Draft Individual Review Form

Proposal number: 2001-F209-2 **Short Proposal Title:Evaluation of Biological Assimilatory Capacity … for Selenium**

1a) Are the objectives and hypotheses clearly stated?

Objectives and hypothesis are discussed at length and clearly provided on p. 3

1b1) Does the conceptual model clearly explain the underlying basis for the proposed work?

The most relevant model would show partitioning of Se among various pools within the organism, but existing data are not adequate to create such a model. The conceptual model provided is a generic flow chart of Se speciation in the environment. While the model does not add much to proposal, it is responsive to CALFED's requirement for one.

1b2) Is the approach well designed and appropriate for meeting the objectives of the project?

The proposed research is intended to address the current problem that standard selenium analytical techniques are of limited value in managing the ecotoxicological risk of the substance. The form(s) of Se which are of toxicological significance are unknown, and thus measurement of total Se, or quantification of inorganic forms as is common, does not provide any information as to whether biota are at risk. Briefly, the investigators intend to feed two fish species a Se-rich diet, measure histological and cytotoxic responses, and determine the Se form(s) in tissue which best correlate with a response. I fully support the investigators' criticism of the current state of the science, and the need for better measures of ecotoxic risk. My main concern with the proposed work, however, is whether it will be successful in meeting this need. The Se source in the fish diet will be brine shrimp incubated with a Se-rich yeast. This diet contains multiple forms of Se, and further biotransformation in the fish is likely to result in the appearance of even more organo-selenium forms in its tissues. The success of the effort is essentially contingent upon demonstration of a correlation between a specific Se form and a biological response, but in fact I would expect many Se forms to be present and all to co-vary in their concentration. A priori, it is my presumption that all Se forms in the tissue (including toxicologically innocuous ones) would show a strong correlation with the histological endpoints being measured, and not just the specific forms that may be responsible for causing the toxic response. The investigators propose no mechanism (such as by establishing treatments that receive alternative dietary Se sources that would vary in their Se form profiles?) to minimize the co-variance problem which I suspect will frustrate their efforts.
I found the constant reference to a "biological assimilatory capacity" (BAC) and the claim that a Se body burden would indicate its exceedance to be confusing and annoying. The assimilatory capacity concept is typically used at an ecosystem level, and in fact the investigators first introduce it as " how much Se contamination a given watershed can tolerate" (p. 3). Throughout the remainder of the proposal, however, they use it at the level of an individual, as in some level of Se in tissues that is associated with a histological effect in that individual and indicates exceedance of BAC. The assimilatory

concept, as it is normally used, is totally unrelated to the research proposed, but for reasons that are unclear to me the term is pervasive throughout the proposal.

1c1) Has the applicant justified the selection of research, pilot or demonstration project, or a full-scale implementation project?

The proposed work is appropriately portrayed as a research project.

1c2) Is the project likely to generate information that can be used to inform future decision making?

If successful as described, the results would certainly improve decision-making, although as noted above I have some question as to whether definitive results would be possible.

2a) Are the monitoring and information assessment plans adequate to assess the outcome of the project?

The investigators assert, and I would agree, that these plans are not applicable to a research project lacking a pilot or demonstration phase.

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

The data handling plans are fairly typical and routine, and appropriate to the work proposed.

3) Is the proposed work likely to be technically feasible?

See comments under section 1b2 above.

4) Is the proposed project team qualified to efficiently and effectively implement the proposed project?

All investigators are highly qualified for the tasks proposed.

Miscellaneous comments

The task breakdown is awkward and unclear. The proposal text is structured around three "objectives". The two "tasks" cross the boundaries of multiple objectives (i.e. there are elements of Task 1 in Objectives 1, 2, and 3), and the sole purpose of the tasks seems to be a way to structure the budget. Tasks and objectives should have been synonomized and made consistent throughout the text.

In view of the widespread attention given to selenium toxicity in the San Joaquin watershed, and the question of integration of this effort with other on-going projects (including those funded by CALFED) it is peculiar that no letters of support are provided.

The proposal cover sheet indicates no prior CALFED funding. While this may be true of the lead P.I., one of the co-P.I.'s (S. Teh) has received extensive CALFED funding through multiple projects as described later in the proposal.

Overall Evaluation Provide a brief explanation of your summary rating

Summary Rating

Good - While the need is great and the proposed efforts laudable, I am not convinced the proposed approach has a high probability of surmounting the same problems that have frustrated previous efforts in Se toxicology.