Proposal Reviews

#249: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

WaterTech Partners

Final Selection Panel Review	
Initial Selection Panel Review	
Research and Restoration Technical Panel Review	
San Joaquin Regional Review	
External Scientific Review	#1 #2 #3
Prior Performance/Next Phase Funding	
Environmental Compliance	
Budget	

Final Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Final Selection Panel Review

Proposal Number: 249

Applicant Organization: WaterTech Partners

Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

Please provide an overall evaluation rating.

Fund	
As Is	**-**
In Part	**X**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**-**

Amount: **$316,090**

Conditions, if any, of approval (if there are no conditions, please put "None"):

Fund Tasks 1.1 through 1.4 only.

Provide a brief explanation of your rating:

A comment from the Clean Estuary Project emphasizes the project's potential value and supports the Selection Panel's recommendation.

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 249

Applicant Organization: WaterTech Partners

Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**-**
In Part	**X**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**-**

Amount: **$316,090**

Conditions, if any, of approval (if there are no conditions, please put "None"):

Fund Tasks 1.1 through 1.4 only.

Provide a brief explanation of your rating:

The Selection Panel recognizes the importance of reducing selenium loading to the San Joaquin River and achieving a salt balance in the San Joaquin Valley. This project can provide incremental progress towards those goals. However, the successfull demonstration of the nanofiltration technology as a pre-treatment of drainage water supplied to reverse osmosis treatment plant must be accomplished prior to funding of the modification of the R/O facility and the construction of the salt concentrator. Therefore, the Panel recommends funding only Task 1 - demonstration of the nanofiltration technology.

The Selection Panel also recommends close coordination of other CALFED programs (WUE, DWQ, and ERP) with the San Joaquin Valley Drainage Implementation Program to acheive a comprehensive solution to this problem.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 249

Applicant Organization: WaterTech Partners

Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XSuperior	**All scientific panel reviewers ranked the proposal as excellent. The regional panel ranked the proposal as high for regional significance. No budget and environmental compliance issues were identified. The team is highly qualified and has demonstrated success on the pilot scale studies.**
-Above average	
-Adequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   Goals were clearly defined, timely and pertinent. The project had well described justifications. A successful completion and operation of the pilot RO facility is timely in meeting the goals of the ERP by reducing contaminants and providing high quality water.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

   The project is a pilot project designed to determine the feasibility of full-scale implementation. RO is technically feasible. The approach has been field tested and successful in field trials. Also, the theoretical basis is likely to occur. Good quantitative

measures are identified. Team is very well qualified and has the expertise to conduct the tasks.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   Products are clear with reporting and public outreach identified. The value-added product the daily availability of high quality water that will be produced from the treatment process.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   No cost shares identified. Difficult to evaluate cost justification and commensurate benefits.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   The panel ranked it high. This proposal is to continue work on a physical-chemical treatment to remove selenium and salts from agricultural drain water before discharging to the San Joaquin River.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   No budget and environmental compliance issues were identified. Permits are itemized on page 17. Previous work started with different researchers, so this cannot be determined at this point.

Miscellaneous comments:

None

San Joaquin Regional Review:

Proposal Number: 249

Applicant Organization: WaterTech Partners

Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

This proposal is to continue work on a physical-chemical treatement to remove selenium and salts from agricultural drainwater before it is discharged into the San Joaquin River.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   This proposal is to do further experiments to demonstrate whether the technology, reverse osmosis, is feasible for removing selenium and salt from agricultural drain water.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   The priority addressed is to improve the quality of the agricultural return water reaching the San Joaquin River by removing selenium, a contaminant of concern, and salt.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   -Yes **X**No

   How?

   The proposal mentions other treatment efforts, i.e., salt farming and biological treatment, but there is no specific activity linked to these other efforts.

4. Does the project adequately involve local people and institutions?

   XYes **-**No

How?

The work previously funded is located within the Panoche Water District. The Grassland Area Farmers are supportive of this and other treatment efforts, whcih are believed to be of critical importance in effort of the Grassland district to meet its waste discharge requirements.

Other Comments:

It is suggested that this effort be cooridnated with other treatment projects for maximum benefit.

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **249**

Applicant Organization: **WaterTech Partners**

Proposal Title: **Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None.

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Overall rating: Excellent. The project is feasible with measurable goals that may result in the improvement of the ecosystem in the CALFED target area. This project is also directed toward solution of agricultural drainage problems so the growers can continue to operate while meeting environmental regulations.**
-Good	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The goals, objectives and hypotheses are clear and consistent throughout the proposal, the design and construction of a pretreatment system for an existing reverse osmosis (RO) treatment facility in the Panoche Drainage District (PDD) to treat drainage water from the district to remove selenium, boron, and salinity. The RO facility was constructed and began operation in 2000 but due to the extreme hardness of the drainage was unable to perform as designed. The RO membranes were fouled due to CaSO4 precipitates clogging the membranes. A successful completion and operation of the pilot RO facility is timely in meeting the goals of the ERP by reducing contaminants and providing high quality water.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The project is justified by the theoretical outcome. The purpose of the CALFED ERP is to improve and restore ecosystem health and function of the Bay-Delta. The proposed work is one way to improve quality of water to the system by treating drainage water to remove potentially toxic constituents such as selenium and boron as well as soluble salts that can degrade water quality. The project is a full-scale demonstration project to determine the economics and engineering of a treatment system that could potentially be used to remove majority of the selenium present in drainage water leaving the Panoche Drainage District. The product water could then be reused in the district allowing for transfers to other users direct export of very high quality water for other uses. The conceptual model is outlined clearly and is summarized in 3 below.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The project is a pilot project designed to determine the feasibility of full-scale implementation. Reverse osmosis is technically feasible. However, current attempts at implementation have been unsuccessful due to membrane fouling caused by excessive hardness (calcium and magnesium salts) in the feed waters. Typically RO is used to treat waters with high salt content without interfering with membrane function. In most cases these waters are dominated by highly soluble sodium salts which reduces precipitation of solids on the RO membranes. Agricultural drainage water in the Central Valley is dominated by calcium salts which are much less soluble than sodium salts and have led to rapid scale build up on RO membranes used to treat drainage water. The proposed project attempts to develop for implementation a cost-effective pretreatment step to remove hardness and prevent membrane fouling. In addition to theoretical justification the investigators claim they have conducted field trials with success on these limited occasions and a full-scale demonstration is needed to determine the long-term sustainability of the project.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   According to the proposal the approach has been field tested and successful in those field trials. Also on the theoretical basis success is likely to occur. The scale of the project has been determined by a logical progression of ongoing studies which began in laboratories progressed through field trials and now need full scale implementation to determine the feasibility of numerous treatment facilities.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   The measure of performance is treated water produced per day and the efficiency of selenium removal. The goal is for 1 acre-foot per day and the output can be quantified and the reduction in toxic constituents can also be quantified through measurement of concentration in feed and product water.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   The value-added product is the daily availability of high quality water produce by the process. If this project is successful the drainage district plans on construction of 9 other treatment facilities which could result in the annual production of 2,500 acre-feet of high quality water. The Districts has a history of been very progressive about dealing with their drainage-related environmental problems and this proposal will help them to achieve it.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The scope of this project is within the capabilities of the PIs. A partnership has been reached between industry, university and the drainage district to allow for the project to be completed. A mobile lab from the University of California, Davis has been made available for the initial phases of the implementation and more than half of the needed infrastructure for the pilot project is already in place. In addition supporting documentation submitted shows membrane manufacturers have also signed on to provide technical assistance and membranes at significant savings.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   The cost to benefit ratio for this project is very high. However, this should be considered as technology development and if the project is successful then future treatment facilities may be more cost effective. The added environmental benefit of removing toxic constituents from the drainage should also be factored in C/B calculations. According to the proposed budget and projected production of 2500 ac-ft per year after full implementation of ten treatment facilities CALFED will have invested $1000 for every acre-foot of yearly production potential. However, two possible problems can be found in the budget section of the proposal. First in the budget breakdown task 2.1 equipment expenses are listed as $600,000 for year one and two. It is unclear if the cost for task 2.1 will be shared equally between the two years or has the cost been inadvertently placed in both years. Second, cost sharing between the PI and PDD is unclear, a cost share partner would help leverage ERP funds to gain maximum benefit.

Miscellaneous comments:

Overall a very good project. One shortcoming is a lack of explanation of the exact relationship between WaterTech Partners and CIFAR at UC Davis. To ensure that the project meets the CALFED science objective I would recommend scientific oversight in development and data gathering by CIFAR.

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **249**

Applicant Organization: **WaterTech Partners**

Proposal Title: **Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**Very good proposal and in-depth detail provided.**
-Good	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Rating: Very Good. The goal is to demonstrate the full-scale operation of an on-farm recycling process Goal could be better articulated in terms of the effectiveness. Objectives could also be improved beyond targeted tasks.

2. **<u>Justification.</u>** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Rating: Excellent. Well-described justifications.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Rating: Excellent. Approach is detailed and appears to demonstrate thorough knowledge.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Rating: Good. The applicants describe feasibility in terms of negative alternatives and caveats of potential problems.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Rating: Excellent. Good quantitative measures identified.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Rating: Excellent. Both reporting and public outreach are identified.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Rating: Excellent. Applicants and team members appear very well qualified.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Rating: Very Good. Difficult to truly evaluate the cost justification and commensurate benefits.

Miscellaneous comments:

The RO technology appears to be a good BMP for removing pollutants and recycling drainage. I am uncertain whether this technology constitutes a drainage diversion that, in its entirety, will cause a hydrodynamic problem for the watershed.

External Scientific: #3

Research and Restoration External Scientific Review Form

Proposal Number: **249**

Applicant Organization: **WaterTech Partners**

Proposal Title: **Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

None

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**The goals, objective, hypothesis, products and measures are clearly stated. Treatment of Se and salts is one of several options for addressing the Se water quality impairment in the San Joaquin River. The team has extensive experience in the area of water technology development.**
-Good	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   The project goals, objectives and hypotheses are clearly stated.

2. **<u>Justification.</u>** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   Clear justification is provided from 2 previous reports. The success of this project will be beneficial to decision makers, to reduce Se, salt/boron into the San Joaquin River.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   The study clearly outlines the tasks to be conducted over the 3 phases of the project.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   To fairly assess the feasibility it is outside my specific area of expertise.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Are clearly outlined in table 2 and has measures for each phase of the project.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Products will be reports and tours of the plant and salt concentrator facility for local community members, panel discussions and presentations at conferences. Upon project completion, the two-stage membrane RO plant, equipment, supplies, drawings, etc will be turned over to the district. conferences.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   The team has adequate experience as a collective whole.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   No cost shares are identified except for in-kind services by the district personnel (ie., plant operators). Costs for conducting specific tasks are outside my specific area of expertise to evaluate.

Miscellaneous comments:

Good letters of support.

Prior Performance/Next Phase Funding:

New Proposal Number: 249

New Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   WUE Proposal #WUE01-0031.pdf Title: Irrigation Scheduling CALFED WUE project through DWR

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   None

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   -Yes **X**No **-**N/A

   If no, please explain any difficulties:

   Proposing entities changed after project awarded but before contract completed. Took recipient a long time to re-gather a capable team.

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   -Yes **-**No **X**N/A

   If no, please explain any inaccuracies:

   Too early to tell

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   -Yes **-**No **X**N/A

   If no, please explain deficiencies:

   Too early to tell

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   -Yes **-**No **X**N/A

If no, please explain deficiencies:

Too early to tell

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

   -Yes **-**No **X**N/A

   If no, please explain:

   This proposal is very different and unrealted to the WUE project.

Other Comments:

Environmental Compliance:

Proposal Number: 249

Applicant Organization: WaterTech Partners

Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   XYes **-**No

   If no, please explain:

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   XYes **-**No

   If no, please explain:

   If environmental compliance requirements are budgeted for under the "Public Outreach" task.

   Permitting is itemized on page 17.

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   -Yes **X**No

   If yes, please explain:

Other Comments:

Budget:

Proposal Number: 249

Applicant Organization: WaterTech Partners

Proposal Title: Full-Scale Demonstration of Agricultural Drainage-Water Recycling Process Using Membrane Technology

1. Does the proposal include a detailed budget for each year of requested support?

   XYes **-**No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes **-**No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes **-**No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes **-**No

   If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   XYes **-**No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

6. Does the budget justification adequately explain major expenses?

   XYes **-**No

   If no, please explain:

7. Are there other budget issues that warrant consideration?

-Yes **X**No

If yes, please explain:

Other Comments: