



Per- and Polyfluoroalkyl Substances (PFAS) JET PROPULSION LABORATORY

This information sheet explains per-and polyfluoroalkyl substances (PFAS) and describes the steps NASA is taking to assess PFAS at the Jet Propulsion Laboratory.

What are PFAS?

PFAS is an umbrella term for thousands of synthetic fluorinated chemicals.

PFAS have been widely used because they repel water, stains, and oil.

Everyday products may contain PFAS such as non-stick cookware, outdoor clothing, fabrics, carpets, and paper packaging for food.

Firefighters and the military use aqueous film-forming foams (AFFF) that contain PFAS used to put out the kinds of fires that occur at airfields and on naval vessels.

PFAS are not naturally occurring. PFAS were manufactured in the United States from 1940 and phased out by 2002.

The characteristics that make PFAS compounds effective for so many uses also prevent them from breaking down in the environment. These substances may remain in air, soil, surface water, and groundwater and they can be transported distances from the source.

Assessing PFAS at JPL

NASA is committed to understanding and addressing PFAS at the Jet Propulsion Laboratory. These assessment activities began in 2019 to understand historical use, storage, and possible release of PFAS-containing materials to the environment. Records were reviewed, interviews were conducted with key personnel having experience with operations at JPL, on-site observations were made, and localized sampling was initiated. This information was evaluated, and five locations were identified as potential PFAS source areas at JPL. They include an area where AFFF was historically stored and released, and four areas where PFAS-containing material may have been used and disposed of. Based on these initial findings, further assessment is underway, and sampling of potential release areas is in process.



Additional field sampling activities are underway at JPL.

Keeping Pace

Currently there are no federal standards for PFAS though much is changing. In May 2022, the United States Environmental Protection Agency (EPA) issued regional screening levels (RSLs) for five PFAS compounds. There are now RSLs for six PFAS. These screening levels help determine when further assessment is needed. If the levels of PFAS in environmental media (groundwater, soil, etc.) are above the screening level, further evaluation is necessary. NASA's additional sampling efforts are using these new RSLs to evaluate PFAS levels. NASA's investigation at JPL is an iterative process, where each step builds on results of the previous activities, and as such NASA is also re-evaluating previously collected data using the new RSLs to determine next steps.

In August 2022, EPA proposed to designate two PFAS compounds as hazardous substances. Hazardous substances are regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Previously, PFAS assessment activities at JPL began as a part of a NASA-wide proactive approach to understand and address these emerging contaminants using existing frameworks for other environmental investigations such as those conducted under CERCLA. Following the proposed designation, EPA requested the PFAS investigation be considered part of NASA's CERCLA cleanup program at JPL. NASA is in process of moving PFAS related documents to the Administrative Record and the NASA CERCLA Program website.

C O N T I N U E D

Sources of PFAS Exposure

Humans and animals can be exposed to PFAS through ingestion by eating food grown in contaminated soil or fish from contaminated water, or through transfer from cookware, food processing, and some food packaging. Exposure can come from inhaling PFAS in dust, or from skin contact. Drinking water is considered a primary source of exposure to PFAS. With repeated exposure, PFAS can build up in the body over time. Most people in the US have been exposed to PFAS and have some levels in their blood. Historically, those who have worked in manufacturing or with AFFF have shown to have higher levels than the general population.

Human Health Effects

Research on health effects is ongoing. The PFAS Toxicology Profile published in 2021 by the Agency of Toxic Substances and Disease Registry (ATSDR) summarizes the available health studies associated with PFAS.

Ongoing Monitoring and Existing Treatment Capabilities

Two technologies that have been shown to be effective in removing certain PFAS compounds from groundwater are liquid granular activated carbon (LGAC) and ion exchange (IX). Both technologies are already in place at three NASA-funded groundwater treatment plants: one located on JPL property; another in Altadena operated by the Lincoln Avenue Water Company (LAWC); and a third plant operated by the City of Pasadena. These technologies have been effectively removing perchlorate and VOCs from groundwater as part of NASA's CERCLA groundwater cleanup program at JPL. NASA's 25 monitoring wells on and in the vicinity of JPL are effective in detecting chemicals in groundwater. NASA routinely samples for chemicals and PFAS levels will be evaluated in a number of monitoring wells later this year. Quarterly monitoring reports are posted to the JPL CERCLA Program website.

The treatment systems enable LAWC and the City of Pasadena to provide their customers with a continuous supply of drinking water that meets all State and federal clean drinking water standards.



Ion exchange (IX) effectively removes PFAS from groundwater. IX is already in place at three NASA-funded groundwater treatment plants.

PFAS and Drinking Water

NASA continues to monitor EPA's work on PFAS as well as guidance from other federal and state health and environmental agencies. Currently, there are no drinking water standards for any PFAS. In June 2022, EPA released interim health advisories for PFOS (perfluorooctane sulfonate) and PFOA (perfluorooctanoic acids); and final health advisories for PFBS (perfluorobutanesulfonic acid) and GenX chemicals (alternatives to PFOA). Health advisories identify the PFAS levels in drinking water to protect all people, including the most sensitive populations, from adverse health effects resulting from a lifetime of exposure. Health advisories give state agencies and public water suppliers who have primary responsibility for overseeing drinking water systems, information on health risks so they can take appropriate action to reduce potential exposures. Establishing health advisories is one step in a process to propose and ultimately set a drinking water standard, which EPA anticipates doing in the fall of 2023.

Until national drinking water standards are established, EPA includes PFAS on its list of unregulated contaminants to be monitored by public water systems. Under the fifth Unregulated Contaminant Monitoring Rule (UCMR 5), water purveyors will collect data between 2023 and 2025 to improve EPA's understanding of the frequency that 29 PFAS (and lithium) are found in the nation's drinking water systems and at what levels.

California is one of several states that are currently developing limits for PFAS exposure. Since January 2020, the Regional Water Quality Control Board (AB 756) has required California drinking water suppliers to monitor for PFAS and to take the water source out of service OR provide public notification within 30 days of detection if PFAS levels are greater than the health advisory limit. PFAS have not been detected above State notification levels in the Monk Hill Treatment System in Pasadena or the Lincoln Avenue Water Company wells.

C O N T I N U E D

NASA remains committed to communicating about PFAS investigation activities and we will continue to share information about the progress being made at JPL.

Next Steps

Additional field activities are planned in late 2022 at JPL when additional groundwater and soil samples will be collected and analyzed. NASA is committed to implementing the PFAS investigation at JPL based on the latest scientific information and regulatory guidance available. There are currently EPA-approved analytical methods for 29 unique PFAS in drinking water with that number likely to expand as new EPA-approved methods and certified laboratories become available. New samples collected will be evaluated, and previously gathered data are being re-evaluated, guided by EPA's new health advisories and regional screening levels. Results will determine any next steps for investigation.

Keeping People Informed

NASA remains committed to communicating about PFAS investigation activities and we will continue to share information about the progress being made at JPL. Updates like this will be distributed periodically and information will be posted to NASA CERCLA Program website.

Links to additional PFAS resources

<https://www.epa.gov/newsreleases/epa-adds-five-pfas-chemicals-list-regional-screening-and-removal-management-levels>

https://www.epa.gov/system/files/documents/2021-10/pfas-roadmap_final-508.pdf

<https://www.epa.gov/sdwa/drinking-water-health-advisories-genx-chemicals-and-pfbs>

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