



Intel Chemical of the Month MAY 2024

PFAS Per- and Poly- Fluoroalkyl Substances

Forever Chemicals

PFAS is an acronym that encompasses several thousand chemicals that contain fluorines linked to carbon atoms. The chemical bonds that exist within PFAS are so strong that they cannot be broken by currently available methods and thus are commonly known as “forever chemicals” that will last for hundreds or even thousands of years in the ground, water and atmosphere. They pose serious risks to human health (see below) and some are known to build up (bioaccumulate) in humans and wild and domestic animals. Many are powerful greenhouse gasses.

Uses

PFAS are essential to semiconductor/microprocessor/computer chip production. Like other similar companies, Intel New Mexico uses or has used several PFAS that we know about including carbon tetrafluoride, carbonyl fluoride (aka fluorophosgene), dichlorofluoromethane, dichlorotrifluoroethane, hexafluoroethane, and perfluorohexane. These PFAS are included in Intel’s waste streams that are directed to thermal oxidizers, but unlike a lot of other chemicals, they are not destroyed by incineration but emerge from the stacks intact.

Following is material from an EPA website that further describes PFAS and the risks they pose to human health.

Health and Environmental Risks

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ARE A GROUP OF MANUFACTURED CHEMICALS

PFAS are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s because of their useful properties. There are thousands of different PFAS, some of which have been more widely used and studied than others.

Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS), for example, are two of the most widely used and studied chemicals in the PFAS group. PFOA and PFOS have been replaced in the United States with other PFAS in recent years.

One common characteristic of concern of PFAS is that many break down very slowly and can build up in people, animals, and the environment over time.

PFAS CAN BE FOUND IN MANY PLACES

PFAS can be present in our water, soil, air, and food as well as in materials found in our homes or workplaces, including:

- **Drinking water** — in public drinking water systems and private drinking water wells.
- **Soil and water at or near waste sites** — at landfills, disposal sites, and hazardous waste sites such as those that fall under the federal Superfund and Resource Conservation and Recovery Act programs.
- **Fire extinguishing foam** — in aqueous film-forming foams (or AFFFs) used to extinguish flammable liquid-based fires. Such foams are used in training and emergency response events at airports, shipyards, military bases, firefighting training facilities, chemical plants, and refineries.
- **Manufacturing or chemical production facilities that produce or use PFAS** — for example at chrome plating, electronics, and certain textile and paper manufacturers.
- **Food** — for example in fish caught from water contaminated by PFAS and dairy products from livestock exposed to PFAS.
- **Food packaging** — for example in grease-resistant paper, fast food containers/wrappers, microwave popcorn bags, pizza boxes, and candy wrappers.
- **Household products and dust** — for example in stain and water-repellent used on carpets, upholstery, clothing, and other fabrics; cleaning products; non-stick cookware; paints, varnishes, and sealants.
- **Personal care products** — for example in certain shampoo, dental floss, and cosmetics.
- **Biosolids** — for example fertilizer from wastewater treatment plants that is used on agricultural lands can affect ground and surface water and animals that graze on the land.

Exposure to PFAS

PEOPLE CAN BE EXPOSED TO PFAS IN A VARIETY OF WAYS

Due to their widespread production and use, as well as their ability to move and persist in the environment, surveys conducted by the Centers for Disease Control and Prevention (CDC) show that most people in the United States have been exposed to some PFAS. Most known exposures are relatively low, but some can be high, particularly when people are exposed to a concentrated source over long periods of time. Some PFAS chemicals can accumulate in the body over time.

Current research has shown that people can be exposed to PFAS by:

- Working in occupations such as firefighting or chemicals manufacturing and processing
- Drinking water contaminated with PFAS
- Eating certain foods that may contain PFAS, including fish
- Swallowing contaminated soil or dust
- Breathing air containing PFAS
- Using products made with PFAS or that are packaged in materials containing PFAS.

PFAS EXPOSURE MAY BE HARMFUL TO HUMAN HEALTH

Current scientific research suggests that exposure to certain PFAS may lead to adverse health outcomes. However, research is still ongoing to determine how different levels of exposure to different PFAS can lead to a variety of health effects. Research is also underway to better understand the health effects associated with low levels of exposure to PFAS over long periods of time, especially in children.

What We Know about Health Effects

Current peer-reviewed scientific studies have shown that exposure to certain levels of PFAS may lead to:

- Reproductive effects such as decreased fertility or increased high blood pressure in pregnant women
- Developmental effects or delays in children, including low birth weight, accelerated puberty, bone variations, or behavioral changes
- Increased risk of some cancers, including prostate, kidney, and testicular cancers
- Reduced ability of the body's immune system to fight infections, including reduced vaccine response
- Interference with the body's natural hormones
- Increased cholesterol levels and/or risk of obesity.

Additional Health Effects are Difficult to Determine

Scientists at EPA, in other federal agencies, and in academia and industry are continuing to conduct and review the growing body of research about PFAS. However, health effects associated with exposure to PFAS are difficult to specify for many reasons, such as:

- There are thousands of PFAS with potentially varying effects and toxicity levels, yet most studies focus on a limited number of better known PFAS compounds.
- People can be exposed to PFAS in different ways and at different stages of their life.

- The types and uses of PFAS change over time, which makes it challenging to track and assess how exposure to these chemicals occurs and how they will affect human health.

CERTAIN PEOPLE MAY HAVE HIGHER EXPOSURE TO PFAS

Adults

Some people have higher exposures to PFAS than others because of their occupations or where they live. For example:

- Industrial workers who are involved in making or processing PFAS or PFAS-containing materials, or people who live or recreate near PFAS-producing facilities, may have greater exposure to PFAS.
- Pregnant and lactating women tend to drink more water per pound of body weight than the average person and as a result they may have higher PFAS exposure compared to other people if it is present in their drinking water.

Children

Because children are still developing, they may be more sensitive to the harmful effects of chemicals such as PFAS.

They can also be exposed more than adults because:

- Children drink more water, eat more food, and breathe more air per pound of body weight than adults, which can increase their exposure to PFAS.
- Young children crawl on floors and put things in their mouths which leads to a higher risk of exposure to PFAS in carpets, household dust, toys, and cleaning products.

Breast milk from mothers with PFAS in their blood and formula made with water containing PFAS can expose infants to PFAS, and it may also be possible for children to be exposed in utero during pregnancy. Scientists continue to do research in this area. Based on current science, the benefits of breastfeeding appear to outweigh the risks for infants exposed to PFAS in breast milk [<https://www.atsdr.cdc.gov/pfas/health-effects/exposure.html>]. To weigh the risks and benefits of breastfeeding, mothers should contact their doctors.