

## **LIST OF FUNDED SMALL BUSINESS INNOVATION RESEARCH WATER REUSE PROJECTS**

**DESCRIPTION:** List of past and currently funded SBIR projects from across the relevant federal SBIR programs, including those from seven different federal agencies. Despite the differences in agency SBIR projects, the shared focus on water technology and water reuse can be leveraged and coordinated to achieve more effective advancement and commercialization of new water reuse technologies.

**CREATORS:** The Environmental Protection Agency, Office of Research and Development

**WRAP ACTION AND MILESTONE:** WRAP Action 7.5: Coordinate and Promote Water Reuse Technology in Federal Small Business Innovation Research Programs, Milestone 1

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**SBIR PROJECTS FROM DOD, DOE, EPA, NASA, NIH, NSF, & USDA**

\*all data comes from <https://www.sbir.gov/sbirsearch/award/all>

**Topic: Water Reuse**

Sub-Topic	Title	Description	Company	City	State	Contact	Email	SBIR *I/II & Amount	Award Year	Agency
Wastewater Reuse	Chemically Resistant Membranes for Water Purification	New opportunities for purifying waters that cannot be economically treated using existing commercial membranes. Increased market growth to include recycle and re-use of contaminated water that is currently slated for disposal or long term environmentally risky storage will increase water availability for industry and agriculture and reduce environmental impact from these users.	NALA Systems, Inc.	Chapel Hill	NC	Sue Mecham	<a href="mailto:sjmecham@nalasystems.com">sjmecham@nalasystems.com</a>	I \$225,000	2019	NSF
Wastewater Reuse	Anti-Microbial Graphene Oxide Nanofiltration Membrane	Designing a reusable nanofiltration membrane platform for wastewater treatment.	CatalyzeH2O LLC	Elkins	AR	Shelby Foster	<a href="mailto:catalyzeH2O@gmail.com">catalyzeH2O@gmail.com</a>	I \$225,000	2019	NSF
Wastewater Reuse	Carbon Nanotube Enhanced Membrane Distillation for Sea and Brackish Water Desalination, and the Treatment of Saline Waste Water	Development of a novel technology for economic desalting for inexpensive clear water generation and the treatment of high concentration saline waste.	Nanosepex	Bridgewater	NJ	Cheng Li	<a href="mailto:nanodesal17@gmail.com">nanodesal17@gmail.com</a>	II \$662,453	2019	NSF
Fuel Production Water Reuse	Supercritical Treatment of Fracking Water	Demonstrate cost and energy impact of an advanced supercritical water treatment (SCWT) process. Recycling and reuse of water and chemicals from the frack water would be a cost	Prayog Labs LLC	Pittsburgh	PA	Charles Hessler	<a href="mailto:Andy.hessler@tharprocess.com">Andy.hessler@tharprocess.com</a>	II \$1,000,000	2019	DOE

		saving measure for oil and gas operators.								
Brine and Wastewater Reuse	Novel Membrane System for Lithium Recovery of Oilfield Brines	Innovative metal recovery technology needed to provide an economically viable process for lithium recovery from brines and waste streams in a manner than can be integrated with the desalination process. Enriching lithium from oilfield brines while performing desalination of the produced water can provide a solution that recovers valuable lithium from highly mineralized brine while at the same time making possible to reuse and recycle the treated waste water. An integration of lithium recovery from oilfield brines and desalination- a beneficiary reuse of the oilfield waste water through advanced technologies- can not only remedy the environmental risk, but also generate financial benefits through the recovery of valuable minerals that are contained in the brines.	Bettergy Corp.	Peekskill	NY	Lin-Feng Li	<a href="mailto:crotonbusiness99@gmail.com">crotonbusiness99@gmail.com</a>	I \$199,982	2019	DOE
Monitoring for Wastewater Reuse	e-CHEM: A fully-autonomous connected in-situ chemical sensor	Innovative monitoring solution that measures wastewater contamination, allowing its effective treatment and reuse.	Fluidion US Inc	Pasadena	CA	Joyce Wong	<a href="mailto:j.wong@fluidion.com">j.wong@fluidion.com</a>	II \$743,701	2019	NSF

Wastewater Reuse	Thermally Partially Reduced Graphene Oxide Membranes for Water Recovery from Wastewater	A thermally partially reduced graphene oxide membrane-based filtration systems to overcome the issues commonly faced when dealing with wastewater treatment systems for spacecraft such as urine wastewater recycling.	Nanomatronix, LLC	Fayetteville	AR	Parker Cole	<a href="mailto:pcole@nanomatronix.com">pcole@nanomatronix.com</a>	I \$123,422	2019	NASA
Wastewater Reuse	Nanoporous Carbon Nitride Photocatalyst Based Water Recovery System	A new nanotechnology based on photocatalytic decontamination of organics for water recovery application. This technology of water recovery from wastewater sources is key to long duration human exploration missions.	CertainTech, Inc	Sterling	VA	Jordan Terrazas	<a href="mailto:jordan@certaintech.com">jordan@certaintech.com</a>	I \$124,990	2019	NASA
Monitoring	Aptamer Beacon Sensor for Manual and Remote Automated Microbial Detection	An automated compact sensor that will be able to assess the safety of recycled water to determine if the water is potable.	Nanohmics Inc	Austin	TX	John Bruno	<a href="mailto:jdruno@nanohmics.com">jdruno@nanohmics.com</a>	I \$124,990	2019	NASA
Wastewater Reuse	Versatile Biocatalytic Processes for Low-Cost Water Reuse in Agriculture	The proposed technology substantially enhances the energy efficiency and robustness of an integrated filtration and membrane-based water treatment unit to provide high quality recycled water that substantially mitigates the risk of pathogens. It is anticipated that this proposed technology process will substantially reduce the cost barrier for adopting water reuse practices across a range of agricultural sectors thereby contributing to increased food safety and furthering sustainable water reuse processes across our	Microvi Biotech, Inc.	Hayward	CA	Fatemeh Shirazi	<a href="mailto:fshirazi@microvi.com">fshirazi@microvi.com</a>	I \$100,000	2019	USDA

		nation's agricultural industry.								
Wastewater Reuse	Novel Adsorbent Materials for Wastewater Treatment	Innovative composite adsorbents based on woody biomass materials were developed in Phase I with superior adsorption performance for wastewater treatment applications. In Phase II work will be conducted to scale up and optimize the composite adsorbent material formulation and fabrication process. The successful development of the novel adsorbents using woody biomass will contribute to increased utilization of woody resources for value-added products from wood and other agricultural materials improve water quality and conservation through effective waste water treatment and reuse enhance economic opportunity and quality of life for people in rural areas and improve the global competitiveness of the manufacturing sector in the United States.	Novoreach Technologies LLC	Midland	MI	Jason Cai	<a href="mailto:jcai@novoreach.com">jcai@novoreach.com</a>	II \$600,000	2019	USDA
Wastewater Reuse	Capillary Membrane Distillation and Photocatalysis for Water Reclamation During Space Travel	A photocatalytic capillary membrane distillation system for the reclamation of water from urine and other forms of impure water that are produced by human life in space.	Materials Modifications Inc.	Fairfax	VA	Tirumalai Sudarshan	<a href="mailto:sudarshan@matmod.com">sudarshan@matmod.com</a>	I \$124,991	2018	NASA

Wastewater Reuse	Disinfection of Water used in the Poultry Industry by Combined Advanced Oxidation Processes	This SBIR Phase I project involves synthetic and physical chemistry, microbiology and the design of disinfection equipment. Our multidisciplinary team intends to develop improved methods for both the remediation and reuse of wastewater with advanced technology.	Micro-Tracers Inc.	San Francisco	CA	Nikolay Barashkov	<a href="mailto:nikolay@microtracers.com">nikolay@microtracers.com</a>	I \$99,913	2018	USDA
Wastewater Reuse	Novel Rhamnolipid Surfactants for (Recovery of Critical Elements and) Remediation of Metal Contaminated Waste Streams	This Phase I SBIR will combine a proprietary process to manufacture green bioinspired metal selective sugar based surfactants with ion flotation technology for efficient and cost effective removal of toxic metals and rare earth elements from wastewater. This new technology will create a saleable product of metals of strategic importance to the US and facilitate water reuse through removal of toxic metals from waste streams.	GlycoSurf, LLC	Park City	UT	Chett Boxley	<a href="mailto:boxley@glycosurf.com">boxley@glycosurf.com</a>	I \$224,883	2018	NIH
Wastewater Reuse	Chlorine-resistant block polymer nanofiltration membranes with added capacity for heavy-metal capture	Development of novel water treatment technologies that can improve access to clean water and reduce cost of water treatment. The innovation is a drop-in-replacement nanofiltration membrane that is chlorine-resistant, highly permeable, and uniquely customizable. These improvements to nanofiltration technology have clear and direct societal and economic impact by facilitating water reuse and offering clean and affordable water solutions.	Anfiro, Inc.	Cambridge	MA	Jaime Mateus	<a href="mailto:jm@anfiro.com">jm@anfiro.com</a>	I \$225,000	2018	NSF

Wastewater Reuse	Forward Osmosis system for treatment of fracking water	This program will utilize forward osmosis, an emerging membrane based technology that uses natural osmosis as a driving force to treat highly contaminated produced water/ Presents potential opportunities for beneficial reuse.	2W Itech LLC	San Diego	CA	Qingwu Wang	<a href="mailto:qwang@2witech.com">qwang@2witech.com</a>	I \$150,001	2018	DOE
Wastewater Reuse	An Efficient PFO-SPS System for Concentration of Brines and Wastewater Using Low Enthalpy Geothermal Heat	This Small Business Innovation Research Phase I project will develop the design of a system concentration of brines and wastewater using low enthalpy geothermal heat. Forward osmosis technology excels in processing difficult-to-treat waters, such as brines and oil and gas wastewater.	Porifera, Inc.	San Leandro	CA	Jennifer Klare	<a href="mailto:jennifer.klare@poriferanano.com">jennifer.klare@poriferanano.com</a>	I \$149,916.79	2018	DOE
Wastewater Reuse	Supercritical Treatment Technology for Water Purification	Wastewater from oil and gas production has high total dissolved solids (TDS) and organics and needs to be treated for safe disposal or reuse. In this project, Envergex, with its partner University of North Dakota, will use lab-based testing to demonstrate proof-of-concept of supercritical water purification process.	Envergex LLC	Sturbridge	MA	Srivats Srinivasachar	<a href="mailto:srivats.srinivasachar@envergex.com">srivats.srinivasachar@envergex.com</a>	I \$149,973	2018	DOE
Wastewater Reuse	Novel Adsorbent Materials for Wastewater Treatment	Proposed novel adsorbent materials will offer unique and versatile high performance adsorbent materials compared with conventional adsorbent materials. The successful development of these materials using biomass waste materials will increase the utilization of wood resources for	Novoreach Technologies LLC	Midland	MI	Jason Cai	<a href="mailto:jcai@novoreach.com">jcai@novoreach.com</a>	I \$100,000	2017	USDA

		value-added products from wood and other agricultural materials, improve water quality and conservation through effective wastewater treatment and reuse, and reduce environmental impacts of biomass wastes.								
Wastewater Reuse	Energy-Positive Wastewater Treatment and Reuse System for Agriculture Applications	In order to develop an enhanced solution for improving agriculture water reuse while maximizing biogas energy recovery, Cambrian Innovation proposes a packaged, distributed, energy-positive wastewater treatment and reuse system (WTRS) targeted for manure wastewater which will enable more than 70% wastewater reuse by utilizing a combination of a novel anaerobic solids digester and membrane bioreactor (MBR). This technology will significantly mitigate water pollution and supplement water supplies for agriculture applications while maximizing energy recovery via biogas production.	Cambrian Innovation, Inc.	Boston	MA	Steven Zeitler	<a href="mailto:szeitler@CambrianInnovation.com">szeitler@CambrianInnovation.com</a>	I \$100,000	2017	USDA
Wastewater Reuse	Economic recovery and reuse of nutrients from wastewater	Low-cost biodegradable sorbents to passively adsorb target nutrient ions. Demonstrated recovery and reuse of essential plant nutrients-focus on wastewater treatment plants, animal farming operations and organic farms to prevent eutrophication of natural waters and lower dependence on	Xplosafe, LLC	Stillwater	OK	Shoaib Shaikh	<a href="mailto:shoaib@xplosafe.com">shoaib@xplosafe.com</a>	II \$300,000	2017	EPA



		manufactured fertilizer through recycling.								
Greywater Reuse	Advanced Pretreatment for Greywater Reuse	Technology which creates a more consistent filtration, smaller footprint, lighter weight and longer life to support reducing water demand by treating greywater and reclaiming potable water. Improve capability of the Army to sustain independence and self-sufficiency at expeditionary bases.	Severn Technology, Inc	Hayward	CA	John Racioppi	<a href="mailto:john.racioppi@severntechnology.com">john.racioppi@severntechnology.com</a>	\$149,852.40	2017	DOD
Greywater Reuse	Development of a Military Hardened Expeditionary, Energy Efficient and Waterless/Low-Flow Laundry System	Proposed reduced water flow/low energy consumption laundry system. Includes a recycled system to reuse 80% of the water. Designed to be self-contained for use at remote and resource-constrained basecamps.	Moniteq, Inc.	Queenstown	MD	Derek Sproson	<a href="mailto:dsproson@moniteq.com">dsproson@moniteq.com</a>	\$99,484.32	2017	DOD
Monitoring for Wastewater Reuse	Bayes Optimal Wastewater Classification Using Noisy Sensors	Wastewater classification device (WWCD) that can assist in proper wastewater management and reuse. Propose a real-time WWCD that would automatically classify both treated and untreated wastewater to assist the US Army in meeting wastewater management objectives. Field-deployable, robust and inexpensive with point-of-device analytics.	Ensaras, Inc.	Champaign	IL	Nina Kshetry	<a href="mailto:nina@ensaras.com">nina@ensaras.com</a>	\$99,995.78	2017	DOD

Brine Water Reuse	A Novel Photobiological Water Treatment Process for More Efficient Water Recovery in Advanced Water Reclamation and Brackish Groundwater Desalination Facilities	Photobiological water treatment process that utilizes natural power of photosynthetic microorganisms and sunlight without use of hazardous chemicals or non-renewable energy to remove contaminants from the concentrated waste streams (brines) from advanced water reclamation and brackish groundwater desalination facilities. Will reduce environmental impact and potentially improve efficiency of water treatment.	Pacific Advanced Civil Engineering, Inc.	Fountain Valley	CA	Keisuke Ikehata	<a href="mailto:kikehata@pacewater.com">kikehata@pacewater.com</a>	I \$225,000	2017	NSF
Wastewater Reuse	Regenerable Adsorbent Filter for Water Purification	A low-cost novel filter to purify water with high effectiveness and superior performance than currently-available carbon filters to remove contaminants such as perfluorinated compounds. Expected to be used by entities conducting industrial wastewater and groundwater treatment, and wastewater utilities that have a focus on water reuse.	Amriton LLC	Philadelphia	PA	Bikash Bhattarai	<a href="mailto:bikash.amriton@gmail.com">bikash.amriton@gmail.com</a>	II \$750,000	2017	NSF
Wastewater Reuse	Advanced Mars Water Acquisition System	The Advanced Mars Water Acquisition System (AMWAS) recovers and purifies water from Mars soils for oxygen and fuel production, life support, food production, and radiation shielding in support of human exploration missions	Pioneer Astronautics	Lakewood	CO	Mark Berggren	<a href="mailto:mberggren@pioneerastro.com">mberggren@pioneerastro.com</a>	I \$124,990	2017	NASA

Monitoring	Rapid Concentration for Improved Detection of Microbes in ISS Potable Water	InnovaPrep proposes development of a rapid microbial concentration system designed for use aboard the International Space Station. Captured microbes are efficiently eluted using a novel process and then delivered to a rapid detection system for analysis to provide a reliable supply of safe drinking water.	InnovaPrep, LLC	Drexel	MO	Andrew Page	<a href="mailto:apage@innovaprep.com">apage@innovaprep.com</a>	II \$749,385	2016	NASA
Wastewater Reuse	Enhanced Non Fouling Membranes for Water Purification and Recycling	Advanced osmosis membrane technology with greatly improved anti fouling characteristics by modifying commercially available osmosis membranes. This modification process is universally transferable to all commercially available membrane technologies used for wastewater purification. Advance anti fouling osmosis membrane technology for the purification of contaminated wastewater sources.	Lynntech Inc.	College Station	TX	Darla Hisaw	<a href="mailto:darla.hisaw@lynntech.com">darla.hisaw@lynntech.com</a>	II \$805,356	2016	NIH
Wastewater Reuse	Bioremediation of Polycyclic Aromatic Hydrocarbons from Wastewaters	Production of low-cost, low-energy novel materials to allow more water recycling and reuse, preserving this precious resource for society. Technical objectives are to design, construct and test encapsulated microbial materials that are targeted toward eliminating hard-to-remove or acutely hazardous chemicals from waters, so as to allow their reuse. To minimize cost and maximize conservation	Minnepura Technologies, Inc.	Saint Paul	MN	Paul Hansen	<a href="mailto:prhansen@minnepura.com">prhansen@minnepura.com</a>	I \$150,000	2016	NSF

		and use of water resources.								
Wastewater Reuse	High Flux Nanofiltration Membrane for Emerging Contaminant Control	Nanofiltration membrane that removes "emerging contaminants" and produces water at five to ten times the throughput of conventional nanofiltration membranes. Lower energy consumption and reduced capital cost. Meets increased market demand for water reuse.	Aspen Products Group, Inc.	Marlborough	MA	Mark Fokema	<a href="mailto:fokema@aspensystems.com">fokema@aspensystems.com</a>	II \$300,000	2015	EPA
Wastewater Reuse	Non-Fouling Water Reuse Technologies	Production of a robust mechanical vapor compression water treatment system made economical and low-maintenance by a patented nanotechnology polymer membrane. Made of strong and inherently fouling-resistant material organized at the nanometer scale. Significantly reduces transport of contaminants into product water. Prototype is a fully functionally 1kgal/day system.	Dais-Analytic Corp	Odessa	FL	John Herrin	<a href="mailto:john.herrin@daisanalytic.com">john.herrin@daisanalytic.com</a>	II \$999,423.75	2015	DOD
Wastewater Reuse	Large Scale, Low Temperature, Microplasma UV Lighting Tiles for Water Purification and Sterilization	UV and VUV radiation technology to neutralize pathogens, drugs, and organic chemicals of increasing concern in drinking water to promote water re-use. Scalable UV lamps enabling efficient chemical processes effective for disinfection.	Eden Park Illumination, Inc.	Champaign	IL	Sung-Jin Park	<a href="mailto:sjinpark@edenpark.com">sjinpark@edenpark.com</a>	II \$1,000,000	2015	DOE

Wastewater Reuse	Novel Integrated Technology Incorporating Anti-fouling Membranes to Dewater Algal Harvests	A new technology that can significantly reduce energy and capital requirements for dewatering is required for algae to become economically viable for bio- fuels and other markets. This project is aimed at the development of an integrated dewatering process that will substantially reduce the energy requirement and capital cost for algae dewatering. Another important benefit is that the water extracted is recycled to the algae farm thus reducing water requirements by over 90%	Helios-NRG, LLC	Amherst	NY	James Maloney	<a href="mailto:maloney@helios-nrg.com">maloney@helios-nrg.com</a>	I \$149,902	2015	DOE
Wastewater Reuse	Oxygen Recovery from Carbon Dioxide through Electrolysis	Developing an improved electrochemical process for the removal CO2 from cabin air, while also providing for recycling of water and provision of O2	Giner, Inc.	Newton	MA	Badawi Dweik	<a href="mailto:bdweik@ginerinc.com">bdweik@ginerinc.com</a>	I \$124,946	2015	NASA
Monitoring	Rapid Concentration for Improved Detection of Microbes in ISS Potable Water	InnovaPrep proposes development of a rapid microbial concentration system designed for use aboard the International Space Station. Captured microbes are efficiently eluted using a novel process and then delivered to a rapid detection system for analysis to provide a reliable supply of safe drinking water.	InnovaPrep, LLC	Drexel	MO	Andrew Page	<a href="mailto:apage@innovaprep.com">apage@innovaprep.com</a>	I \$125,000	2015	NASA

Monitoring	Spacecraft Potable Water Monitor	InnovaPrep proposes development of a rapid microbial concentration system designed for use aboard the International Space Station. Captured microbes are efficiently eluted using a novel process and then delivered to a rapid detection system for analysis to provide a reliable supply of safe drinking water.	Spectral Sciences, Inc.	Burlington	MA	Bridget Tannian	<a href="mailto:btannian@spectral.com">btannian@spectral.com</a>	I \$121,151	2015	NASA
Wastewater Reuse	Development of a Cost-effective, Nutrient-removal, Onsite Household Wastewater Treatment System for Environmentally Fragile Areas	Production of a system of holding tanks and electrochemical reactors to disinfect wastewater and reduce nutrient loading. The water can then be safely reused as flushing water or leached out without detrimental impact to the environment. Innovative standard septic tank replacement unit that can be directly connected to the household sewer line.	CLEW	Pasadena	CA	Michael Hoffmann	<a href="mailto:mrh@caltech.edu">mrh@caltech.edu</a>	I \$100,000	2014	EPA
Fuel Production Water Reuse	Advancing a Novel Low-voltage Electric Arc Method to Oxidize Organic Material in Contaminated Water	Plasma treatment system to allow produced water in the oil and gas industry to be effectively treated, thereby allowing its safe discharge or recycling to stimulate production in new wells. Facilitates cleanup and reuse of a critical resource, water, in the oil and gas production industry. Innovative technology is a low-voltage plasma discharge that creates powerful oxidizing species for destroying biological and chemical contaminants in produced water.	Symbios Technologies Inc.	Fort Collins	CO	Justin Bzdek	<a href="mailto:justin@symbiotechnologies.com">justin@symbiotechnologies.com</a>	II \$401,026	2013	NSF

Monitoring	Portable Herbicide Monitor	Portable analysis instrument that would allow regulators to 1) determine more quickly which compounds are present, 2) choose remediation steps, 3) add specific monitoring of ground and surface water, 4) increase studies of the human health effects of specific compounds, and 5) eliminate the source through targeted public education on proper use and disposal.	OndaVia, Inc. (Labrador Research, LLC)	Hayward	CA	Mark Peterman	Peterman@ondavia.com	I \$100,000	2013	USDA
Monitoring	Optical Fiber Sensor for Plant Nutrients	Compact and inexpensive optical fiber sensor that uses lab-on-a-fiber concept and microfluidic volumes of water samples to determine nutrient concentration in water and to monitor the soil, the environment and drinking water conditions.	Science and Sensors Technologies	Los Angeles	CA	Claudio O. Egalon	coegalon@aol.com	II \$460,000	2013	USDA
Wastewater Reuse	Ultra Permeable Carbon Nanotube Membranes for Forward Osmosis	Carbon-nanotube pores to develop membranes tailored specifically for forward osmosis applications, which will impact wastewater reuse.	Porifera, Inc.	Hayward	CA	Olgica Bakajin	olgica@poriferanano.com	II \$499,710	2013	NSF
Wastewater Reuse	Selenium Biopolymer Spacers to Prevent Biofouling of Reverse Osmosis Modules	Organo-selenium bio-composite spacer that constantly inhibits bacterial attachment for the reverse osmosis membrane with no negative effect upon surrounding water. Important for wastewater reclamation's desalination process.	Selenium, Ltd.	Austin	TX	Robert Hanes	rhanes@selenbio.com	I \$149,537	2012	NSF

Greywater Reuse	Polymer Mesocomposites: Novel Materials for Compaction-Resistant, High-Flux Water Treatment Membranes	High-flux, compaction-resistant and durable polymer mesocomposite membranes for filtration of sustainable drinking water purification and reuse. Uses mesoporous silica particle (MPS) as a polymer reinforce.	InPore Technologies (ClayTech, Inc.)	East Lansing	MI	Joel Dulebohn	jidulebohn@comcast.net	I \$150,000	2012	NSF
Wastewater Reuse	Highly Ordered Membranes for Molecular Separation	Ceramic nanofiltration membrane with highly uniform pores using DNA as a template in a silica sol-gel for molecular separation of fuels and chemicals from biomass. Applications for wastewater purification and desalination.	Zeomatrix, LLC	Orono	ME	Susan MacKay	smackay@zmtrx.com	II \$503,645	2012	NSF
Greenhouse Water Reuse	A Sustainable Wavelength Selective Energy Producing Greenhouse	Greenhouse that utilizes land for food and electricity production. Facilitates plant growth, reduces cooling requirements and generates power at low cost. Conserves and recycles valuable resources, especially water.	Alers Photovoltaics	Moffett Field	CA	Glenn Alers	gbalers@apvresearch.com	I \$150,000	2012	NSF
Wastewater Reuse	Electricity Generation From Anaerobic Wastewater Treatment in Microbial Fuel Cells (MFCs)	Anaerobic microbial fuel cell (MFC) technology for commercial use. In laboratory-scale research, MFCs have been well proven to simultaneously treat organic wastewater and generate electricity.	Fuss & O'Neill	Manchester	CT	Michael Curtis	800-286-2469	II \$295,000	2012	EPA
Wastewater Reuse	Ion-Exchange Fiber Composites for Rapid and Selective Removal of	Ultrafast (10-100x faster than current technology), highly sensitive, high permeability ion-exchange fiber composites for removing perchlorate from drinking water. Applications may include water	Serionix, Inc.	Champaign	IL	James Langer	jlanger@serionix.com	I \$164,996	2012	NSF



	Perchlorate from Water	deionization, softening, and industrial wastewater recycling.								
Wastewater Reuse	Mobile Bioelectric Filtration System (MBFS): Accelerated Anaerobic Digestion via Bio-Electrochemical Reactions	Utilization of electrically active microbes to generate direct electric current and other value-added products while treating wastewater. Development of Mobile Bioelectric Filtration System (MBFS), a novel wastewater treatment system to convert energy in wastewater streams into methane, electricity and treated water. System has anaerobic digester with internal electrodes and corresponding air cathodes. Will power a downstream membrane bio-filtration system to supply a usable water source.	Cambrian Innovations (IntAct Labs)	Boston	MA	Patrick Kiely	Patrick@intactlabs.com	I \$99,577	2012	DOD
Wastewater Reuse	Fouling Resistant Membranes for Efficient Oil Well Wastewater Treatment	Efficient, high flux, fouling-resistant filtration membranes to treat oil well produced water. Will reduce discharge of contaminated water and enable wastewater reuse.	Clean Membranes, Inc.	Lexington	MA	N/A	info@cleanmembranes.com	I N/A	2012	DOE
Wastewater Reuse	A Variable-Output Bio-Electrochemical System for Wastewater Treatment and Increased Loop Closure in Exploration	System that increases loop closure for water treatment in regenerative life support using bio-electrochemical processes. This technology will treat water while generating electricity and other products such as methane and hydrogen.	Cambrian Innovation, Inc.	Boston	MA	Matthew Silver	silver@intactlabs.com	I \$100,000	2011	NASA

	Life Support Systems									
Wastewater Reuse	Removal of Dissolved Organics From Flow Back Waters Using Swellable Organosilica	Water treatment system that removes organic contaminants from the flow back water that comes from hydraulic fracturing in order to recycle and/or reuse it. Based on Osorb technology, which captures up to 8x its weight in organics.	ABS Materials Company	Wooster	OH	Stephen Spoonamore	s.spoonamore@absmaterials.com	II \$978,821	2011	DOE
Fuel Production Water Reuse	Produced Water Treatment Using Animated Organosilicas That Rapidly and Reversibly Swell	Organosilica that rapidly and reversibly swells when exposed to organics and acts as a nanomechanical sponge to extract dispersed and dissolved hydrocarbons. Serves as a water purification system for the water that is co-extracted from oil and gas production.	ABS Materials Company	Wooster	OH	Stephen Jolly	s.jolly@absmaterials.com	II \$498,222	2011	NSF
Storm Water Reuse	Development of Physico-Chemically & Biologically Activated Swelling Organosilica-Metal Composites Filter Media	Bio-retention soils for the remediation of storm water runoff and common pollutants using engineered glass materials. Engineered glass (Osorb)-metal composites mixed into bio-retention systems will absorb a wide variety of VOCs from water.	ABS Materials	Wooster	OH	Hanbae Yang	h.yang@absmaterials.com	I \$149,000	2011	NSF

Wastewater Reuse	Advanced Air Evaporation System with Reusable Wicks for Water Recovery	Advanced Air Evaporation System (AAES) recovers nearly 100% of water from highly contaminated wastewater without concern for precipitation of organic and inorganic solids using reusable wicks. Will help meet the challenge of improving water loop closure in water recycling systems as missions go beyond Low-Earth Orbit.	UMPQUA Research Company	Myrtle Creek	OR	John S. Aker	aker@urcmail.net	I \$100,000	2011	NASA
Wastewater Reuse	Marine Aquaculture Water Reuse and Effluent Treatment Systems: An Integrated Sustainable Approach for Commercial Producers	Evaluating a novel application of wastewater treatment technologies proven to be effective at elevated salinities on waste stream of marine fish production facility. Goal of 100% water reuse without addition of chemicals or loss of dissolved solids and beneficial ions	Aqua Green LLC	Chalmette	LA	Charles Weirich	<a href="mailto:cweirich@aquagm.com">cweirich@aquagm.com</a>	I \$89,180	2010	USDA
Wastewater Reuse	Development of Wide Area Radiation Sources for Wastewater Treatment	X-ray with or without UV-C treatment for inactivating, destroying, and otherwise reducing major wastewater contaminants. Will lead to new solutions and major commercial opportunities not only in municipal wastewater treatment, but in fresh water treatment, industrial wastewater, marine, and residential water treatment markets.	Stellarray, Inc.	Austin	TX	Nalin Kumar	kumar@stellar-micro.com	I \$149,983	2010	NSF
Monitoring	Reagent-Free Compact Online TOC Sensor	Reliable, compact total organic carbon (TOC) analyzer for real time water monitoring with lifetime of 5 years. Will monitor the potability of recovered and processed wastewater for crew consumption on	Lynntech, Inc.	College Station	TX	Cynthia Barnett	cindy.barnett@lynntech.com	II \$600,000	2010	NASA

		extended space missions.								
Wastewater Reuse	Development of Low Cost Enzymatic Biodiesel Production from Wastewater	Automated, low-cost, low-energy system to produce biodiesel from wastewater. A revolutionary process that cleans water and produces bioenergy in a single, internally driven system. The process will use cyanobacteria's (blue-green algae) vitamin B12 production to drive a simplified enzymatic biodiesel production system using wastewater. Wastewater will be seamlessly converted into clean water and biodiesel allowing heavy water users, including beverage, food, and biofuel industries, to become clean water and clean energy producers.	Waltham Technologies, Inc.	Boston	MA	Theresa O'Keefe	tokeefe@walthamtechnologies.com	I \$149,944	2010	NSF
Wastewater Reuse	Bio-Electrochemical Systems for Ethanol Wastewater Treatment	Ethanol stillage treatment based on microbial fuel cells processes, which can treat the soluble portion of stillage because of its operation at diffused wastewater ranges and produce small amounts of electricity.	Cambrian Innovations (IntAct Labs)	Boston	MA	Matthew Silver	silver@intactlabs.com	I \$46,770	2010	EPA
Wastewater Reuse	Development of Technologies to Reduce Freshwater Use and Consumption in Coal-Fired Power Plants	Novel, low-cost vapor distillation technology that will enable municipal wastewater and non-traditional waters to be used as process water for coal power plants. An important feature of the approach is the use of	TIAX, LLC	Lexington	MA	David Kingston Owens	owens.kingston@tiaxllc.com	II \$746,741	2010	DOD

		stack gas waste heat – which otherwise would be discharged into the atmosphere – for cleaning the contaminated water through a humidification/dehumidification process carried out at atmospheric pressure.								
Wastewater Reuse	Marine Aquaculture Water Reuse and Effluent Treatment Systems: An Integrated Sustainable Approach for Commercial Producers	Application of wastewater treatment technologies proven to be effective at elevated salinities on the waste stream of a pilot-scale marine fish production facility. Goal of 100% water reuse without addition of chemicals or loss of desirable dissolved solids.	Aqua Green, LLC	Chalmette	LA	Charles R. Weirich	cweirich@aquagrnr.com	I \$89,180	2010	USDA
Biomass Processing Water Reuse	Drying and Moisture Management of Microalgae Biomass	Method for reducing cost of algae biomass processing by recycling waste energy and water resources that are currently lost in the production process. Will also develop a method to reclaim water that is currently lost in the drying process in order to recycle it back into the growth system.	Energy Derived, LLC	Scottsdale	AZ	Jeff Collier	jeff.collier@energyderived.com	I \$99,987	2010	DOD
Wastewater Reuse	Ionomer-Membrane Water Processor System Design and EDU Demonstration	Use of microporous-ionomer membrane technology to improve the robustness, simplicity and effectiveness of water recovery processes for space applications. Offers near complete removal of water from wastewater, integrated capture of wastewater solutes for disposal.	Paragon Space Development Corporation	Tucson	AZ	John Straus	jstraus@paragonsdc.com	II N/A	2010	NASA

Wastewater Reuse	Production of Electrolysis-Purity Water	Improvement on the Air Evaporation System (AES) for recovering water from wastewater by designing a system that uses thermally conductive porous media that results in a system with almost 100% water recovery. Will use the processes of freeze-concentration and porous media evaporation to produce pure water.	Makel Engineering	Chico	CA	Susana Carranza	scarranza@makelengineer.com	I \$99,104	2010	NASA
Wastewater Reuse	Economical Sequestering of Heavy Metals Dissolved in Acidic Water	A developed, relatively simple, economical and low capital intensive method of removing dissolved heavy metal contaminants from water. This method will be applied and optimized for process and waste waters generated by coal-fired power plants to enable water recycling and reduce environmental pollution.	Tusaar, Inc.	Boulder	CO	Gautam Khanna	gautam.khanna@tusaar.com	II \$998,940	2010	DOE
Wastewater Reuse	Recovery Act- High Flux Ultra Low Pressure BWRO Nanocomposite Membrane	Development of reverse osmosis membranes that will reduce energy consumption by up to 50%, reducing total cost of desalination and wastewater reuse by up to 40%. Purifying water to the required quality.	Nanoasis, Inc.	Richmond	CA	Chris Kennedy	<a href="mailto:ChrisK@NanOasisInc.com">ChrisK@NanOasisInc.com</a>	I \$149,855	2010	DOE
Wastewater Reuse	Heterogeneous Photocatalytic System For Water Remediation	System that will destroy pharmaceuticals in drinking water by leveraging Eltron's PeroxEgen' and proprietary photocatalysts. PeroxEgen is an H2O2 and peracetic acid (PAA) generating device that is nearing commercial readiness. Wastewater, doped with PeroxEgen'-generated H2O2/PAA,	Eltron Research, Inc.	Boulder	CO	Joel Thompson	Eltron@Eltronresearch.com	I \$100,000	2010	NIH

		will come into contact with the photocatalysts, ensuring destructive oxidation of the target pharmaceutical.								
Wastewater Reuse	Multi-Component Remediation System for Generating Potable Water Onboard Spacecrafts	Energy-efficient water purification system to enable humans to live and work permanently in space. High surface nanoparticles in a compact, portable filtration/remediation system for generation potable water from spacecraft wastewater.	Fractal Systems, Inc.	Bellaire Beach	FL	Matt Aldissi	maldissi@fractalsystemsinc.com	I \$99,999	2010	NASA
Wastewater Reuse	The Removal Of Disinfection Byproducts From Water (1000-641)	Triton proposes to use selective adsorbents to remove DBPs from water after the chlorination step. Phase I demonstrated that certain hydrophobic nanoporous sorbents have great advantages over existing materials for a cost effective and efficient removal of DBPs. Phase II will experiment with both POU and POE devices necessary to qualify the adsorbent material, relative to standards set forth by the EPA and NSF.	Triton Systems, Inc.	Chelmsford	MA	Arjan Giaya	Agiaya@Tritonsystems.com	II \$743,716	2009	NIH
Greywater Reuse	Greywater Recycling System for Mobile Kitchens and Sanitation Centers	Greywater remediation and recycling system for Army kitchen sanitation centers. Reduces all greywater contaminant concentrations except BOD using a photocatalytic reactor.	UV Cleaning Systems, Inc.	Beaverton	OR	R. Thomas Hawkins II	thawkins@uvcleaningsystems.com	I \$69,078	2009	DOD

Wastewater Reuse	Advanced Aqueous Phase Catalyst Development Using Combinatorial Methods	Combinatorial methods to develop advanced Aqueous Oxidation Catalysts (AOCs) with the capability to mineralize organic contaminants present in effluents from current and future primary wastewater treatment processes. AOCs that oxidize organic contaminants at low temperatures can be used to clean up wastewater or groundwater, or to produce ultra-pure water.	UMPQUA Research	Myrtle Creek	OR	James Akse	Akse@ucrmail.net	II	N/A	2009	NASA
Wastewater Reuse	Water Reclamation using Spray Drying	Spray-drying technology for the recovery and recycling of water while stabilizing the solid wastes or residues as found in advanced life support systems. Focused on recovery of water from concentrated wastewater recovery system brine and other concentrates. Spray-drying is a one-step continuous process where a solution, slurry, sludge or paste is transformed from fluid state to dried masses.	NanoMaterials Company	Malvern	PA	Nicholas Coppa	<a href="mailto:ncoppa@nanomaterialscompany.com">ncoppa@nanomaterialscompany.com</a>	II	\$600,000	2009	NASA
Monitoring	Water Quality Monitor	Chemical sensor capable of identifying and quantifying CHCs (chlorinated hydrocarbons) and BTEX (benzene, toluene, ethylbenzene, and xylenes) in surface water and groundwater.	Lynntech, Inc.	College Station	TX	G.R.Hisaw	Renee.hisaw@lynntech.com	I	\$80,000	2008	USDA



Wastewater Reuse	An Innovative Transport Membrane Condenser for Water Recovery from Flu Gas and Its Reuse	Development of a modified membrane- the successful completion of this proposed Phase II project will produce a commercially viable true green process for water conservation and reuse along with significant energy savings.	Media and Process Technology, Inc.	Pittsburgh	PA	Paul Liu	<a href="mailto:pliu@mediaandprocess.com">pliu@mediaandprocess.com</a>	II \$225,000	2008	EPA
Wastewater Reuse	A Compact, Efficient Pyrolysis/Oxidation System for Solid Waste Resource Recovery in Space	Integration of pyrolysis, a process used for volume reduction, water recovery and stabilization, with tar cracking and oxidation steps into compact, efficient system for processing spacecraft solid wastes. Will benefit NASA's efforts for solid waste sterilization/stabilization and water recovery and production.	Advanced Fuel Research, Inc.	East Hartford	CT	Michael Serio	<a href="mailto:mserio@AFRinc.com">mserio@AFRinc.com</a>	II N/A	2008	NASA
Greywater Reuse	Photocatalytic and Adsorptive System for Odor Control in Lunar Surface Systems Using Silica-Titania Composites	Silica-Titania Composite (STC) technology capable of adsorbing and oxidizing volatile organic chemicals (VOCs) to harmless byproducts when irradiated with UV light. Has many applications for air and water purification, removal of organic compounds from gray water.	Sol-gel Solutions, LLC	Gainesville	FL	Anna Casarus	<a href="mailto:aicasarus@sol-gel-solutions.com">aicasarus@sol-gel-solutions.com</a>	II N/A	2008	NASA
Wastewater Reuse	The Application of Ferrate for Wastewater Reuse	Testing an automated Ferrator suitable for integration with a water reuse facility. Ferrate used as powerful oxidant and disinfectant for treatment of water and wastewater.	Ferrate Treatment Technologies, LLC	Orlando	FL	Luke Daly	<a href="mailto:Ldaly@ferrate.biz">Ldaly@ferrate.biz</a>	I \$70,000	2007	EPA

Wastewater Reuse	High Recovery, Low Fouling Reverse Osmosis Membrane Elements for Space Wastewater Reclamation	Research into the use of composite hollow fiber membrane elements alternative to the current generation of spiral wound membrane elements for the reclamation of space mission wastewater via reverse osmosis. Goal is to treat multi-component (inorganic and organic contaminants) wastewater streams.	Santa Fe Science and Technology, Inc.	Santa Fe	NM	Ian Norris	Norris@sfst.net	II	N/A	2006	NASA
Brine Water Reuse	Enhanced Brine Dewatering System	An easily scalable means of completely recovering usable water from byproducts created by reverse osmosis water purification systems without the use of consumable wicks. Designed to completely and autonomously recover usable water and isolate water salts.	Orbital Technologies Corporation	Madison	WI	William Butrymowicz	butrymowicz@orbitec.com	I	N/A	2006	NASA