



2012 YEAR in REVIEW

JPL Groundwater - A NASA "Countdown to Cleanup"

This 2012 Year in Review helps meet NASA's ongoing objective to keep the public informed about the progress of groundwater cleanup efforts at and in the vicinity of NASA's Jet Propulsion Laboratory (JPL). The cleanup is permanently removing chemicals from the groundwater (see story on reverse side) and is allowing local communities access to hundreds of thousands of gallons of clean drinking water.

Here is our year in review, as expressed in a **5-4-3-2-1** "countdown to cleanup" format:

FIVE

Earlier this year, we completed and posted to our cleanup Website (<http://go.nasa.gov/WRYq4a>) a **Five-Year Review** that looked at whether the three NASA-funded groundwater treatment systems we've put in place were effectively treating groundwater and whether they are protective of human health and the environment. EPA agreed with NASA that the results of that review show that this interim cleanup strategy is effective. Michael Montgomery, EPA Assistant Director, Federal Facilities and Site Cleanup Branch, wrote in a letter to NASA: "EPA agrees with the findings, conclusions, and recommendations provided in the Report, and concurs with NASA that the interim remedies in place are protective of human health and the environment..." A fact sheet summarizing the Five-Year Review is posted on the Web at <http://go.nasa.gov/WRYMb9>.

FOUR

In conjunction with the new NASA-funded Monk Hill Treatment System (MHTS) and the system's groundwater treatment plant at the Windsor Reservoir, NASA completed the rehabilitation of **four** Pasadena drinking water production wells in 2012. The Arroyo Well, Well 52, Ventura Well, and Windsor Well tap an aquifer beneath the Hahamonga Watershed Park in the Arroyo Seco and had been closed for several years. NASA rehabilitated all four wells by late 2012, and today they are in use by Pasadena Water & Power (PWP), restoring thousands of gallons of clean water to the City's supply.

THREE

In 2012, all **three** NASA-funded treatment plants designed to remove chemicals from groundwater beneath JPL and beneath areas adjacent to JPL were operating at capacity.

Source Area Treatment System

Since system startup, NASA's Source Area Treatment System – on JPL property – has reduced chemical concentration levels by more than 90 percent, according to groundwater monitoring well data. From system startup to the end of 2012, 1,710 pounds of perchlorate and 41 pounds of VOCs have been removed from groundwater beneath JPL. Perchlorate at this treatment site is removed from the source area groundwater using a fluidized bed reactor system with naturally-occurring microorganisms that break down the chemical compound into harmless byproducts. VOCs in the source area groundwater are removed using a liquid-phase granular activated carbon (LGAC) system.



Shown above are two senior NASA officials, Olga Dominguez, Assistant Administrator, Office of Strategic Infrastructure (second from left) and Dr. Woodrow Whitlow, Jr., (second from right), Associate NASA Administrator for Mission Support, who visited JPL in late 2012 and talked about the groundwater cleanup project with Lincoln Avenue Water Company General Manager Bob Hayward (far left) and Groundwater Cleanup Project Manager Steve Slaten (far right).

Groundwater Chemicals Being Addressed

The groundwater chemicals being addressed by NASA's cleanup are volatile organic compounds (VOCs) and perchlorate. These 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.

Most of the VOCs that affected the JPL groundwater came from cleaning fluids and degreasers used on rocket engines being tested at the site more than a half-century ago. Perchlorate is both a naturally occurring and manmade contaminant found in groundwater, surface water and soil. Most perchlorate manufactured in the U.S. is used as an ingredient in solid fuel for rockets and missiles. In addition, perchlorate-based chemicals are also used in the construction of highway safety flares, fireworks, pyrotechnics, explosives, common batteries, and automobile restraint systems.

Perchlorate contamination has been reported in at least 20 states, according to the California Department of Toxic Substances Control (DTSC).

Monk Hill Treatment System (MHTS)

Located at roughly the mid-point of the area affected by chemicals originating at JPL, the MHTS can treat groundwater at a rate as high as 7,000 gallons per minute (gpm). The system began operations in early 2011. Perchlorate is removed at the MHTS using ion exchange technology, and – similar to the Source Area Treatment System – LGAC is used to remove VOCs in MHTS groundwater. Following the LGAC carbon filter process, the water is pumped into the Windsor Reservoir, where it is then available for the City of Pasadena to use. To date, 538 pounds of perchlorate and 47 pounds of VOCs have been removed from the groundwater by the MHTS.

Lincoln Avenue Water Company (LAWC) System

The NASA-funded LAWC system treats water pumped from two LAWC production wells at a rate of 2,000 gpm. A NASA-funded LGAC system has effectively removed VOCs from groundwater near the wells since the early 1990s. A NASA-funded addition to the plant has effectively removed perchlorate from the groundwater since July 2004, using ion exchange technology. In all, since system startup, a total of 958 pounds of perchlorate and 199 pounds of VOCs has been removed from LAWC groundwater.

TWO

In 2012, **two** communities – **Pasadena and Altadena** – were enjoying restored water resources thanks to the NASA cleanup. On the **Pasadena Water & Power (PWP)** Website, the “Frequently Asked Question,” “Is my tap water safe to drink?” is answered in this fashion: “Yes! The MHTS has been carefully designed and evaluated to ensure that the water produced by the treatment plant does not contain any perchlorate or VOCs. In addition, PWP conducts extensive testing of the water as required by CDPH [the California Department of Public Health]. PWP prepares an annual water quality report summarizing the results of the mandated testing that is performed throughout the year.” Those annual reports can be accessed at: <http://ww2.cityofpasadena.net/waterandpower/waterquality/>.

The LAWC serves customers in west **Altadena** and is the oldest local water company in the area. Its two drinking water production wells are at the leading edge of the area of groundwater chemicals that originated at JPL, according to data from an extensive NASA groundwater monitoring network. That network consists of 26 well sites, most with the ability to sample groundwater at different screening depths; it provides NASA with a total of 82 monitoring locations.

ONE

NASA's **number one** goal continues to be the complete cleanup of chemicals associated with historic practices at JPL. According to NASA Groundwater Cleanup Project Manager Steve Slaten, “We continued to make excellent progress in 2012 toward restoring valuable water resources to the community and fulfilling our commitment to take responsibility for the cleanup. That progress and our commitment will continue into the future until our cleanup goal is met.”

For information, contact

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