

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
**GENERAL INFORMATION**  
**NASA's CERCLA Site at JPL**  
**Updated – October 2011**

Media Contact:  
Merrilee Fellows  
NASA Manager for Community Involvement  
NASA Management Office (Located at Jet Propulsion Laboratory)  
4800 Oak Grove Drive  
Pasadena, CA 91109  
Telephone: (818) 393-0754  
E-mail: [mfellows@nasa.gov](mailto:mfellows@nasa.gov)

News and information on the NASA groundwater cleanup, including an electronic copy of this general information backgrounder, fact sheets, status reports and images, are available on the NASA groundwater cleanup Website at <http://jplwater.nasa.gov>.

**Contents**

Media Services Information .....	2
Comprehensive Cleanup Overview .....	2
Cleaning Up the Source:	
On-Facility (on JPL) Soil Cleanup.....	3
On-Facility Groundwater Cleanup (beneath JPL).....	3
Cleaning Up Groundwater Offsite (Beyond JPL)	
NASA-funded Treatment for Lincoln Avenue Water Company.....	5
Cleaning Up Groundwater Offsite (Beyond JPL)	
NASA-funded Treatment for the City of Pasadena.....	7
Groundwater Monitoring (Well Water Sampling).....	9

## **Media Services Information**

### **Media Credentialing**

Journalists who wish to access the Jet Propulsion Laboratory for purposes related to NASA's groundwater cleanup should contact NASA Manager for Community Involvement Merrilee Fellows at (818) 393-0754 to arrange for advance credentials. All media representatives must have valid photo identification. Non-U.S. citizens must also bring their passport and visa.

Journalists who hold a JPL press badge must make a separate request to Merrilee Fellows, noted above, to access the Jet Propulsion Laboratory for issues regarding NASA's groundwater cleanup project.

### **Overview of NASA's Comprehensive Groundwater Cleanup Plan**

NASA is committed to cleaning up groundwater affected by chemicals associated with historic waste disposal practices at the Jet Propulsion Laboratory (JPL). NASA's comprehensive three-plant treatment strategy is complete. NASA-funded treatment plants have been successfully removing groundwater chemicals from the source area at JPL and from the farthest reaches of the area affected by the chemicals – at wells operated in Altadena by the Lincoln Avenue Water Company. A new NASA-funded treatment plant on City-owned property adjacent to the Windsor Reservoir in Pasadena is providing groundwater cleanup in the area between the source of the chemicals and the farthest reaches. With that plant now operational, Pasadena Water & Power (PWP) is able to re-open previously-closed water production wells located in the Arroyo Seco and to serve treated water from those wells to its customers.

While NASA takes the lead for environmental investigations and cleanup activities associated with JPL, its work is closely overseen by federal and California regulatory agencies, including the U.S. Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB), Los Angeles Region. The regulatory agencies' roles are spelled out in a Federal Facilities Agreement (FFA) with NASA (<http://jplwater.nasa.gov/NMOWeb/Docs/NAS70753.PDF>). Negotiation of the FFA followed the 1992 listing of the site on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as Superfund. In 1986, the Superfund Amendments and Reauthorization Act (SARA) required federal facilities, such as those owned and/or operated by NASA, to comply with CERCLA. Under CERCLA, NASA must follow certain federal and state regulations and requirements for conducting specific site investigations to define the nature and extent of the chemicals, and conduct appropriate remediation.

Remedial project managers from the EPA, DTSC, and RWQCB communicate frequently with NASA managers to review remedial investigation and cleanup activities as well as plans for future work at the site.

The groundwater chemicals being addressed by NASA are volatile organic compounds (VOCs) and the chemical compound perchlorate. The chemicals originated from long-discontinued liquid and solid waste disposal practices during the 1940s and 1950s when wastes from JPL drains and sinks were disposed of in brick-lined seepage pits – a waste management practice that was common at the time.

### **Cleaning Up the Source – On-Facility (on JPL) Soil**

With the acceptance of a March 2007 final Remedial Action Report by California and federal regulatory agencies, NASA officially completed a major soil cleanup project at JPL.

NASA used a technology called soil vapor extraction (SVE) to remove 230 pounds of carbon tetrachloride and 30 pounds of trichloroethylene (TCE) from the dry soil directly beneath JPL. By removing this source of chemicals, the process also eliminated further chemical movement into the aquifer hundreds of feet below the ground surface.

### **Cleaning Up the Source – On-Facility Groundwater (beneath JPL)**

On-site groundwater treatment is a critical part of the overall cleanup effort, given the fact that chemicals in the groundwater beneath JPL could continue to move offsite if not removed.

NASA's source area groundwater treatment system, located in the north-central section of the 176-acre JPL complex, focuses on an eight-acre by 100-foot-thick portion of the aquifer deep beneath the ground surface. Now operating at its full capacity of up to 300 gallons per minute, the on-site plant – through the end of September 2011 – had removed more than 1,600 pounds of perchlorate from the groundwater beneath JPL and more than 38 pounds of VOCs. The plant uses a fluidized bed reactor system with naturally occurring microorganisms to break down and eliminate perchlorate from the groundwater and a liquid-phase granular activated carbon (LGAC) technology to trap dissolved VOCs for subsequent disposal at licensed off-site facilities.

NASA's strategy to target chemicals at the source is helping to:

- Remove chemicals from groundwater at the source area where the highest levels of the chemicals are found, and
- Prevent further movement of the chemical groundwater plume to reduce the amount of time needed for treatment.

### **Cleaning Up the Source – Quick Facts**

***Timeline:***

- In 2007, NASA officially completed a major soil cleanup project at JPL. Employing a process called soil vapor extraction (SVE), NASA removed 230 pounds of carbon tetrachloride and 30 pounds of trichloroethylene (TCE) from the dry soil directly beneath JPL.
- Source-area groundwater treatment has also progressed at an accelerated rate. An on-site groundwater treatment plant became operational in early 2005, removing perchlorate and VOCs from groundwater at a water treatment rate of about 150 gallons-per-minute (gpm). Two wells were originally being used to extract groundwater, and two wells re-injected clean, treated water into the aquifer hundreds of feet beneath the surface. NASA added a third extraction well and a third injection well in 2007, increasing the water treatment rate to about 300 gpm.

***Technology:***

- The groundwater treatment system at the source area utilizes two technologies, a liquid-phase granular activated carbon (LGAC) system to remove VOCs and a fluidized bed reactor to remove perchlorate. That combination of technologies was pilot-tested on-site and proven to be effective.
- The LGAC treatment technology is a widely utilized system for treatment and removal of VOCs from groundwater. With LGAC, water passes through a tank containing carbon particles. VOCs in the water attach to the carbon particles. After enough VOCs attach to the carbon particles, the carbon is removed and processed at a secure, licensed facility off-site, and fresh carbon is placed in the system.
- NASA selected the perchlorate removal technology, a fluidized bed reactor, after an extensive comparative analysis of the available treatment technologies for perchlorate. The fluidized bed reactor system uses vertical tanks containing a bed of granular activated carbon upon which naturally occurring bacteria can grow. Added nutrients make naturally occurring bacteria multiply. As groundwater flows upward and through the bed, the bacteria destroy the perchlorate.
- After perchlorate and VOCs are removed from the water, the clean water is piped back into the aquifer using three injection wells, uphill and up-gradient on the JPL site, flushing further chemicals towards the extraction wells.
- The groundwater extraction wells are screened so that they draw water at 200-300 feet below ground surface. The re-injection enters the aquifer at approximately 250 feet below ground surface.

## **Cleaning Up Groundwater Offsite (Beyond JPL)**

### **NASA-Funded Treatment for Lincoln Avenue Water Company**

Since 1992, the Lincoln Avenue Water Company (LAWC) has operated a NASA-funded groundwater treatment plant that has been removing VOCs from its two water production wells in Altadena. In 2004, NASA funded the expansion of that plant to begin removing perchlorate from the groundwater. The successful groundwater treatment has enabled LAWC to provide its customers with a continuous supply of drinking water that exceeds all state and federal clean drinking water standards.

The plant is located at the LAWC Olive Street reservoir, and treats water from two wells located at the outer edge of the area where the groundwater chemicals had moved. NASA monitoring wells nearby confirm that the treatment plant has indeed contained the spread of chemicals.

According to NASA Cleanup Project Manager Steve Slaten, "NASA monitoring well data indicate the plant is working effectively. Target chemicals in the NASA monitoring well nearest the LAWC plant have decreased since the LAWC plant operation began. The next monitoring well further southeast of the plant has only had sporadic detections of target chemicals since operation began. These data indicate that there is containment, thanks in large part to the LAWC treatment plant."

Groundwater is treated by the plant at a rate of up to 2,000 gallons per minute (gpm). Through the end of August 2011 more than 767 pounds of perchlorate and 175 pounds of VOCs had been removed from LAWC groundwater.

The LAWC plant uses a state-of-the-art ion exchange technology to remove perchlorate from the groundwater. In ion exchange, a perchlorate-selective resin absorbs or "captures" the perchlorate and removes it from the water to a non-detectable level.

VOCs are removed from the groundwater with the proven and widely utilized liquid-phase granular activated carbon (LGAC) system.

### **NASA-Funded Treatment for Lincoln Avenue Water Company – Quick Facts**

#### ***Timeline:***

- Since 1992, the Lincoln Avenue Water Company (LAWC) has operated a NASA-funded groundwater treatment plant that has been removing VOCs from two LAWC water production wells in Altadena.
- With additional NASA funding, the plant was expanded in 2004 to enable it to remove perchlorate from the groundwater. The expanded plant became operational in July of that year.

- Successful treatment of the groundwater has allowed LAWC to provide its customers with a continuous supply of clean drinking water.

***Technology:***

- The ion exchange technology uses a perchlorate-selective resin to absorb or "capture" the perchlorate and remove it from the water to a non-detectable level.
- A liquid-phase granular activated carbon (LGAC) system removes volatile organic compounds from the groundwater. With LGAC, water passes through a tank containing carbon particles. VOCs in the water attach to the carbon particles. After enough VOCs attach to the carbon particles, the carbon is removed and processed at a secure, licensed facility off-site, and fresh carbon is placed in the system.
- The plant treats water at a rate of up to 2,000 gallons per minute.

## **Cleaning Up Groundwater Offsite (Beyond JPL) NASA-funded Treatment for Pasadena**

A new NASA-funded City of Pasadena groundwater treatment plant went on line in the Spring of 2011. The plant is removing perchlorate and volatile organic compounds (VOCs) from groundwater near four previously closed water production wells located in the Arroyo Seco. NASA funded plant construction and is also covering costs of plant operation. The City of Pasadena is the facility's owner-operator.

At a March 17, 2009 groundbreaking ceremony kicking off plant construction, NASA's Deputy Assistant Administrator for Infrastructure Dr. James W. Wright called construction of the plant a "win-win-win for NASA, for the City of Pasadena, and for its citizens."

"NASA is making good on its commitment to clean up the environment," Dr. Wright said. Emphasizing NASA's extensive effort in involving the community in siting and design of the treatment plant, he said, "Throughout the planning process for this plant, openness and community involvement have been hallmarks of this project. NASA and the City sought to engage the community at virtually every step along the way - from siting the plant, to landscaping, to plant design."

At the groundbreaking Pasadena Mayor Bill Bogaard noted: "NASA and the City of Pasadena have a special and valuable relationship. Working together, we've taken a difficult issue ... and brought about a positive solution." He acknowledged the "green character of this project" and praised NASA and PWP for encouraging what he termed, "the participation and cooperation of the neighborhood." The restoration to the City of water supplies, Mayor Bogaard noted, "represents a very important contribution to water sufficiency in the Pasadena area."

Neighborhood leader Tecumseh Shackelford reinforced the Mayor's comments, telling the groundbreaking ceremony crowd of about 140 that, "NASA and the City listened to the community and to our suggestions regarding design and landscaping and incorporated several of them into the plant. We appreciate their (NASA's and the City's) efforts to reach out to the community."

Also present at the groundbreaking were Keith Takata and Judy C. Huang of the U.S. Environmental Protection Agency (EPA), Pasadena City Councilwoman Jacque Robinson, Pasadena City Councilwoman Margaret McAustin, Pasadena City Manager Michael Beck, Pasadena Water & Power Manager Phyllis Currie, NASA Cleanup Project Manager Steve Slaten and NASA Manager of Community Involvement Merrilee Fellows.

Slaten told the gathering, "With the Pasadena facility, NASA's interim three-plant treatment strategy to clean up the groundwater chemicals from beneath the JPL

and from beneath areas adjacent to JPL is now nearing full execution. Existing NASA-funded treatment plants have been removing significant amounts of groundwater chemicals from the source area and from the farthest reaches of the area affected by the chemicals. This new plant will provide groundwater cleanup in the middle of those two areas."

Fellows later noted, "Like the cleanup project itself, the groundbreaking ceremony spotlighted NASA's relationship with local residents. As construction progresses, NASA will continue to keep the public informed, and more importantly - we'll continue to listen and respond to the public's comments and concerns."

### **NASA-funded Treatment for Pasadena -- Quick Facts:**

#### ***Technology:***

- The Pasadena groundwater treatment plant uses a liquid-phase granular activated carbon (LGAC) system to remove VOCs from groundwater and an ion exchange system to remove perchlorate.
- With LGAC, water passes through a tank containing carbon particles. VOCs in the water attach to the carbon particles. After enough VOCs attach to the carbon particles, the carbon is removed and processed at a secure, licensed facility and fresh carbon is placed in the system.
- The ion exchange technology uses a perchlorate-selective resin to absorb or "capture" the perchlorate and remove it from the water to a non-detectable level.
- The Pasadena plant treats water at a rate of up to 7,000 gallons per minute, sufficient to meet the City's seasonal water supply needs.,

### **GROUNDWATER MONITORING – WELL WATER SAMPLING**

Scientific research is central to NASA's objective to implement a sound and comprehensive cleanup. Using various methods, NASA continually seeks to understand conditions and the extent of chemicals in groundwater. Quarterly groundwater samples are taken from the 25 NASA monitoring wells. NASA uses this information to better understand the complicated groundwater flow conditions and the movement and extent of the groundwater that contains chemicals associated with historic waste disposal practices at JPL. Quarterly results are also placed on the NASA water cleanup website at <http://jplwater.nasa.gov>.

#####