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# WEF HIGHLIGHTS

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News for Members of the Water Environment Federation

## Slaking Astronauts' Thirst in Zero Gravity

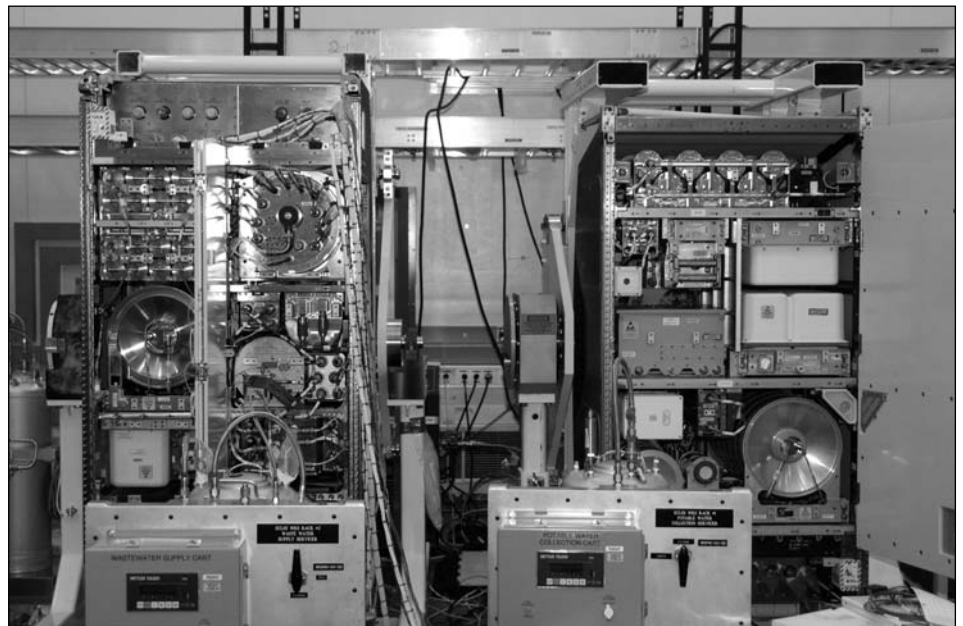
*NASA engineers develop technology to turn sweat, urine into potable water*

By 2008, NASA astronauts aboard the International Space Station will be drinking water processed right at the station. Pricey refueling trips to replenish the potable water in space will be a thing of the past. While the technology that will enable this feat is complex, the process itself begins simply with a few beads of sweat in zero gravity.

### Space-Age Filtration

It all starts with NASA's Environmental Control and Life Support System, which includes a Water Recovery System (WRS) and a system for regenerating oxygen. Both systems are being designed and tested by the NASA Marshall Space Flight Center (Huntsville, Ala.), and aerospace company Hamilton Sundstrand Space Systems International (Windsor Locks, Conn.).

The WRS is comprised of a urine processor assembly and a water processor assembly. It includes an inlet tank that receives the humidity condensate, which is what the crew generates from respiration and perspiration, explained Layne Carter, NASA's lead designer for the system. In addition to this condensate, the astronauts' urine is also



*The Water Recovery System is comprised of a urine processor assembly and a water processor assembly. It provides clean drinking water to astronauts at the International Space Station by running urine and perspiration through an advanced treatment process. Photo provided by NASA.*

processed and turned into potable water.

The unique WRS process begins with the urine processor, which uses vapor compression distillation technology. The urine distillate is combined with the humidity condensate, and that wastewater is fed to the water processor. From there, the water processor feeds the water through a liquid separator, which divides any free gas and solids

from the water, and then through a 0.5 micron filter that is designed to remove any particulates present in the water. Finally, the water travels through a series of multifiltration beds, which have the absorbent anionic exchange resin to remove "about 96%" of the contaminants from the water, Carter said.

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## A Final Word



As the annual WEFTEC® conference approaches, and we look forward to another outstanding conference, it is important to reflect on

the past year and our progress.

The Water Environment Federation (WEF; Alexandria, Va.) has had a busy year improving products and services; evaluating potential new opportunities for membership; examining its role in the global water community; updating its strategic plan; and improving governance.

WEF is rolling out a new online publication called *Water Practice*. This online research journal will publish peer-reviewed technical papers and presentations from WEFTEC and WEF specialty conferences. Prior to the development of *Water Practice*, the only Federation venue for publication of technical research has been the *Water Environment Research Journal*. *Water Practice* will provide additional opportunities for publication of papers and presentations.

The Federation continues to work with the U.S. Environmental Protection Agency (EPA) and others to educate the public, utilities, regulators, and the agricultural industry about the value of watershed-based permitting and water quality trading as key components in the program to achieve the nation's water quality goals.

WEF's Water Is Life, and Infrastructure Makes It Happen™ campaign is actively underway. The online Members' Toolkit containing key messages, media kits, and other outreach materials is complete and available at [www.WaterIsLife.net](http://www.WaterIsLife.net). Thirteen pilot utilities have begun implementing their work plans and seven WEF Member Associations are leading implementation in their states and regions.

The Federation is working in partnership with the Water Environment Research Foundation (Alexandria, Va.) and the National Association of Clean Water Agencies (Washington, D.C.) to develop the Water and Wastewater Leadership Center Program for middle managers. The organizations are also working collaboratively to consider the creation of a National Institute for Utility Management. These activities are focused on facilitating EPA's "better management" component of its "Four Pillars of Sustainable Infrastructure."

WEF is in the process of developing new structures for membership that allow utilities to package individual memberships with additional value components.

The Federation has adopted World Water Monitoring Day. This international program engages communities throughout the world in monitoring the condition of local rivers, streams, estuaries, and other water bodies, and was recently transferred to WEF.

WEF's new International Program Committee has brought forth several recommendations for the Federation's international activities. Among their recommendations is to evaluate the potential for consolidation of water messages and processes by WEF and other water-oriented organizations in the United States. The Federation Board of Trustees has agreed with the need for this evaluation and WEF leadership has begun discussions with other U.S.-based water interests on the future of water association services in North America.

In the international arena, WEF continues its role in helping to address the global water challenge. The messages about the global water need are carried by WEF in its publications and in presentations to practitioners, policy-makers, and the public.

At WEFTEC.06, the WEF House of

Delegates will be reviewing and addressing a comprehensive set of organizational changes and improvements. A major rewrite of the organization's constitution and bylaws will be presented for approval; a comprehensive update of WEF's strategic plan with

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## WEF HIGHLIGHTS

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# WEF Launches New *WE&T* Web Site

The Water Environment Federation (WEF; Alexandria, Va.) announces a new addition to its family of Web sites. WEF's flagship magazine, *Water Environment & Technology (WE&T)*, is now available at a newly designed Web site, [www.wef.org/magazine](http://www.wef.org/magazine).

Visitors to the user-friendly site will find all of the feature articles, news stories, and departments from the current issue of *WE&T*. From the *WE&T* home page, members also can access articles from past issues, as well as subscription and advertising information, author guidelines, and much more.

"This site brings the magazine right to WEF members' desktops," said Melissa Jackson, WEF director of magazines and newsletters. "We expect it will be a valued resource for members who want to research technical topics,

or just stay on top of developments in the water quality field."

The new site was designed with readers' requests in mind:

- The front page gives readers a snapshot of an entire issue, plus a sneak preview of coming attractions in the next issue. Navigation is simple and intuitive.
- Feature articles are available in PDF format so they can be easily printed out and distributed.
- A search function makes it easy for readers to find articles by topic, author, or keyword.
- The archives area allows readers to quickly scan through issues one year at a time. (At press time, archives were available as far back as the June 2006 issue, but plans are underway to make older archives available.)

Members can access the site directly at [www.wef.org/magazine](http://www.wef.org/magazine), or go to the Science & Technology Resources area at [www.wef.org](http://www.wef.org) and select *WE&T*.

Jackson encouraged members to bookmark the site so they can visit it regularly. She also said she welcomes member feedback.

"We want this site to serve the needs of our readers," she said. "I hope members will visit *WE&T* online and give us their input, so we can continue to make improvements."

## What do you think about *WE&T* online?

Let us know. Send your comments to [mjackson@wef.org](mailto:mjackson@wef.org).

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# International Coordination Committee: Recharged and Restructured

The International Coordination Committee (ICC) and the International Program Committee (IPC) primarily assist in enacting the global policy of the Water Environment Federation (WEF; Alexandria, Va.).

The ICC is tasked with representing the interests and advocating on behalf of WEF members who are involved with or have interests in water, sanitation, and environmental issues outside North America. IPC provides the Board of Trustees, WEF leadership, and staff with strategic guidance on macro facets of international programs and activities, focusing solely on related “big picture” issues.

The ICC was formed almost 9 years ago, and the IPC was established in 2005 on the basis of recommendations from a task force established by former WEF president Lynn Orphan and chaired by Marie Meunier.

This task force also recommended the review of ICC’s structure and charge, considering that ICC should

- be aligned with WEF’s global policy;
- recognize its primary role as a stakeholder committee, representing and leveraging the participation of WEF members with interest, and active and demonstrated experience in addressing water and sanitation issues in an international setting, regardless where its members are actually located; and
- recognize a joint yet distinct responsibility with the IPC for implementing WEF’s global policy, seeking to complement rather than duplicate or overlap efforts.

## Recharged

The original charge of the ICC, developed before WEF had enacted its global policy, was to develop and coordinate international and regional programs and partnerships to improve the exchange of technical information among members, organizations, and other entities.

In order to expand its responsibilities and scope, ICC needed to recognize that its role has broadened beyond just technology exchange. The committee’s new charge is to “plan, coordinate and work with WEF members, WEF committees, WEF Member Associations (MAs), like-minded organizations and entities worldwide for the purpose of

- identification, analysis and quantification of emerging technical issues and needs areas in the global water, sanitation and environmental arena;
- dissemination of technical and non-technical information regarding solutions and learned lessons in this arena when such issues and needs have been or are being addressed; and
- contribution to and proactive involvement in WEF forums, publications and initiatives that highlight such issues and needs and promote or deliver solutions and positive change.”

## Restructured

The original ICC consisted of a chair and vice chair appointed by the president, plus eight other members, six of whom are ex-officio appointments to the ICC through their roles as chair and vice chair for three regional working groups: Asia–Pacific, Latin America, and Europe–Africa–Middle East. The two other members were appointed by the president to represent the North American region.

In the new model, the ICC will revert to being a true WEF committee structured according to committee rules regarding terms of committee membership and office. Membership will be open to all WEF members who have an interest in global water and environmental issues and who apply through the normal committee channels. The

*continued on page 5*

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## Black & Veatch Leader Joins Board of Water For People

Past Water Environment Federation (WEF; Alexandria, Va.), President Richard Kuchenrither has been selected as a new board member for Water For People (Denver, Colo.), an organization dedicated to improving the quality of life for impoverished peoples by supporting sustainable drinking water, sanitation, and hygiene projects. Kuchenrither is currently senior vice president of B&V Water — the water business of engineering, consulting, and construction company Black & Veatch (Overland Park, Kan.).

Kuchenrither has served on the boards of the Water Environment Research Foundation (Alexandria, Va.) and the National Biosolids Partnership (Alexandria, Va.), a not-for-profit alliance formed in 1997 with the National Association of Clean Water Agencies (Washington, D.C.), WEF, and

U.S. Environmental Protection Agency.

During his 27-year career with Black & Veatch, Kuchenrither has held many senior roles related to water and wastewater treatment. He is an internationally recognized expert in the area of residuals management and beneficial reuse programs for biosolids.

Kuchenrither brings to Water For People key industry knowledge from Black & Veatch’s global water experience and will apply his skills within the organization as it expands services to those most in need of help. Water For People’s vision is of a world where all people have access to safe drinking water and adequate sanitation; a world where no child suffers or dies from a water-related disease.

Kuchenrither began his 3-year term in July.

# WEF Editorial Advisory Boards Seek New Members

WEF's Publications Committee is seeking additional members to join its various editorial advisory boards (EABs). The EABs offer members the opportunity to lend their technical expertise and provide input to WEF's various publications, with a minimal time commitment.

EAB members review selected abstracts submitted for publication, provide contacts for features and news stories, and keep editors apprised of emerging trends in the water quality field. EABs meet once a year at WEFTEC® and participate in conference calls 2 to 4 times per year. Time commitment is approximately 3 hours per month.

Currently there are openings on the following EABs:

- **WE&T** — This monthly magazine focuses on current events, trends, and technologies in the water quality field. Article topics range from regulatory and political issues to treatment plant and equipment design to business and international concerns.
- **Operations Forum** — This special section of *WE&T* is intended for the people who actually operate and

maintain wastewater treatment plants. Articles focus on practical day-to-day issues, such as shift scheduling, preventive maintenance do's and don'ts, and tips for optimizing existing equipment and processes.

- **Biosolids Technical Bulletin** — Published 6 times a year, this newsletter is designed for those responsible for treating solids and managing biosolids. Article topics range from new odor control and treatment technologies to environmental management systems and public acceptance.
- **Industrial Wastewater** — Published 6 times a year, this newsletter is intended for those involved in managing wastes at industrial facilities. Article topics range from pollution prevention and waste minimization to treatment technologies and regulatory issues.
- **Utility Executive** — Published 6 times a year for mid- and upper-level managers at water and wastewater treatment plants, this newsletter focuses primarily on business and management issues, such as creative financing options, effective strategic

plans, and staff development. Regulatory and technical issues, when addressed, are limited to brief overviews (executive summaries).

- **Watershed and Wet Weather Technical Bulletin** — Published 6 times a year, this newsletter is intended for those responsible for stormwater and/or watershed management. Article topics range from best management practices and new treatment technologies to inter-agency coordination and public participation strategies.
- **Water Environment Laboratory Solutions** — Published 6 times a year for environmental labs, this newsletter focuses primarily on the practical aspects of water monitoring, sampling, and analysis. Articles address such issues as adopting new analytical methods, working effectively with operators, and using and maintaining lab equipment correctly. If you are interested in joining an editorial advisory board, please contact Publications Committee staff liaison Melissa Jackson at [mjackson@wef.org](mailto:mjackson@wef.org) or (703) 684-2455.

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## International Coordination Committee *continued from page 4*

exception to this is that all non-North American MA WEF directors shall be ex-officio members of the ICC for as long as they remain as WEF directors for their respective MAs.

The WEF president will appoint the chair and vice chair of the ICC from among the committee membership, with the recommendation that at least one of these roles be filled by a member from outside North America.

### ICC at WEFTEC®.06 and Beyond

It is intended that the focus of the ICC should no longer be regional, but rather, reflect the areas and issues identified by the IPC as key to the role of WEF in the global scene.

IPC is recommending that WEF

adopt a more integrated water vision — covering water and sanitation. ICC members can play an essential role in promoting this wider vision to a larger audience through international events such as WEFTEC.

As a coordinating committee, ICC will

- create forums for collection and dissemination of information;
- sponsor workshops or sessions at WEFTEC where issues can be presented and discussed;
- work with the IPC on developing and delivering programs of action and major WEF initiatives; and
- work with WEF staff, particularly publications and outreach, to promote greater and wider awareness of

the above items.

To kick off the recharged and restructured ICC, the committee will hold an inaugural meeting at WEFTEC.06. The meeting will be held Oct. 22 from 1 to 2 p.m. at the Dallas Convention Center, Room A115/117.

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*Garry Macdonald is project director/business development manager at Beca Infrastructure Ltd (Auckland, New Zealand). Marie Meunier is an international sales manager at John Meunier Inc. (Saint-Laurent, Quebec). Julian Sandino is a vice president, wastewater treatment fellow, and assistant director of technology at CH2M Hill (Kansas City, Mo.). All three are members of the ICC Review Committee.*

# New England Wastewater Agencies Partner with National Biosolids Partnership

Three New England wastewater and biosolids organizations have agreed to work together and with the National Biosolids Partnership (NBP) on a demonstration program for the biosolids Environmental Management System (EMS) developed by the NBP. The occasion for the first co-sponsored event is the Annual New England Residuals and Biosolids Conference & Exhibit, which will be held Nov. 14–15 in Wells, Maine.

The New England Water Environment (NEWEA) Residuals Management Committee, New England Biosolids Residuals Association (NEBRA), Maine Wastewater Control Association (MWWCA), and the National Biosolids Partnership (NBP) are co-sponsors of the kick-off event planned for Nov. 14.

Thanks to creative discussions

among New England representatives Tom Schwartz (NEWEA), Ned Beecher (NEBRA), Jeff Pinnette (MWWCA), John Donovan (CDM; Cambridge, Mass.), and NBP's Peter Machno, the groups agreed to work together on a program starting with an EMS workshop covering the NBP EMS program. The groups plan to expand the current EMS program by helping 10 to 12 additional New England agencies and three contractor-managed operations improve their biosolids management programs. Six agencies in New England already are in the program.

"The NBP is looking forward to working with New England organizations to bring the benefits of the EMS," said Peter Machno, manager of the NBP EMS program. "The November workshop will provide an opportunity for agencies and contractors to under-

stand the breadth of the program and what it has meant to the 89 agencies currently part of the NBP."

In anticipation of a successful introductory program, the NBP has released a Request for Proposal (RFP) that would provide technical support to 15 new agencies. The selected contractors would assist these agencies in conducting assessments and developing their biosolids EMS programs for a 12-month period. Agencies would then undergo an independent third party audit of their program. In addition, the NBP has issued an RFP for a contractor to provide a series of four training workshops.

For more information, download the conference announcement at [www.nebiosolids.org/pdf/NEBiosolidsConfAnnouncmntJun06.pdf](http://www.nebiosolids.org/pdf/NEBiosolidsConfAnnouncmntJun06.pdf).

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## From the President *continued from page 2*

detailed activities and assignments will be considered; and potential changes to WEF's management and governance will be discussed.

WEFTEC.06 promises to be one of our best conferences ever. The Opening General Session will include a keynote address by James Hansen, the nation's lead climate scientist and director of the NASA Goddard Institute for Space Studies. His presentation, *Climate Change and Implications for Hydrology and Water Management*, will provide critical information on the global challenges of climate change and the implications on water supply.

The exposition at WEFTEC.06 will be the largest ever. With 900 companies occupying more than 230,000 square feet of exhibit space, attendees are sure to find every technology and service available for the water quality community.

It's been a great year and I am looking forward to seeing all of you at WEFTEC.06 in Dallas, Oct. 21–25.



*J. Michael Read*  
2005–2006 WEF President

### WEFTEC.06® Committee Meetings

For a schedule of committee meetings, go to [www.weftec.org](http://www.weftec.org) and select "Schedule & Events."

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## Become a Member of MARC

The Manufacturers and Representatives Committee (MARC) is currently looking for new members. The committee advises the Water Environment Federation (WEF; Alexandria, Va.) in policy matters, and develops activities pertaining to and supporting the interests of manufacturers and their representatives. The committee meets twice a year at the mid-year meeting and at the annual confer-

ence in October, giving members the opportunity to help shape the water quality industry. Members serve 5-year terms. Those interested in joining must be manufacturers or representatives, and must be a member of WEF.

For more information on becoming a MARC member, go to [www.wef.org/MembershipCareers/MembershipInformation/CommitteeList/](http://www.wef.org/MembershipCareers/MembershipInformation/CommitteeList/) and fill out a committee membership application.

## Slaking Astronauts' Thirst *continued from page 1*

"The only contaminants that the multifiltration beds can't remove effectively are the volatile organics. Those are removed by catalytic oxidation," explained Carter.

The catalytic reactor heats gaseous oxygen to approximately 130° C (265° F), oxidizing the volatile organic compounds to either carbon dioxide or to an organic acid. The residual products are then removed by another ion exchange resin downstream of the catalytic reactor, Carter explained.

"At that point you've got clean — extremely clean — water," Carted said. The water is stored in a tank capable of holding 54 kg (120 lb) of water. The waste tank hold up to 45 kg (100 lb) of water, and it operates at a rate of 6 kg/hour (13 lbs/hour).

NASA holds its engineers who design these components to high standards, not just for the benefits of astronauts at the International Space Station, but also for logistical reasons.

"Everything has to be highly reliable," Carter said. If a component to a water processing system breaks on the ground, "you just get the part to replace it. You don't have that luxury on the

Space Station, so there's a significant amount of effort that goes into ensuring each part has the highest quality component so that it won't break down."

### Challenges in the Final Frontier

In space, circumstances and situations not present on Earth become challenging design issues for the WRS, namely, the lack of gravity.

Carter explained that the liquid separator, which separates gas from liquids, would normally "take advantage of gravity" on Earth. Gravity itself would assist in the actual separation.

"Designing ... is extremely challenging when you lose gravity. On the Space Station, the liquid separator is a rotating device that spins to basically create artificial gravity to separate the gas and the liquids downstream of our catalytic reactor to remove any excess oxygen. We have a passive membrane separator that operates on surface tension to basically collect the gas, and it permeates through the membrane and then is vented out to the cabin — so all the water stays in the membrane."

In addition to using highly reliable parts and creating artificial gravity,

physical space is also an issue.

"There are significant issues in reducing the weight and the volume" of the WRS, Carted said. "We don't want it to weigh too much because it's very costly to launch things into space, and we have to reduce volume because it has to fit into a very small package."

### Benefits of the Water Recovery System

According to NASA, the WRS is capable of reducing the net mass of water and consumables that would normally need to be launched from Earth for six crew members by 2760 kg (6000 lbs) per year. This saves both time and money, while also benefiting crewmembers.

Robyn Carrasquillo, engineering manager for the Environmental Control and Life Support System, said the ability to recycle and reuse wastewater at the International Space Station allows for NASA to have a total of six crew members there.

"They would not be able to expand their crew to six, which is their goal, without this system," said Carrasquillo. "It'd be too costly to truck up that much water."

While still in testing at the Marshall Space Flight Center, the WRS is due to launch in August 2008.

### NASA in Iraq

Kendala, a small village in northern Iraq, also is benefiting from NASA ingenuity. Interestingly enough, a component designed for water purification used for the Space Shuttle Program can also be found in this village.

"Kendala was a healthy village at one time that had dwindled down to a couple hundred people," said Carrasquillo. While the city's population used to top 1000, the outfall of the reign of Saddam Hussein had left villagers with a bleak water situation.

"They had a [water] pump which was stolen [from them], and were basically living off of a pretty dirty well that the villagers came and used,"



*A little girl in Kendala, Iraq, washes her hands. The village now has clean water thanks to the non-profit organization Concern for Kids and NASA engineers. Photo provided by NASA.*

## Slaking Astronauts' Thirst *continued from page 7*

Carrasquillo explained. "It ran by a stream that the goats use for water. I saw the pictures, and it was not clean water. The villagers were taking this water and straining it through layers of cloth, using it cook with and to drink."

Carrasquillo first heard of Kendala from her brother, Todd Harrison, president of Concern for Kids, a nonprofit child welfare agency based in Fleetwood, Pa. The organization has been working to improve conditions for Iraqis since 1992, and the water situation in Kendala was just one of the problems they tackled. Harrison asked his sister for the aid of NASA engineers to help install and test a water filtration and purification system they had been given by Water Security Corporation (Reno, Nev.).

The ground-based system had a few challenges upon installation, and via e-mail, NASA was able to offer assistance.

"The pump got over to Kendala and had some issues," Carrasquillo said. The

pump, purchased in Dahuk, the major city nearest to Kendala, was oversized for the system.

"Another problem they had was the microbial check valve cartridges had arrived dry ... so they were worried they would not work properly." The microbial check valves had dried out during transport, despite being in bags labeled with a cautionary note warning against letting them dry out.

The component common to both the Space Shuttle Program water system and that of Kendala are the microbial check valves developed for NASA by certified water testing laboratory Umpqua Research Company (Myrtle Creek, Ore.). Using a flow-through cartridge containing iodinated ion exchange resin, the microbial check valve keeps the microbes in water from local streams and rivers under control by delivering iodine into the system, explained Carrasquillo.

Carrasquillo said that once these cartridges dry out it is difficult to know whether or not they are still capable of working.

"So my brother e-mailed me [from Kendala] and I worked with Layne and another guy in our group to e-mail him back some advice about how to configure the pumps and how to check those cartridges and figure out if they were healthy or not. We've had some dialogue back and forth, and they were able to get the system working."

According to a NASA news release, the residents of Kendala now have clean drinking water for the first time in 2 years.

For more information on the Environmental Control and Life Support System, visit [www.nasa.gov/centers/marshall/pdf/104840main\\_eclss.pdf](http://www.nasa.gov/centers/marshall/pdf/104840main_eclss.pdf).

— Meghan H. Oliver

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# Call for Abstracts & Conference Announcement

san diego

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