CHE Collaborative for Health & Environment

Webinar Highlights

Outside the Safe Operating Space of a PFAS Planetary Boundary

Recent research indicates that the safe planetary boundary for PFAS has been exceeded. In this webinar, Dr. Ian Cousins discussed the concept of planetary boundaries and his research comparing the levels of four selected perfluoroalkyl acids (PFOS, PFOA, PFHxS, and PFNA) in global rainwater, soils, and surface waters with recently proposed health guidelines set forth by US and European government officials. These comparisons indicate that the health guidelines have been exceeded around the globe, due to the atmospheric deposition of PFAS.

Ian Cousins, PhD, Associate Editor of Environmental Science and Technology, speaking October 06, 2022.

This fact sheet has been created by CHE based on information presented in an EDC Strategies Partnership webinar. Selected quotes in bold are from the webinar speaker(s). For the full set of resources provided by the webinar presenters, see the webinar page, where you'll also find associated Slides & Resources.

The Problem

The planetary boundary concept establishes guidelines for a "safe operating space" for humanity. When environmental impacts extend beyond those boundaries, we are at risk of triggering catastrophic, irreversible environmental changes. Recent findings suggest that we have exceeded the planetary boundary for global PFAS contamination.

- PFAS are highly persistent chemicals. Some long-chain PFAS have already been phased out, but are not declining notably in the atmosphere. **"Once they are spread...there's nothing you can do."**
- Humans are exposed to PFAS in the environment through contaminated food, household dust, air, and drinking water.
- Continual release results in global spread, increasing levels, and increasing probabilities of known and unknown effects.

- Exposure is difficult to reverse. **"You can't easily reverse the contamination or the exposure."**
- Use of PFAS follows a familiar pattern seen with other persistent, toxic chemicals (such as DDT, PCBs, and CFCs). The chemicals are used for decades before being banned. After finally being banned, the chemicals persist and continue to have negative health impacts.
- U.S. Environmental Protection Agency (EPA) guidelines are based on immunotoxicity. Emerging evidence shows that PFAS harm our immune systems. **"Reduced effectiveness of vaccines in children is driving these guidelines."**
- As we learn more about PFAS toxicity, health guidelines become more stringent.
- Levels of PFAS in surface waters and soils often exceed safety guidelines.
- Rain becomes contaminated by PFAS through three pathways:
    - Emissions from polymer manufacturing;
    - Precursor chemicals degrading into the air; and
    - "Toxic boomerang effect." PFAS in the ocean get back into the air through sea spray. As PFAS cycle in the global hydrosphere, coastal water resources are especially threatened.

Key finding: Everywhere on the planet – from the Tibetan plateau to the coast of Antarctica – PFOA levels in rainwater are higher than US EPA drinking water guidelines.

Recommendations

- Rapidly restrict the uses and emissions of PFAS. By the time the full impacts of these chemicals are understood, it will be too late to protect our food and water.
- Beware of other, substitute PFAS. Substituting known persistent chemicals with less-understood ones is not a solution.
- Learn from the mistakes made with other persistent chemicals. Let's finally understand the problems with highly persistent, manufactured substances.

To Find Out More

- Watch the October 06, 2022 webinar: Outside the Safe Operating Space of a PFAS Planetary Boundary

- View the webinar slides: https://www.healthandenvironment.org/assets/images/CHE%20Ian%20Cousins%2006102022.pptx
- Read the paper: Outside the Safe Operating Space of a New Planetary Boundary for Per- and Polyfluoroalkyl Substances (PFAS)

About the Speaker

Ian Cousins, PhD, has worked at the Department of Environmental Science at Stockholm University since 2002. His research comprises a combination of experimental and modeling approaches to investigate the sources, transport, fate and exposure of contaminants. For the last 20 years, he has conducted research on per- and polyfluoroalkyl substances (PFAS) and works closely with analytical chemists in his department to better understand the environmental behavior of these contaminants. Prof. Cousins has published more than 170 peer-reviewed articles and eight book chapters. He was designated as a Highly Cited Researcher in 2018 and 2020. In 2020, Prof. Cousins kicked off the PERFORCE3 project, which is a Europe-wide multi-partner doctoral research training programme in the field of PFAS that he coordinates. He recently became an Associate Editor of Environmental Science and Technology. Prof. Cousins' website: https://www.aces.su.se/staff/ian-cousins/