Draft Individual Review Form

Proposal number: 2001-F200-1 **Short Proposal Title:** Transportation & Effects of Se and C in the Delta

1a) Are the objectives and hypotheses clearly stated?

No. The objectives with respect to carbon are unclear. While the effect of carbon on the transformation of selenium are part of this proposed study, the only transport modeling that will be done will be for selenium. Why is the carbon distribution not being modeled using a transport model.

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

The selenium and transport models shown in Figures 1 and 2 do capture the underlying mechanisms involved and make them easy for others to understand. Because of bioaccumulation, interactions with sediment, etc., the transport and dispersion of selenium is very complex. I am concerned that a 3-D salinity transport model (DELTA-TRIM) with a few simple reaction and decay type of modifications will not accurately simulate the details shown in Figure 1 and will therefore be more misleading than helpful. As discussed below, I believe a simpler 1-D model will be just as accurate and less cumbersome and expensive to use.

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

No, see 1a above. It is also not clear why a 2-D or 3-D model is going to be used when the spatial distribution of selenium and carbon can be modeled using simpler 1-D arrays of channels and junctions to represent the Bay-Delta system. The simpler 1-D models can compute the hydrodynamic and transport much faster than 3-D models and would allow the researchers to simulate transport of selenium and carbon over multiple year periods covering a range of different year types and hydrologies. Using a 3-D model, the researchers will only be able to model conditions for limited periods of time lasting a few months and will not be representative of the full range of conditions.

On page 11, it is stated that previous work developing DELTA-TRIM has revealed dispersive transports of constituents that cannot be predicted with simple, one-dimensional models or with measures of net flow and mean concentration. No data is presented in the proposal to illustrate these results. No data are presented that validate this 3-D model. Without seeing a validation of the model and comparisons with 1-D models, it is not clear that these dispersive transports are not artifacts of errors in what is a very complex 3-D model. Results from the 3-D model in question was presented at a recent Bay Delta Modeling Forum workshop but only for the flow regimes in the area of the Delta cross-channel. The results were less accurate than those generated by 1-D models. CALFED should require a peer review of this model before funding an ambitious simulation of 3-D transport of selenium and carbon using this model.

At the top of page 5, the researchers propose to first model selenium transport without incorporating transformation, trapping and decay mechanisms. These "outer envelope" results will not have any meaning in the Bay-Delta system and will only serve to confuse.

Additionally, no mention is made of modeling the interaction of the selenium with turbidity, e.g., settling velocity effects of selenium attached to sediment particles. This will be an important factor

in determining the distance and rate at which selenium moves through the Delta from the San Joaquin and other sources.

On page 6, the researchers propose to determine whether Three Mile Slough is an important conduit of selenium into the Sacramento River. Even if it were, the selenium from the San Joaquin River that reached the Sacramento River would have a relatively short distance to be advected and dispersed before it reached the confluence of these two rivers below Collinsville. It is not clear why this would have any significant effect on selenium distributions or on fish in the confluence region. This study of Three Mile Slough will not add to our understanding of selenium transport, even though it will be useful for other CALFED projects related to seawater intrusion into the Central Delta.

Figure 8 which shows conservative tracer flux through Three Mile Slough could just as easily be modeled with a 1-D model as a 3-D model.

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

The tasks related to residence times in shallow water habitats will provide very useful data and are justified. The studies of selenium transformation by local phytoplankton and selenium in the food web will also be useful. However, the numerical transport model should be significantly reduced (by at least half) and focus on the use of simpler 1-D models. The proposed research should not just be an opportunity to further refine a complex 3-D model that is not yet proven to accurately model Delta hydrodynamics and salinity transport let alone selenium transport.

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

Not unless the accuracy of the 3-D model is first demonstrated for tides, flows, salinity transport and non-conservative contaminants.

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

The proposed field monitoring of flows, selenium and carbon is very detailed and will reveal a great detail of very useful information.

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

Yes. They are based on experienced already developed the USGS and others on other earlier projects in the Bay and Delta.

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

The 3-D is extremely cumbersome and slow. This may hamper the ability of the researchers to perform simulations of transport over periods of years with a range of hydrologic conditions. Simulations over a long periods are also important because of the long residence time of selenium in the Delta and Bay.

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

The project team consists of highly talented individuals who have considerable experience in these scientific fields and are well published.

There is no biographical description of Nancy Monsen. This is unfortunate because the proposal requests fulltime funding for Monsen for three years to carry out the 3-D modeling runs. This is the largest labor cost in the proposal, about $387,000. This is almost half the labor costs. I believe Monsen is very competent but because of my concerns over the use of the 3-D model discussed above, I do not believe that so much labor should be devoted to that modeling task. If a well-established 1-D model were used much less staff time would be needed.

Miscellaneous comments

Under Task 2C (page 7), why is it important that the shallow water habitat experiments coincide with phytoplankton production and *Egeria* growth? While that may prove to be a period of greater selenium transformation, periods of lower transformation and uptake are also important.

Under Task 3B (page 7), will data be collected and will data be available from at key boundary sites in the Delta, e.g., at Vernalis where the San Joaquin River enters the Delta, or the Tracy Pumping Plant where selenium leaves the Delta. It will be important to have data at these locations to check on the selenium and carbon mass balances.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
☐ Excellent ☐ Very Good **X** Good ☐ Fair ☐ Poor	There are a number of high quality aspects to this proposal such as laboratory and field testing of selenium uptake, transformation and bioaccumulation. However, there is too much reliance on a complex unverified 3-D transport model when existing well-established 1-D models may be just as accurate and less expensive in terms of staff time and computer time.