



RIVERSIDE PUBLIC UTILITIES

Board Memorandum

BOARD OF PUBLIC UTILITIES

DATE: JULY 25, 2016

ITEM NO: 4

SUBJECT: THE UNIVERSITY OF CALIFORNIA, RIVERSIDE'S PROPOSAL FOR RIVERSIDE PUBLIC UTILITIES' WATER INNOVATIONS GRANT TO FUND RESEARCH FOR ELECTRO-OXIDATIVE ROUTE TOWARDS NITRATE REMOVAL FROM DRINKING WATER RESOURCES USING ACTIVATED CARBON AS ELECTROACTIVE SUBSTRATE IN THE AMOUNT OF \$50,000

ISSUE:

The issue for Board of Public Utilities' consideration is to approve a Water Innovations Grant for the University of California, Riverside, in the amount of \$50,000, to fund research for Electro-oxidative Route towards Nitrate Removal from Drinking Water Resources using Activated Carbon as Electroactive Substrate.

RECOMMENDATION:

That the Board of Public Utilities recommend to the City Council approve the University of California, Riverside's request for a Water Innovations Grant in the amount of \$50,000, to be paid in three installments funded in Fiscal Year 2016-17, to research Electro-oxidative Route towards Nitrate Removal from Drinking Water Resources using Activated Carbon as Electroactive Substrate.

BACKGROUND:

One of Riverside Public Utilities' (RPU) programs funded through the Water Conservation Fund is the Water Innovations Grant (WIG) Program. This program was created in 2012 and was developed for funding of research, development and demonstration programs with water related projects. It is available to public or private post-secondary educational institutions within the city limits of Riverside to advance science and/or technology. Applicants would propose an original innovative solution to a significant water issue, provide a clear potential benefit to California water ratepayers, and target one or more of the following categories:

- Landscape water use efficiency
- Indoor water use efficiency
- Industrial process efficiency
- Water reclamation and re- use
- Water-use related environmental research
- Strategic water research

Participation in the WIG Program is restricted to institutions of higher learning whose primary activities fall within City limits.

RPU has awarded grant funds to the University of California, Riverside (UCR) over the past decade to help look for new ways to advance science and technology in energy-related fields. Through its Energy Innovations Grant Program, funding was awarded to UCR for their various projects ranging from: the Control of NOx (nitrogen oxides), SOx (sulfur oxides) and Particulate Matter in Biological Filters to the

establishment of the Southern California Research Initiative for Solar Energy (SC-RISE). To date, UCR has received more than \$2 million in grant funding through the energy grant program.

As staff continued to work with local universities on the development of new innovative projects, the need for a water innovations grant program became apparent. RPU staff created the WIG Program that was approved by the Board of Public Utilities and then City Council in June of 2012. UCR is the first institution of higher education to recently submit several proposals for the RPU Grant Review Team (GRT) to consider. The GRT is composed of RPU engineering staff and other staff members who select a project to fund focusing on proposals that directly affect the utility, its operations, its potential impact to RPU's water system, and would also benefit the community.

A new proposal was recently submitted for grant funding by Dr. David Jassby, assistant professor of Chemical and Environmental Engineering at UCR. This project proposes to develop a new electrochemical treatment system designed to remove nitrate from groundwater. The system is based on the use of a packed bed granular activated carbon (GAC) column, where the GAC is used as an anode and a metal ring as a cathode. Their preliminary results demonstrated that nitrate ions are electrochemically transformed on the electrically charged GAC electrode, resulting in the formation of nitrogen gas; importantly, when the hydraulic residence time (HRT) in the GAC column was two minutes, nitrate concentrations were reduced by 26 ppm.

To the best of their knowledge, this is the first report of an oxidative process capable of eliminating nitrate in an aqueous environment, although such reactions have been reported in the gas phase. The project addresses the need for a compact, simple and robust technology capable of rapidly eliminating nitrate contamination from drinking water resources. The main advantage of this technology is its ability to abiotically denitrify water, with the only transformation product (based on their preliminary information) being nitrogen gas. This technology has the potential of transforming drinking water treatment processes for nitrate-contaminated waters, which are a growing concern for many utilities and individual well owners in California.

More information on this project is in the proposal "An Electrooxidative Route Towards Nitrate Removal from Drinking Water Resources using Activated Carbon as Electroactive Substrate" attached as Exhibit A of the contract.

FISCAL IMPACT:

The total grant award funds of \$50,000 will be paid in three installments. Sufficient funding is available in the Fiscal Year 2015-16 Water Conservation Fund Unprogrammed Funds Account No. 6220200-453001 to be carried forward to Fiscal Year 2016-17.

Prepared by: Michael J. Bacich, Public Utilities Assistant General Manager
Customer Relations and Marketing
Approved by: Girish Balachandran, Public Utilities General Manager
Approved by: John Russo, City Manager
Approved as to form: Gary G. Geuss, City Attorney

Certifies availability
of funds: Laura M. Chavez-Nomura, Public Utilities Assistant General Manager/Finance

Attachment: Grant Agreement, including Project Proposal