

Title: Heavy Metals in Municipal Wastewater Treatment Plants

PIs: M. S. Switzenbaum and J. K. Edzwald

Objectives: 1) To evaluate the impact of heavy metals at WWTP in the Commonwealth of Massachusetts
2) To examine the fate of heavy metals at selected treatment plants.

Procedure: Heavy metals present many problems for the proper management of municipal wastewater treatment facilities. Problems include:
1) toxicity to receiving waters, 2) toxicity to biological unit processes in the treatment plant, and 3) sludge management due to the accumulation of these metals in residuals.

To satisfy the first objective of this study a survey will be made of municipal wastewater plants in Massachusetts to assess how many plants are having problems with heavy metals, and the nature of these problems. In addition the specific actions taken by these facilities will be noted. Based on this survey, four to five treatment plants will be selected for intensive monitoring to evaluate the fate of these metals in treatment plants. The plants will be carefully chosen to evaluate different situations (i.e. heavy industrial input, low industrial input, etc.). This will satisfy the second objective. Sampling during the intensive monitoring will include measurements of total and soluble metals as well as important variables that will influence the fate of the metals (e.g., pH, dissolved oxygen,...)

Expected Results: The results of this study will be presented as a technical report providing valuable information for MDWPC. A journal article will also be published. Note that the PIs have done a similar study with phosphorus removal in lower Great Lakes treatment plants.

Duration: 2 years

Cost: \$36,000

Name of Project: Variation of Heavy Metals Concentrations in Municipal Wastewater Treatment Plant Sludges

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Student: George Bacon (M.S. Student)

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Progress Report: May, 1987

Recent work on this project has focused on three aspects: 1) setting up and testing the new atomic adsorption spectrophotometer, 2) reviewing and testing sludge digestion methods, 3) identifying and contacting appropriate waste treatment plants for this project.

Installation and testing of the new Perkin-Elmer 3030 Atomic Adsorption Spectrophotometer is complete. Analytical routines for six heavy metals (cadmium, chromium, copper, lead, nickel, and zinc) have been programmed into the machine. Preliminary measurements on sludge from the Amherst Wastewater Treatment Plant has shown that Flame atomic adsorption is sensitive enough for these six metals.

We have chosen a simple nitric acid digestion technique for destroying sludge solids and releasing metals (Analyst, vol. 105, pp. 883-896, 1980). In this method, sludge is digested and the digest brought to volume in a single calibrated glass tube. Both liquid and sludge cake are conveniently digested with this method.

Selection of plants to include in this study has not yet been finalized. Three to five plants representing high and low industrial input and a variety of final sludge disposal methods will be selected. A list of candidate plants is attached.

Research Timetable: (2 year study)

On schedule (see January 1987 progress report)

CANDIDATE PLANTS FOR SLUDGE METALS PROJECT

<u>PLANT</u>	<u>SLUDGE DISPOSAL</u>	<u>INDUSTRIAL CONTRIBUTION</u>
Amherst	landfill	small
Attleboro	landfill	large
Concord	compost/landfill	small
South Deerfield/ Old Deerfield	land spreading*	small
Sunderland	land spreading*	small

*Plant failed to meet Type I sludge criteria in Fall, 1987.