



2024 YEAR IN REVIEW

NASA GROUNDWATER CLEANUP PROJECT

This year in review is part of NASA's ongoing efforts to keep the community informed about NASA's progress in cleaning up groundwater at and in the vicinity of the Jet Propulsion Laboratory. Investigation and cleanup efforts are conducted under the Federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly known as Superfund. The groundwater chemicals being addressed are volatile organic compounds (VOCs), the chemical compound perchlorate, and per- and polyfluoroalkyl substances (PFAS) that were recently added by the US Environmental Protection Agency (EPA) to be investigated under CERCLA.

NASA is the lead agency for all investigation and cleanup activities. All work is overseen by the following federal and state agencies:

- U.S. Environmental Protection Agency (EPA),
- California Department of Toxic Substances Control (DTSC), and the
- Regional Water Quality Control Board (RWQCB), Los Angeles Region.

PROGRESS CONTINUES IN 2024 ON GROUNDWATER CLEANUP

The ongoing removal of unwanted chemicals from groundwater made steady progress in 2024 at three NASA-funded treatment plants. One plant is located on JPL property, another in Altadena is operated by the Lincoln Avenue Water Company (LAWC) at the leading edge of the affected groundwater, and a third plant in the Arroyo Seco is operated by the City of Pasadena. All three systems utilize liquid-phase granular activated carbon (LGAC) technology to remove VOCs and ion exchange (IX) technology to remove perchlorate. Cleanup efforts continue as described in NASA's 2018 Record of Decision (ROD). NASA is committed to continuing the cleanup until treatment objectives — as outlined in the ROD — are achieved. The ROD was approved by federal and state government agencies as the best approach to reach the cleanup goals and to maintain protection of human health and the environment. Details are described below.

Together, the two off-site treatment systems are performing effectively, preventing migration of the chemicals originating from JPL, and allowing the treated water to be disinfected and safely used by Pasadena and LAWC for drinking water.

The "Source Area" Groundwater Cleanup Continued Without a Hitch

In 2024, the source area treatment system at JPL continued to operate effectively. The system has removed more than 2,246 lbs. of perchlorate and more than 50.5 lbs. of volatile organic compounds (VOCs) since startup in January 2005. The total amount of unwanted chemicals in groundwater beneath JPL has been reduced by more than 97 percent.

While chemical removal has been significant, removing the increasingly lower levels of contaminants to achieve cleanup goals is challenging. This is because it takes a long time to flush enough water through the aquifer to achieve the very low (i.e., in the parts-per-billion concentration) cleanup goals.

Continued operation of the system to achieve cleanup goals in groundwater is expected to take another five to ten years.

Groundwater Cleanup Progress in the Arroyo Seco

The NASA-funded Monk Hill Treatment System (MHTS) currently consists of four City of Pasadena drinking water wells in the Arroyo Seco and a treatment plant located on Windsor Avenue. As with LAWC earlier, NASA is also supporting an enhancement to this system. In October 2024, Pasadena Water and Power (PWP) began construction of "Explorer Well," a fifth drinking water well located in the northern portion of the Arroyo. This new Explorer Well is being constructed by PWP and funded by NASA. It will enhance the groundwater cleanup, supplement Pasadena water production in the Arroyo Seco, and expedite the cleanup project. In 2024, PWP completed all necessary environmental reviews and permits required for the

Progress Also Continued at LAWC Wells in Altadena With Cleanup at the Outer Edges of the Affected Area

The Lincoln Avenue Water Company (LAWC) system treats groundwater extracted from three NASA-funded drinking water wells located at the leading edge of affected groundwater. The third of those wells was installed in 2017 and has been running near-continuously since then. As the deepest of the three, it has become the primary means of containment of the leading edge of affected groundwater. The LAWC system ensures that chemicals in groundwater do not migrate further in the aquifer. In all, the system has now removed more than 1,461 pounds of perchlorate and more than 361 pounds of VOCs since startup in 2004. Chemical concentrations in the LAWC groundwater have been reduced by more than 92 percent.

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Reflections on Two Decades of Cleanup Work From NASA's Groundwater Cleanup Project Manager...

Steve Slaten recently reflected on NASA's cleanup efforts over the more than 20 years he has served as NASA's Groundwater Cleanup Project Manager. He spoke about the importance of the role of the various agencies that oversee all aspects of the groundwater cleanup project and stakeholders engaged in the project.

"Investigation and cleanup under CERCLA is a long process, and NASA remains committed to meeting our cleanup goals. We have also worked hard to have a NASA team committed to working with our federal and state partners. As I reflect on the many years I have served as NASA's lead for the project, I want to say thank you to our partners at EPA Region 9, the Department of Toxic Substances Control (DTSC), and the Regional Water Quality Control Board (RWQCB), as well as the Lincoln Avenue Water Company (LAWC), and Pasadena Water and Power (PWP) with whom we have worked for the last two decades. The individuals involved over the years from these agencies along with other stakeholders have been great to work with and have contributed significantly to the success of the project. We all also understand the importance of keeping the community informed, and NASA pledges to continue to do so. It is definitely reassuring when agencies and stakeholders can work together to make a real difference in protecting the public and restoring the environment."

Explorer Well and began construction. The new well will be operational in late 2025. For information or questions about the NASA-funded Explorer Well project, contact PWP Engineer Johnathan Giang at PWPEXplorerWell@CityOfPasadena.net.

Since system startup in 2011, the MHTS has removed more than 1,524 pounds of perchlorate from groundwater and more than 258 pounds of VOCs. Chemical levels in groundwater extracted by the MHTS in the Arroyo have been reduced by more than 94 percent.

PFAS INVESTIGATIONS CONTINUED IN 2024

Since 2019, NASA has been proactively investigating PFAS at JPL using the environmental investigation framework under CERCLA to understand the historical use, storage, and possible release of PFAS-containing materials to the environment. Results from a preliminary assessment at JPL identified potential PFAS source areas where PFAS-containing material may have been used and disposed of.

When EPA designated two PFAS as hazardous substances in August 2022, the PFAS investigation at JPL was added as part of NASA JPL's CERCLA groundwater cleanup program. Since then, NASA has continued its PFAS investigation, performing further groundwater and soil sampling. In 2024, NASA sampled monitoring wells within and near JPL, taking advantage of rains that had replenished some previously dry wells. The groundwater report and its recommendations were submitted to regulators in late October. The report indicated PFAS were present at concentrations slightly above the new EPA Maximum Contaminant Levels (MCLs) (see below) in some monitoring wells. The report also noted that the treatment systems in place can effectively remove PFAS in groundwater to below the newly established drinking water standards.

TREATMENT SYSTEMS IN PLACE REMAIN EFFECTIVE

The two technologies in use at the three NASA-funded treatment plants - LGAC and IX – are proven technologies that are successfully removing the chemicals of concern needed for cleanup. Importantly, these technologies have also been shown to be effective in removing certain PFAS from groundwater.

In April 2024, the EPA, under the Safe Drinking Water Act, established a national, legally enforceable drinking water standard as outlined in the agency's PFAS Strategic Roadmap for five individual PFAS and others that occur as mixtures. The limits are known as maximum containment levels (MCLs) - the highest level of PFAS that is allowed in drinking water. The MCL is set to be protective of human health.

The new federal drinking water regulation requires all public water suppliers to determine whether PFAS is in their drinking water by testing for 29 PFAS, and to take action to notify consumers if MCLs are exceeded as soon as practicable but no later than 30 days after learning of the exceedance. The rule also requires water suppliers to reduce PFAS levels to below the drinking water standard by 2029. States can develop their own standard, but they cannot be less protective of human health than the federal levels.

The State Water Resources Control Board oversees drinking water in California. PFAS have not been detected above California state notification levels in the MHTS in Pasadena nor in the LAWC system.

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CONTINUED GROUNDWATER MONITORING

With 25 monitoring wells on and in the vicinity of JPL, NASA continues to demonstrate that the treatment systems in place are effective in addressing the groundwater chemicals in the affected groundwater. Quarterly monitoring reports for 2024 continued to be filed and are posted at the groundwater cleanup website. The most recent quarterly testing was completed in early December. NASA also continued weekly monitoring of perchlorate levels in wells at the nearby Rubio Cañon Land and Water Association (RCLWA).

Several of the monitoring wells are multi-level helping to understand the distribution of chemicals in groundwater throughout the entire depth of the aquifer. Precipitation over the past two years has helped reverse declining water levels in the basin associated with the ongoing drought. Even with the rain events over the past two years, drought impacts on the local aquifer continue to be a concern to local water purveyors and NASA. NASA is working with water purveyors to ensure containment and treatment of chemicals in groundwater near JPL continue. These wells can also be used to monitor for PFAS.

COMMUNITY OUTREACH

NASA remains committed to ongoing open communication in all groundwater cleanup activities at JPL, and community outreach remains a cornerstone of the program. While infrequent, NASA responds to any stakeholder questions or concerns, including when people are new to the area and may have questions about the cleanup. NASA also offers Project updates and presentations to interested groups and stakeholders.

During 2024, NASA specific community outreach activities included the following:

2023 Year-in-Review was posted to the CERCLA Project website,

Presentations were made to community groups and other organizations;

NASA hosted several site visits during the year;

Continued maintenance of the CERCLA Project website including: updates, software/programming/security updates, and posting of other content (e.g., updates on PFAS investigations and regulatory changes);

Completed and posted to the CERCLA website the 2023 Annual Institutional Controls (IC) Report. The final Record of Decision requires an annual IC report to ensure the effectiveness of ongoing groundwater treatment and a discussion of actions taken to prevent exposure to impacted groundwater at JPL and in neighboring areas;

Responded to several community questions; and

Supported area students researching the JPL CERCLA cleanup program.

For additional information on NASA activities during 2024, or for general background information regarding the CERCLA Groundwater Project, please see the project website at <https://jplwater.nasa.gov> or contact:

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