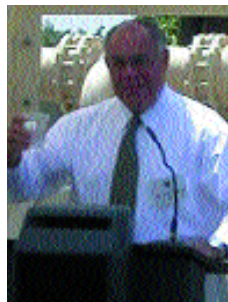




This is one in a series of project updates prepared by the National Aeronautics and Space Administration (NASA) to provide the public with information on its groundwater cleanup efforts at the Jet Propulsion Laboratory (JPL).

## Update on NASA's JPL Groundwater Cleanup Ion Exchange Process Selected for Perchlorate Removal Treatment at LAWC and Pasadena Water Production Wells

NASA's groundwater cleanup project has begun in earnest with its funding of a 2,000 gallon-per-minute treatment plant to remove perchlorate and volatile organic compounds (VOCs) from water coming from the two Lincoln Avenue Water Company (LAWC) drinking water wells in Altadena. The treatment facility, operational on July 28, 2004, uses a state-of-the-art ion exchange treatment system to remove perchlorate from the water. It is coupled with an existing liquid-phase granular activated carbon (LGAC) process to remove VOCs. Removal of the chemicals will allow LAWC to continue to deliver water to its customers that meets all California Department of Health Services (DHS) standards and to meet varying, seasonal water demands.



NASA Deputy Administrator and former astronaut Frederick Gregory is shown holding a cup of clean drinking water as he speaks at the July 29 dedication of the NASA-funded Lincoln Avenue Water Company ion exchange treatment system, an important milestone in the ongoing NASA groundwater treatment program.

NASA also has proposed to fund a similar water treatment plant for the City of Pasadena. That plant would be operated by the City and would treat water from four City drinking water wells - Arroyo, Well 52, Windsor, and Ventura.

Ion Exchange (IX) is a technology that has been or is being successfully used at 12 other locations in California. Also, it has been officially approved by the state for the removal of perchlorate from drinking water. The ion exchange technology at the Lincoln Avenue Water Company plant (and future Pasadena plant) was successfully pilot-tested by NASA.

NASA Remedial Project Manager Steve Slaten explained that LAWC selected ion exchange for its plant because systems using ion exchange are available "off-the-shelf" and can be quickly ordered, installed, and operational. Ion exchange technology offers water purveyors such as LAWC a great deal of flexibility, making it a very suitable technology to meet varying levels of seasonal demand. Furthermore, in the last year, advances in ion exchange resins for perchlorate removal have made the ion exchange technology more cost effective.

The LAWC treatment plant is located near the corner of Harriet Street and North Olive Avenue in Altadena and near LAWC's two drinking water wells. The plant was built under the supervision of and will be operated by LAWC with NASA reimbursing all expenses and providing technical assistance as requested.

For further information on the Ion Exchange treatment technology and NASA's funding of this technology, please see NASA's Action Memorandum, which is available for public comment through Friday, October 1. (see sidebar).

### NASA Cleanup Technologies Include IX, FBR, and LGAC

**Ion Exchange (IX)** perchlorate removal systems, such as the one being used at the Lincoln Avenue Water Company treatment plant, run groundwater through tanks filled with tiny plastic beads, or resin. As groundwater passes through the tanks, perchlorate molecules become attached to the plastic beads. The water leaving the tanks contains no detectable level of perchlorate.

**Fluidized Bed Reactor (FBR)** perchlorate removal systems, such as the one being constructed at its Jet Propulsion Laboratory (JPL) by NASA in its source removal study have vertical tanks containing a bed of granular activated carbon. Added nutrients make naturally occurring bacteria multiply. As groundwater flows upward and through the bed, the bacteria consume and destroy perchlorate.

**Liquid-phase Granular Activated Carbon (LGAC)** system - a technology widely used to remove VOCs from water, and the technology being used in the LAWC plant - VOCs attach to the highly porous carbon particles that are then collected for proper disposal.

### Novedades en la limpieza del agua subterránea

La NASA ha comenzado con la limpieza del perclorato del agua subterránea.

La NASA se ha hecho responsable del costo de una planta de tratamiento para remover los compuestos químicos del agua que proviene de dos pozos de agua potable localizados en Altadena y pertenecientes a Lincoln Avenue Water Company (LAWC).

La planta de tratamiento empezó a operar en julio de este año. Al remover los compuestos químicos del agua, LAWC podrá continuar distribuyendo agua que cumple con las normas establecidas por el Departamento de Servicios de Salud (DHS) y también podrá satisfacer las altas demandas de agua típicas de la temporada.

La NASA también ha propuesto hacerse responsable del costo de una planta de tratamiento para los pozos de agua de la ciudad de Pasadena. La ciudad se encargaría de operar el sistema de limpieza del agua proveniente de cuatro pozos de agua potable ubicados en Pasadena.

### PUBLIC COMMENT IS INVITED

The public is invited to comment on actions taken by the National Aeronautics and Space Administration (NASA) to contain the spread of perchlorate in groundwater by funding the construction and operation of a Lincoln Avenue Water Company (LAWC) groundwater treatment plant near the corner of Harriet Street and North Olive Avenue in Altadena to treat drinking water from two LAWC wells.

A summary of the project and NASA's basis for this action are described in what's referred to as a time-critical "Action Memorandum" that is available for review and public comment through Friday, October 1. The Summary is available in Spanish, but the Action Memorandum itself is available only in English. Members of the public may obtain or examine a copy of the summary and the Action Memorandum by visiting any of the NASA groundwater cleanup public document information repositories listed in this document or by visiting the NASA JPL Groundwater Cleanup Website at <http://JPLwater.nasa.gov>. The public also may call (818) 393-0754 for more information.

Comments on NASA's action may be submitted electronically to [watercleanup@nmo.jpl.nasa.gov](mailto:watercleanup@nmo.jpl.nasa.gov).

Comments also may be submitted by mail to the attention of **Merrilee Fellows**, NASA Water Cleanup Outreach Manager, Jet Propulsion Laboratory, NASA Management Office, 180-801, 4800 Oak Grove Drive, Pasadena, CA 91109.

No specific format for the comments is necessary, although legible comments keyed to specific portions of the Action Memorandum will be helpful.

All comments must be submitted electronically by midnight, Friday, Oct. 1. If comments are posted by mail, the comments must bear a postmark of no later than Friday, Oct. 1.

### Invitación al público a dar su opinión

El resumen del Memorando de Acción está disponible en español, pero el Memorando de Acción está disponible solo en inglés. Los miembros del público pueden obtener o examinar una copia del resumen en español y una copia del Memorando de Acción en inglés si visitan cualquiera de los lugares de información pública donde la NASA tiene los documentos referentes a la limpieza del agua subterránea. La lista de estos lugares se encuentra en la página 4 de este boletín. También pueden visitar la página Web de la NASA referente a "La Limpieza del Agua Subterránea en JPL." Si desea más información, por favor llame a Gabriel Romero, NASA JPL, Teléfono: 818-354-8709.

VISIT OUR WEBSITE AT <http://JPLwater.nasa.gov>  
VISITE NUESTRA PÁGINA WEB <http://JPLwater.nasa.gov>

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Miembros del Equipo de Limpieza del Agua

## NASA Nears Completion of the Groundwater Treatment Plant Located on the JPL Facility

Treatment of up to 250 Gallons of Groundwater per Minute, Removing Volatile Organic Compounds (VOCs) and Perchlorate

NASA is nearing completion of construction of the first phase of a groundwater treatment plant at the Jet Propulsion Laboratory (JPL).

The treatment plant, located in a portion of a parking lot on JPL, will remove volatile organic compounds (VOCs) and perchlorate found in groundwater directly beneath JPL, the area where the highest concentrations of the chemicals are located. Treating groundwater at the chemical source area will help stop chemicals from spreading into the groundwater beyond the JPL boundary and reduce the duration of treatment at the City of Pasadena and Lincoln Avenue Water Company wells.



Construction activity for the treatment facility at the JPL site in July, 2004.

From the late 1990s through 2003, under a Navy program designed to specifically test technology, NASA conducted six small-scale tests to determine what technologies would be best for the groundwater cleanup job. One of those studies, in early summer and fall of 2001, was a small six-gallons-per-minute test combining two processes - Liquid-phase Granular Activated Carbon (LGAC) and Fluidized Bed Reactor (FBR) - to remove VOCs and perchlorate, respectively, from the water.

This combined system was judged to be the best match of the technologies tested for cleanup of the source area and has been selected for larger scale implementation.

NASA's expanded study will be conducted in phases to make it possible to optimize the system to create the best long-term strategy for groundwater cleanup. NASA Remedial Project Manager Steve Slaten said the unit will be "up and running" in the fall of 2004 and will be pumping and treating as much as 125 gallons of groundwater per minute in its first phase and as much as 250 gallons per minute when coupled with an anticipated second phase.

### Instalación de una planta de tratamiento de agua subterránea en JPL

La NASA completará la primera etapa de la construcción de la planta de tratamiento del agua subterránea en JPL en el otoño del 2004.

La planta de tratamiento, localizada en una parte de un antiguo estacionamiento de autos en JPL, removerá los compuestos químicos que se descubrieron en el agua subterránea directamente debajo de JPL, el área donde existe la mayor concentración de compuestos químicos. El hecho de tratar el agua subterránea en el lugar donde se halla la fuente de los compuestos químicos ayudará a evitar el movimiento de estos compuestos en el agua subterránea más allá del límite de JPL y ayudará a limpiar más rápidamente el agua proveniente de los pozos de agua pertenecientes a la ciudad de Pasadena y a Lincoln Avenue Water Company.

## NASA Cleanup Team in Place at JPL



NASA Remedial Project Manager Steve Slaten and Project Outreach Manager Merrilee Fellows sample glasses of clean drinking water produced by the Lincoln Avenue Water Company water treatment plant.

One would expect NASA to have teams at the Jet Propulsion Laboratory (JPL) dedicated to the scientific pursuit of water on Mars, but NASA also has a highly talented team at JPL dedicated solely to the science and cleanup of the groundwater located beneath and adjacent to JPL.

And in less than a year, that team - consisting of Remedial Project Manager Steve Slaten and Project Outreach Manager Merrilee Fellows - has made considerable progress on the cleanup itself and the community outreach that NASA has made part and parcel of its cleanup activities.

As NASA's full-time, dedicated Remedial Project Manager, Steve is responsible for the cleanup resulting from past waste disposal practices at the site during the 1940s and 1950s that have impacted the area's drinking water aquifer. As Outreach Manager for the cleanup project, Merrilee is the public face and voice of NASA's effort, and she also represents the ear of NASA, constantly soliciting public input about the cleanup and ensuring that NASA responds.

While Steve and Merrilee are the most visible members of the cleanup team, a partnership of federal and state regulatory agencies and area water purveyors is also working hard on the cleanup. They include the U.S.

Environmental Protection Agency (EPA), the California Department of Health Services (DHS), the Los Angeles Regional Water Quality Control Board, the California Environmental Protection Agency Department of Toxic Substances Control, Pasadena Water and Power (PWP) and the Lincoln Avenue Water Company (LAWC).

The primary goal for all involved is to provide the public with clean, safe drinking water that meets all health standards. A hydrogeologist by training, Steve has held several key positions over the years that have involved him in managing complex environmental cleanup projects. He has worked extensively on cleanup projects involving local, state, and federal regulatory agencies, and he has worked with members of the public, responding to their concerns and explaining steps in the cleanup process.

Continued on page three

## Cleanup Team continued from page two

Among the jobs Steve held before coming to NASA was Environmental Restoration Project Manager at the Los Alamos National Laboratory, and he served for a time as an enforcement officer at the U.S. EPA office in Dallas. He received his B.S. Degree in geology from the University of Texas at Austin.

A Pasadena-area resident for 25 years and former member of the Pasadena Planning Commission, Merrilee has served in a number of positions with such organizations as The Nature Conservancy and the California Energy Commission. She was also Director of Regulatory Affairs for Luz, a company that at the time was the world's largest producer of solar thermal electricity. She has a B.A. in Environmental Studies, an M.A. in Urban Planning and a J.D. with an emphasis in environmental law.

Steve and Merrilee constantly meet with members of the public to answer questions and hear concerns, as well as to explain NASA's commitment to cleaning up the groundwater beneath and adjacent to the Jet Propulsion Laboratory. They have, in the process, become NASA's environmental ambassadors to the Altadena, Pasadena and La Cañada Flintridge neighborhoods near JPL.

Anyone who wants to learn more about NASA's plans and commitment may contact Merrilee at 818-393-0754.

### La NASA está dedicada a limpiar el agua en JPL

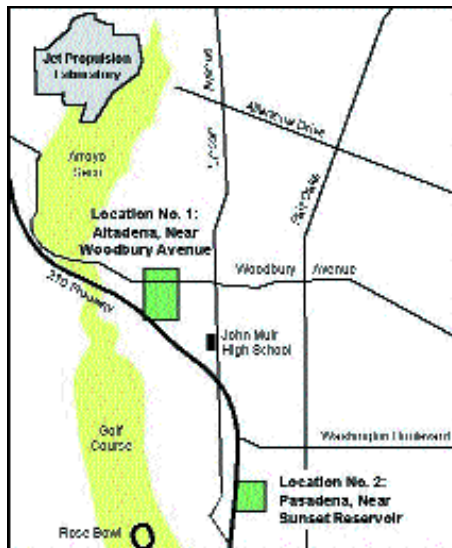
Mientras que la NASA explora la existencia de agua en Marte, también tiene un equipo científico que se dedica a la limpieza del agua subterránea en y alrededor de JPL. Steve Slaten, el gerente responsable de la limpieza del agua, trae su experiencia como hidrólogo - la persona que estudia el agua subterránea. Merrilee Fellows, que ha vivido en Pasadena por los últimos 25 años, es la persona encargada de comunicarse con la comunidad sobre los esfuerzos que hace la Nasa para limpiar el agua.

## NASA's Monitoring of Groundwater Is Key To Determining Movement of Chemicals

### NASA to Site Two New Monitoring Wells

While cleanup is the ultimate goal, as part of NASA's overall cleanup efforts NASA has been conducting another vital activity since the late 1980s -- monitoring the groundwater beneath and in areas adjacent to the Jet Propulsion Laboratory (JPL). NASA's primary goal for the monitoring wells is to characterize the extent and movement of chemicals that are in the aquifer 300 to 1,000 feet beneath the surface.

With changes to the groundwater flow resulting in part from the closure of some water pumping wells in the City of Pasadena, the chemicals in the groundwater are moving slowly in a south/southeasterly direction from JPL and have now moved beyond some of the southernmost monitoring wells. NASA is in the process of siting two additional monitoring wells, (see map below) one in the Woodbury Avenue area in Altadena and the other expected to be placed much further south, in Pasadena near the City's Sunset Reservoir. The placement of these wells will help NASA better understand the full extent that these chemicals have traveled in the groundwater.



Every three months or even more often, technicians sample JPL area groundwater as part of NASA's ongoing effort to characterize the plume of chemicals it is cleaning up. (Photo, Westbay Instruments)

Since the groundwater is hundreds of feet below the surface in this area, the new monitoring wells will be drilled down to about 1000' feet. Drilling of deep monitoring wells is a costly process, so the location for each well is carefully considered in order to gain the most useful information on the groundwater.

The information gathered from the groundwater monitoring will guide NASA in its groundwater cleanup program, including where to install groundwater treatment systems. After treatment systems are installed, NASA will use the monitoring information from groundwater wells to measure the effectiveness of the groundwater cleanup efforts.

### La NASA está al corriente del movimiento de compuestos químicos

La NASA, por medio de una serie de pozos de control de agua, ha estado observando el movimiento de los compuestos químicos debajo y alrededor de JPL desde fines de los años 1980. Los compuestos químicos que se hallan en el agua subterránea a grandes profundidades (300 a 1,000 pies debajo de la tierra) se han desplazado más allá de algunos de los pozos de control de agua ubicados en la zona sur dentro del perímetro de JPL.

La NASA está construyendo dos pozos adicionales de control de agua, uno en el área de Woodbury Avenue en Altadena y el otro cerca del Sunset Reservoir. La información obtenida con el control del agua subterránea ayudará a la NASA en su programa de limpieza del agua.

For more information contact



**Merrilee Fellows**

Water Cleanup Outreach Manager OR

818-393-0754

**Steve Slaten**

Remedial Project Manager

818-393-6683

Para más información en español llame a



**Gabriel Romero**

NASA JPL

Teléfono: 818-354-8709



NASA Management Office

4800 Oak Grove Drive  
Pasadena, CA 91109

## For More Information

Documents on JPL groundwater cleanup activities are available for review at the following Information Repositories:

Para más información en español llame a:  
Gabriel Romero  
NASA JPL  
Teléfono: 818-354-8709

**La Cañada Flintridge Public Library**  
4545 Oakwood Ave.  
La Cañada Flintridge, California 91011  
818-790-3330

**Pasadena Central Library**  
285 E. Walnut St.  
Pasadena, California 91101  
626-744-4052

**Altadena Public Library**  
600 E. Mariposa Ave.  
Altadena, California 91001  
626-798-0833

**JPL Repository**  
(JPL Employees Only)  
4800 Oak Grove Dr., Bldg. 111  
818-354-4200

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del Agua