WATEREUSE FOUNDATION

June 27, 2003

REQUEST FOR PROPOSALS

PATHOGEN REMOVAL AND INACTIVATION IN RECLAMATION PLANTS – STUDY DESIGN (WRF-03-001)

Objective

This purpose of this project is to design a study for assessing the efficacy of water reuse processes specifically for removing and inactivating human pathogens in reclaimed water that is intended for public access or potable uses. The objectives of this project are to:

- Develop a list of reclamation treatment processes for recycled water used for public access and indirect potable reuse. Identify established methodologies and removal efficacies the treatment strategies associated with water used for public assess.

- Design a detailed study for various reclamation plants of sufficient size and continuous operation to evaluate concentrations and removal efficacy of pathogens, surrogates, and indicators before and after reclamation

The study designed by this project would then be considered by the Foundation under its research process for future funding in order to provide an understanding of the reduction, inactivation, and pathogen risk associated with public access use of reclaimed water treated by various processes.

Background

As with many activities, the potential risk of direct human exposure to pathogenic organisms in reclaimed water has historically been a concern. To protect public health, regulatory approaches stipulate water quality standards and requirements for treatment, sampling, and monitoring. Microbiological monitoring approaches incorporate principles of risk assessment with the assumptions that monitoring of pathogens and/or indicator organisms coupled with treatment specifications will provided adequate safeguards for the public.

There is currently debate as to whether existing regulatory requirements are based on suitable and sound science and if they are protective enough. In addition to protecting public health, water agencies need to gain public acceptance for their water reclamation practices. Protecting public health and maintaining public acceptance are necessary for the support of existing and future water reuse projects.

Research is needed to better understand pathogen removal and inactivation as well as their surrogates and potential indicators in treated reclaimed water. Pathogens of concern include helminthes, viruses, protozoa, bacteria, and other microorganisms. Research should focus on appropriate requirements for non-potable reuse applications where there is the possibility of direct human contact such as: irrigation of parks, playgrounds, and golf courses; body-contact recreation; uses in buildings for toilet flushing; industrial uses like cooling towers and carpet dyeing; and irrigation of food crops.

The purpose of this project is to investigate possible research options and develop a recommended scope and design for a study of pathogen removal and inactivation. The future study will be based on current and anticipated treatment technologies in the U.S that are considered appropriate for reuse applications where the recycled water is intended for public access or potable uses. These uses include groundwater and surface water recharge, unrestricted urban reuse, agricultural reuse on food crops, and unrestricted recreation reuse.

The objectives of the future follow-up study that will be designed by this project will focus on the development of risk assessments for using reclaimed water from various treatment processes as well as the development of monitoring and treatment goals and guidelines.

Research Approach

The researcher will develop a study design for assessing and evaluating pathogen removal and inactivation in reclamation plants where the recycled water is intended for public access or potable uses. The project will provide information that would help to understand appropriate operational parameters and concomitant pathogen levels that could be used to revise/update regulations.

The project will address the following tasks and considerations:

1. **Literature Search.** Conduct a literature search of published and publicly available research on the pathogen removal and inactivation across the nation, including viability to define what pathogen removal and inactivation studies have already shown, what treatment processes are currently is use, and how to test the various treatment processes for removal and inactivation efficacy (regardless of water matrix).

2. **List of Inactivation and Removal Treatment.** Survey recycled water facilities across the country including types of physical removal treatments (conventional filtration, membranes, etc.) and inactivation treatments (chlorine, chloramines, ozone, chlorine dioxide, UV, etc.) in place where the recycled water is intended for public access or potable uses. Assess effluent water quality characteristics and determine the impact of various secondary treatment processes on such characteristics. Review various treatment schemes and water quality information for further study and comparisons under the scope and design to be developed under the next task.

3. **Study Design.** Develop a scope and design a future study to evaluate the removal and inactivation of pathogens in effluents from reclamation facilities where the recycled water is intended for public access or potable uses.

   The objectives of the project that is being designed are to develop risk assessments for using reclaimed water from various treatment process and to develop guidelines including monitoring and treatment goals

   The study design should address the variety of physical removal and inactivation treatments used in these facilities. The design should address type and frequency of pathogen and surrogate monitoring necessary for evaluating removal and inactivation effectiveness. The design should incorporate pathogen viability into the analysis. Both traditional and advanced pathogen and indicator detection methods, such as nucleic acid based tests, should be considered for the design.

   The design should detail the level of bench, pilot, and full-scale testing required.

   Incorporate the evaluation of plant performance indicators such as specific chemical and physical parameters. For example, consider ammonia levels, TSS, BOD, turbidity, flow rate, chorine residual, and others.

   In the design, propose a representative number of facilities for further study based on the review of existing facilities conducted under the previous task. Develop a comprehensive water sampling program and data analysis plan that is statistically robust to compare the water quality from various reclamation facilities in order to assess pathogen removal and inactivation achieved by various physical treatments and disinfection. Develop an appropriate Quality Assurance/Quality Control (QA/QC) plan.

For the study design, the contractor should prioritize the tasks or create phases by treatment technologies, reuse objectives (landscape irrigation versus ground water recharge and indirect potable reuse), and other factors that have significant impacts on the cost of the future study. The prioritization or phases would help to determine the scope of the future study taking available funding into consideration. The contractor should include an assessment of cost and other constraints in the scope for the study design since it will directly influence the prioritization of work elements for possible inclusion in the future study.

Proposal Guidelines

The technical portions of the proposal are limited to no more than 15 pages in length. This does not include resumes, organizational charts, or statements of qualifications.

Proposals should be structured as follows:

1. Understanding of the Problem
2. Technical Approach
3. Management and Communication Plan
4. Schedule and Deliverables

5. Costs
6. Qualifications, Resumes, Organizational Charts, and Technical Resources

When planning a proposal, a Respondent should review the Foundation's *Guidelines for Solicited Proposals.* A copy of the guidelines can be found on the Foundation's website (www.WateReuse.org/Pages/foundation.html). The purpose of these guidelines is to outline the requirements for submitting proposals under the Foundation's solicited research program. These guidelines also provide information on the process used by the Foundation to review, rank, and fund research projects. As discussed in the guidelines, a Respondent should determine, prior to proposal submission, whether the Foundation's standard contract conditions are likely to be acceptable to the Respondent, its subcontractors, and other participants. A copy of the Foundation's standard contract can also be found on the Foundation's website.

Budget and Schedule

The maximum amount of funding available from the Foundation for this project is $100,000. This project will require matching funds of at least 25 percent of total project costs. Therefore, the total project cost is $125,000 ($100,000 in Foundation funds and $25,000 in-kind contributions). The matching contribution may consist of direct funding or in-kind contribution of such items as personnel costs, analytical and support services, facilities, consulting services, etc. An ideal source of in-kind contributions is water utility participation in the project. Respondents may elect to contribute more than 25 percent to the project but the Foundation's maximum contribution remains fixed at $100,000. Proposals that request less that the $100,000 from the Foundation need only contribute 25 percent of the total project cost.

Respondents are encouraged to identify other co-funding sources and in-kind services that would contribute to the funding of the project. One of the evaluation criteria will be the percentage match that the Respondent is able to provide.

The time period for the investigation is approximately 12 months.

Project Advisory Committee

A Project Advisory Committee (PAC) will be organized by the Foundation to provide guidance, review all reports and significant materials, and generally monitor project performance on behalf of the Foundation and other sponsoring organizations. The PAC will consist of at least five members, including technical experts and representatives from the U.S. Bureau of Reclamation, the California State Water Resources Control Board, and the Foundation's Research Advisory Committee.

Utility Participation

The Foundation encourages Respondents to include both participation and contribution of resources from water and wastewater utilities in the research effort.

Application Procedure and Deadline

Questions to clarify the intent of this RFP may be addressed to Jeff Mosher at 703-684-2481 or by e-mail at jeffmosher@WateReuse.org.

Proposals are to be submitted to Jeff Mosher at the Foundation's office in Alexandria, VA on or before **August 15, 2003**. Late proposals will not be considered. Eight copies of the proposal should be sent to:

Jeff Mosher
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WateReuse Foundation
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703-684-2481