Title: Continuing Research Using the Algal Assay:Bottle Test (AA:BT)

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Objective:

The Environmental Engineering laboratory at UMASS/Amherst now has a fully functioning algal assay laboratory. The objective of the proposed research is to continue work in process involving investigations about:

a) The contribution of particulate phosphorus contained in wastewater to become biologically available to algal growth and the validity of autoclaving in solubilizing bioavailable phosphorus.
b) The ability and accuracy of the AA:BT to assess the impact of either raw or treated sewage on receiving waters.

The first area of research will study the relative contribution of particulate and dissolved phosphorus on S. capricornutum growth. Such information is important in the design and implementation of wastewater treatment processes. The current AA:BT protocol precludes portions of particulate algal stimulatory constituents of municipal sewage owing to the necessary filtration step required to remove indigenous algae and particulates that would interfere with biomass determination using an electronic particle counter. Studies are therefore needed to develop a modified AA:BT procedure which allows sufficient time for mineralization of such constituents to bioavailable forms.

The second area of study will be a continuation of the work begun during the establishment of the UMASS algal assay laobratory involving the incorporation of AA:BT data into decisions about the need for and effectiveness of phosphorus removal in wastewater treatment plants. It has been suggested that results of the AA:BT can be used to evaluate: 1) the level of improvement in water quality resulting from the reduction of wastewater phosphorus loading into a receiving water, 2) the bioavailable phosphorus content in the raw or treated wastewater, 3) possible shifts in nutrient limitation below the wastewater outfall attributable to phosphorus removal and 4) the extent to which established effluent guidelines prevent nutrient enrichment, and aquatic weed proliferation in a receiving water. The research will further examine these questions utilizing laboratory bench scale treatment and AA:BT data.

Procedure:

Algal assays will be conducted in accordance with the methods developed at the UMASS laboratory as described in the technical report on the "Establishment of an Algal Assay Laboratory," previously submitted to the Massachusetts Division of Water

Pollution Control. All three areas of research will involve *in vitro*, studies of nutrient availability to *S. capricornutum* using the AA:BT with and without varying treatment strategies.

Expected Results:

1. Further information on the relative bioavailability of particulate vs dissolved phosphorus.
2. Linkage between AA:BT results and wastewater treatment strategies.

Cost: $44,000