Draft Individual Review Form

Proposal number: 2001-F203-1 **Short Proposal Title: Tertiary and Quaternary Wastewater Treatment for Water Quality**

1a) Are the objectives and hypotheses clearly stated?
The objective is to demonstrate that the water supply for wildlife and agriculture can be increased and improved through improved reclamation of wastewater. There are three clear hypotheses: the described Advanced Integrated Wastewater Pond System (AIWPS) treatment system produces higher quality water than conventional methods; is less costly; and has low levels of heavy metals in harvested algal biomass such that it can be used as a fertilizer.

1b1) Does the conceptual model clearly explain the underlying basis for the proposed work?
There is a clear written description of the conceptual model.

1b2) Is the approach well designed and appropriate for meeting the objectives of the project?
The approach appears to be well designed. An existing AIWPS demonstration facility will be upgraded and closely monitored for a wide range of constituents during operation of the facility. There appears to be sufficient information from past research at the existing facility to suggest that this demonstration project will allow investigators to meet the project objective.

1c1) Has the applicant justified the selection of research, pilot or demonstration project, or a full-scale implementation project?
The project is identified as a pilot/demonstration project. Focus of the proposal is continued funding and expansion of an existing pilot/demonstration project at the AIWPS Demonstration Facility in Richmond. Justification for this continued funding is "to advance the state of the art by allowing continuous research over three years and in all seasons." This component of the proposal is a research oriented pilot/demonstration project. The project proposal also includes construction of two pilot High Rate Ponds at the Stockton RWCF to study only ammonia removal kinetics (tasks 2, approximately 15 percent of total project cost). Three years of research at the pilot facility in Richmond has not been justified in the proposal.

1c2) Is the project likely to generate information that can be used to inform future decision making?
Information obtained from this project will be of use to wastewater treatment plant operators; providing an alternate (more effective and less expensive) method for treating wastewater. The research may be used to assist in the design of full-scale wastewater treatment facilities in Stockton and other municipalities. This could assist in regional management of a broad range of water quality (nutrient, ammonia, metal, dissolved oxygen) issues.

2a) Are the monitoring and information assessment plans adequate to assess the outcome of the project?
The project will monitor influent, effluent, evolved gas, sludge, and algal biomass for a broad range of substances including nutrients, salts, various metals, and pathogens. Mass balances for each element of the facility will be performed for nutrients. There will be engineering and cost analyses generated that can be used to assist in the design of facilities such as the Stockton RWCF.

2b) Are data collection, data management, data analysis, and reporting plans well-described, scientifically sound and adequate to meet the proposed objectives?
Data management of the project is well described and adequate to meet the proposed objective.

3) Is the proposed work likely to be technically feasible?
The proposal calls for updating and extending the use of existing demonstration facilities in Richmond. The few major physical modifications to the facility appear to be technically feasible. Addition of ponds to the Stockton facility should also be a simple technical task. The monitoring and research component at both facilities appear to be technically feasible.

4) Is the proposed project team qualified to efficiently and effectively implement the proposed project?
The project team has done much work at the Richmond and other AIWPS facilities. The team is well qualified to do the proposed work. As indicated in the proposal, any construction should be within the capabilities of most general contractors.

Miscellaneous comments
The project will provide continued funding and expansion of research at an existing demonstration facility. It appears preliminary data addressing some of the research in this proposal has already been obtained. It is clear, however, that much more comprehensive data will be obtained from this study. It is not clear what additional data will be obtained from multiple years of study. Task 2 describes a change in method only between years one and two. Are three years of research necessary?

As stated in section 2.5 of the proposal, a product of this research will be the "data needed prior to full-scale implementation such as reliability and costs for achieving" water quality goals. It is not clear from the proposal if *all* information needed to design a full-scale facility will be a product of this research. Will other information be needed after the completion of this research and prior to design of full-scale facilities? Will results of this research provide all the information necessary for full-scale implementation?

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
☐ Excellent ■ Very Good ☐ Good ☐ Fair ☐ Poor	Excellent if miscellaneous comments (above) are addressed.