

Title: Biological Removal of Phosphorus

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Objectives:

- 1) To evaluate the potential for implementation of biological phosphorus removal in the Commonwealth of Massachusetts
- 2) To examine the kinetics of biological phosphorus removal, in particular, the anaerobic phase.

Procedure:

Phosphorus removal is practiced at several wastewater treatment plants in the Commonwealth for nutrient control in the receiving waters. In general, phosphorus is removed by chemical precipitation.

Several modifications of the activated sludge process are able to remove phosphorus, above the amount needed for normal biological synthesis, without the addition of chemicals or with greatly reduced amounts. These processes offer the advantage of lower operation and maintenance costs when phosphorus removal is necessary due to lower chemical costs, and lower sludge processing costs (due to lower amounts and easier to handle sludge).

However, there exists some controversy in the concept of luxury uptake. Many are skeptical of the mechanism. In addition, there exists a great deal of controversy among the proprietors of the three commercial Biological Phosphorus Removal Systems (PhoStrip, A/O, Bardenpho) concerning the reaction times necessary to achieve Biological Phosphorus Removal - particularly for the anaerobic phase of the process (from 0.5 to 18 hours). The resolution of this controversy is hampered by a paucity of field data.

In order to satisfy the first objective of the study a survey will be made of wastewater plants in Massachusetts to better assess how many plants are practicing P removal, how it is being accomplished, and what design criteria are used. The survey will also seek to establish which of these plants are good possibilities for retrofit for Biological P Removal. This portion of the study will be a paper study.

The other portion of this study will be conducted in the lab. Due to the importance of the anaerobic phase of the Biological Phosphorus Removal process, and because of the wide discrepancy among the three commercial proprietors, the kinetics of the overall process, with emphasis on the anaerobic phase, will be studied.

Expected Results

The results of the research will be presented as a technical report, providing valuable information relating to the potential for implementation of biological P removal processes in

Massachusetts. The research results should also help to resolve discrepancies among the three commercial processes.

Cost:       \$34,000