Webinar Highlights

Ultrashort-Chain PFAS: The global threat of trifluoroacetic acid

Trifluoroacetic acid (TFA) is one of the ultrashort-chain perfluoroalkyl acids, a subset of the larger family of per- and polyfluoroalkyl substances (PFAS). TFA is a degradation product of many refrigerants (and other chemicals) and is also directly released from industrial products and processes.

In this webinar, **Dr. Hans Peter Arp** discussed a new study, The Global Threat from the Irreversible Accumulation of Trifluoroacetic Acid (TFA). This study reviewed 43 studies reporting on TFA concentrations. Monitoring data was analyzed based on research spanning from the late 1990s to the 2020s. These data indicate that TFA exposure is widespread and increasing. This raises serious concerns about global health and environmental impacts.

Featured Speaker: Hans Peter H. Arp, PhD, Professor at the Norwegian University of Science and Technology and Norwegian Geotechnical Institute, speaking February 19, 2025.

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The Problem

TFA is produced by many industrial products and processes. It is made intentionally but is also a degradation product. Sources of TFA include:

- Refrigerants and blowing agents (such as hydrofluorocarbons and F-gases)
- Agricultural chemicals (including fluenacet, oxyfluorfen, trifluralin, and fluometuron)
- Pharmaceuticals (including prozac, flecainide, and bicalutamide)
- PFAS production and products
- PFAS remediation (enhanced degradation techniques used to remove PFAS from water can lead to TFA formation)

There are no natural sources of TFA. As the study notes, "TFA is by far the most abundant PFAS in the environment." It can be found in many plants, including crops. From Arctic ice cores to the leaves of trees, levels of TFA are increasing. It is highly mobile and moves with the water cycle.

"It will go wherever the water flows."

Shorter-chain PFAS like TFA have been assumed to be less hazardous than longer-chain PFAS. However, because TFA exposure is so widespread, we are chronically exposed at levels higher than other PFAS. While the full effects of TFA on health are not yet known, early research suggests that there is cause for serious concern. Animal studies have shown TFA to have liver toxicity and indicate possible harmful impacts on the development of embryos in humans and mammals.

The study authors make the case that TFA poses a planetary boundary threat, based on increasing exposure world-wide, irreversible environmental contamination, and "long-lasting disruptive effects on human health and vital earth system processes."

Because TFA is so persistent and mobile, we cannot afford to wait until the health impacts are fully understood to take action.

Recommendations

Arp stressed the need for binding actions to reduce emissions of TFA and its precursors. There are several steps we can take:

- Transition to PFAS-free and TFA-free alternatives, starting with the TFA precursors that are being produced in the greatest volume:
    - Switch to alternatives to F-gases that are used as refrigerants and blowing agents.
    - Phase out and restrict the use of PFAS.
    - Phase out or find safer alternatives to TFA precursor pesticides and pharmaceuticals.
- Classify and label TFA as a PFAS. Regulate TFA like other PFAS.
- Remove TFA from active emission sources, ideally via the polluter pays principle.

To Find Out More

- Watch the February 19, 2025 webinar: [Ultrashort-Chain PFAS: The global threat of trifluoroacetic acid]
- Read the presentation slides: [Ultrashort-Chain PFAS: The global threat of trifluoroacetic acid]

About the Speaker

Hans Peter H. Arp, PhD is a Professor at the Norwegian University of Science and Technology and Norwegian Geotechnical Institute. His research interests are at the intersection of fundamental and applied aspects of environmental pollution. On the fundamental level, he is interested in how different types of pollutants, such as microplastics, PFAS, PAHs, POPs, and metals behave in the environment. On the applied level, he uses this fundamental knowledge to design solutions within the context of emerging technologies and policy mechanisms, such as REACH and the circular economy, to create a zero pollution society. His current research projects include ARAGORN, which seeks to provide guidance for remediating and restoring contaminated soil using co-creative, sustainable approaches, and ZeroPM (Zero Pollution of Persistent, Mobile Substances), which involves 16 institutes across Europe identifying ways to prevent, prioritize, and remove pollution of mobile PFAS, TFA, and other persistent, mobile and toxic (PMT) substances.