SURVEY OF MICROTOX USE IN PUBLICLY OWNED WASTEWATER TREATMENT PLANTS

TREATMENT PLANT CHARACTERISTICS:

What is Plant Classification?

- Conv. Activated Sludge
- Pure Oxygen Act. Sludge
- Contact Stabilization
- Trickling Filter
- Plug-Flow Act. Sludge
- Extended Aeration Act. Sludge
- Oxidation Ditch
- Lagoon
- Other. Please Specify:

What is Average Daily Dry Weather Flow? Please check one.

- < 1 MGD
- 10-50 MGD
- > 100 MGD
- 1-10 MGD
- 50-100 MGD

What percentage of total influent flow is from industrial sources?

- 0-10%
- 10-20%
- 20-30%
- 30-40%
- >50%

What industries contribute to influent flow? Please check.

- Adhesives
- Leather tanning and finishing
- Soaps and detergents
- Aluminum forming
- Battery manufacturing
- Coil coating
- Copper forming
- Electroplating
- Foundries
- Iron and steel
- Nonferrous metals
- Photographic supplies
- Plastics processing
- Porcelain enamel
- Gum and wood chemicals
- Paint and ink
- Printing and publishing
- Pulp and paper
- Textile mills
- Inorganic chemicals
- Timber
- Coal mining
- Ore mining
- Petroleum refining
- Steam electric
- Organic chemicals
- Pesticides
- Pharmaceuticals
- Plastic and synthetic material
- Rubber
- Auto and other laundries
- Mechanical products
- Electric and electronic components
- Explosives manufacturing

What are some identified pollutants in the influent? (i.e. Cyanide, Mercury)

- Heavy metals
- Pesticides
- Refractory organics
- Organic solvents
- Other. Please specify:
MICROTOX USE:

Please check uses:

- Toxicity Screening
- Toxicity Reduction Evaluation
- Pollutant Source Identification
- Establishment of Operating Parameters
- Effluent Monitoring
- Establishing Treatability of New Industry Effluents
- Billing of Specific Industries
- Other, Please Explain:

How often do you test toxicity?

OTHER TOXICITY MEASURING MEANS:

Are other toxicity measuring devices used at your plant? What are they?

- Fish assays
- ATP assays
- Daphnia assays
- Respirometry
- Other. Please specify:

How are they used?

- Toxicity Screening
- Toxicity Reduction Evaluation
- Pollutant Source Identification
- Establishment of Operating Parameters
- Effluent Monitoring
- Establishing Treatability of New Industry Effluents
- Billing of Specific Industries
- Other, Please Explain:

PERMIT REQUIREMENTS:

What effluent discharge requirements must be met?

Is Microtox used to monitor any requirement in your permit?
ADDITIONAL COMMENTS:

What are the reasons that you use the Microtox?

___ Ease ___ Quickness
___ Sensitivity ___ Cost
___ Reproducibility ___ Other. Please Specify:

What are the disadvantages of Microtox?

___ Cost ___ Lack of government standards
___ Speed ___ Results
___ Sample preparation ___ Other. Please Specify:

Please add your own comments.

Please fill in name, address, and telephone number of a person we may contact at your facility:

Name: ____________________________________________________________
Address: __________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________
Telephone number: _________________________________________________

Please return to:

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