State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Division of Planning and Local Assistance
San Joaquin District

SELENIUM REMOVAL
at
ADAMS AVENUE AGRICULTURAL DRAINAGE RESEARCH CENTER

Agricultural Drainage Program
Drainage Treatment

District Report

May 2004

Arnold Schwarzenegger
Governor
State of California

Michael Chrisman
Secretary for Resources
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Director
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FOREWORD

This district report is to provide documentation and evaluation of the biological processes that were tested to reduce/remove selenium from agricultural drainage water at the Adams Avenue Agricultural Drainage Research Center in western Fresno County, California. This report provides a summary of the work that was performed and combines data, results, and other information from operation logs, monthly reports, status reports, *Appendices Report* and two final operation reports - *Final Report on Reactor Operations for the Period September, 14, 1993 to December 31, 1994 and Final Report on Reactor Operations for the Period January 1, 1995 to November 21, 1995.*

The Adams program was developed in September 1990 to test and develop processes to remove selenium from agricultural drainage water. The program was a cooperative effort among four groups: the California Department of Water Resources (DWR), the Engineering Research Institute of California State University, Fresno (CSUF), Westlands Water District, and the U.S. Bureau of Reclamation (USBR).

The work at Adams was a continuation and further development of selenium removal processes that were tested at Murrieta Farms in western Fresno county by EPOC AG in 1985 and 1986. In the final report to DWR (Contract B-55712), recommendations included operation of a prototype plant to maximize selenium removal rates of a two-stage biological plant, development of a single-stage biological reactor (the upflow anaerobic sludge blanket reactor process) to replace the two-stage process, and the use of a crossflow filter as a polishing step to remove residual selenium. The Adams testing plan was based upon the recommendations but tested slow sand filtration in lieu of crossflow filtration. A packed bed reactor process was included in the Adams investigation to determine its use as a simple, alternative process for on-farm management of selenium. Other investigations included the use of molasses as an alternative carbon source for denitrification and the use of ferric chloride to coagulate and adsorb selenium from the effluent of first and second-stage processes.

Funding for this program was provided by DWR and USBR through DWR Contracts B-57806 and B-80502 to the Engineering Research Institute via the CSUF Foundation.

Paula J. Landis, Chief
San Joaquin District

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