Draft Individual Review Form

Proposal number:_2001-F201-2____   Short Proposal Title:_Mircrobial Indicators for Se Assessment & Sensor Biofouling

1a) Are the objectives and hypotheses clearly stated?
Task 1 – The objectives and hypotheses are clear. The proponents will try to determine how microbial communities influence biouptake of selenium. Their hypotheses are focused on determining whether the microbial communities can be characterized, as well as the role of the microbial communities in food chain transfer.

Task 2 – The objective for the biofouling task is clear, in that the proponents are trying to address a problem with EC and DO sensors. It is not clear why Task 2 is needed for Task 1, since task 2 appears to be focused on EC and DO, whereas Task 1 is focused on selenium. The hypothesis is not totally clear, but appears to rely somewhat on Task 1 to inform development of effective biocides for the sensors.

1b1) Does the conceptual model clearly explain the underlying basis for the proposed work?
Task 1 – The conceptual model clearly describes how the various components of the project are related to developing information on biouptake. The use of native organisms for feeding studies and detailed analysis of selenium species is also a plus.

Task 2 – The discussion of how biofilms form on sensors and impact sensors is clear. It is not clear exactly why the information from Task 1 is critical to determine the proper maintenance regimen of the sensors.

1b2) Is the approach well designed and appropriate for meeting the objectives of the project?
Task 1 – I am not qualified to comment on whether the particular methods used for the identification of microbial communities or the analytical methods for selenium speciation are adequate. The overall approach appears to be solid. Understanding which species of selenium are most readily transferred or converted through the food chain is important and the identification of the microbial community that contributes most readily to that transformation is also important. The use of resident species for the foodchain transfer experiments is also appropriate. The approach is less clear in the discussion of "system operating parameters" on the top of page 4 and under Task 1.2 on page 8. It is not clear at all what the "system" is – are they referring to one of the pilot treatment systems or how drainage water is managed?

Task 2 - The approach does describe an appropriate method for determining effective ways to address biofilms on sensors.

1c1) Has the applicant justified the selection of research, pilot or demonstration project, or a full-scale implementation project?
Task 1 – Yes. There are data gaps in the food chain processes that govern selenium uptake, so a research project of this type does make sense. It is not clear from the discussion whether this research will also be applied to the microbial communities that are present in the effluent of the pilot selenium removal projects.

Task 2 – The issue of sensor biofouling seems to be an operational or maintenance issue that should be addressed primarily by the manufacturers of the sensors. It is not clear why this level of research is necessary.

1c2) Is the project likely to generate information that can be used to inform future decision making?
Task 1 – Yes. The information on the mechanisms for selenium uptake should help determine what site-specific adjustments to water quality criteria can be made and still be protective of aquatic and terrestrial

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wildlife. It will also be critical when decisions are made regarding the need for additional selenium load reductions, since this research may be able suggest the appropriate treatment technologies or management practices to apply.

Task 2 – It may help decision makers evaluate the reliability of real-time water quality management, if biofouling becomes a major impediment to real-time monitoring.

2a) Are the monitoring and information assessment plans adequate to assess the outcome of the project?
Task 1 – The types of data being collected appear to be appropriate, but it is not clear whether the number of samples collected and evaluated will allow the proponents to come up with statistically valid conclusions.

Task 2 – I was not able to find a clear description of the monitoring and assessment plan for this task.

2b) Are data collection, data management, data analysis, and reporting plans well-described, scientifically sound and adequate to meet the proposed objectives?
Task 1 – The analytical procedures are well described as are the types of data will be collected. Data handling is poorly described. It appears from the description on page 9, item d, that there will be no central repository for data collected and that it will be dispersed in various Excel spreadsheets and Access databases. It is also unclear who is responsible for ensuring the quality and integrity of the data.

Task 2 – The type of data collection that will take place to evaluate techniques for eliminating biofouling is not described.

3) Is the proposed work likely to be technically feasible?
Task 1 – It appears that the analytical techniques for evaluating biouptake of selenium have been applied previously. The proposal appears to take a comprehensive look at biouptake through evaluation of actual microbial communities the San Joaquin Basin, as well as through controlled feeding studies in the lab.

Task 2 – It appears that there are techniques for addressing biofouling of sensors, so this task does appear to be technically feasible.

4) Is the proposed project team qualified to efficiently and effectively implement the proposed project?
Task 1 – The team appears to be well qualified with experience directly relevant to the proposed project.
Task 2 - The team does not appear to have a specialist or industry representative with wide ranging experience in dealing with biofouling of sensors.

Miscellaneous comments
The project appears to contain two separate projects and I have evaluated them as such (Task 1 and Task 2). Task 1 is not connected to Task 2, since Task 1 deals with selenium hazard assessment and Task 2 deals with sensors for electrical conductivity and dissolved oxygen.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
	Overall rating – Very Good Task 1 should provide a complete picture of the role of the microbial community in selenium biouptake. The results should provide

valuable information on management of selenium in the San Joaquin valley, especially in determining the site-specific factors that contribute to selenium uptake. The types of "system operating parameters" that are to be evaluated need to be defined as well as the number of samples that will be collected and analyzed.

Overall rating – Fair   Task 2 appears to be focused on a maintenance issue related to real-time monitoring of electrical conductivity and dissolved oxygen. It will be of minor utility in decision making. The justification does seem to support the level of research suggested.

☐ Excellent
☐ Very Good (Task 1)
☐ Good
☐ Fair (Task 2)
☐ Poor