IMPACT OF EMERGING CONTAMINANTS IN OUR WATER SUPPLY

NEWLY DISCOVERED CHEMICALS IN THE WATER SUPPLY ARE BECOMING OF INCREASING IMPORTANCE DUE TO THEIR UNKNOWN EFFECTS ON THE ENVIRONMENT AND HUMAN HEALTH. IDENTIFICATION AND RISK ASSESSMENT IS REQUIRED TO MEASURE THE POTENTIAL DANGERS OF THESE CHEMICALS IN THE WATER.

WHAT ARE EMERGING CONTAMINANTS?

Any synthetic or naturally occurring chemical not commonly perceived in the environment. The presence of emerging contaminants in the environment may cause known or suspected adverse ecological and/or human health effects.

CHEMICAL CLASSES FOR POTENTIAL EMERGING CONTAMINANTS:

- Pharmaceuticals and Personal Care Products (PPCPs)
- Chemicals from Consumer Products
- Endocrine Disrupting Compounds (EDCs)
- Nanomaterials

WHAT ARE THE EMERGING CONTAMINANTS?

- Human and veterinary pharmaceuticals
- Steroid hormones
- Caffeine
- DEET (N,N-diethyl-meta-toluamide) is a common insect repellent

Sources include chemicals from liquids, fragrances, creams, over-the-counter medications, and over-the-counter drugs, and more.

- PFOA (Perfluorooctanoic Acid)
- PFOS (Perfluorooctane Sulfonate)
- Sigshosphate
- Phosphorus
- PFOAs (Perfluorinated Octyl/Undecyl) fluorotelomer

Sources include cleaning products, paints, flame retardants, varnishes, and more.

- Industrial solvents/lubricants and their byproducts
- Florin
- Plastics
- Pesticides and fungicides
- Pharmaceutical agents

Sources include protective coatings and treatments, herbicides, flame retardants, heavy metals, and more.

- Silver
- Copper
- Iron
- Zinc
- Tin/Cadium
- Titanium Oxide
- Aluminum Oxide

Sources include cosmetics, sunscreens, material coatings, paints, agricultural products, and more.

HOW DO THESE CONTAMINANTS ENTER THE WATER?

- leaching from leachates
- flushing or disposal of unused, or expired products
- runoff from agricultural land
- leaching of chromium from waste
- heavy metals in radon
- leaching from waste
- leaching from waste
- leaching from waste

WHAT DO WE KNOW ABOUT THE IMPACT OF THESE CONTAMINANTS?

The full extent is unknown due to the risks currently present. Are they dangerous or not dangerous?

WHAT HAPPENS TO CONTAMINANTS IN WASTEWATER TREATMENT FACILITIES?

Wastewater treatment facilities may not have the technologies required to detect and remove emerging contaminants. Understanding the chemicals and identifying unknowns allows wastewater treatment facilities to improve their processes to remove emerging technologies.

Some emerging contaminants, e.g., non-pollutants, are removed during activated carbon or ion exchange processes ending up in the biosolids or sludge layer.

Other unknowns may be fully removed through conventional treatment processes and are released into the environment.

Formation of unknown transformation products depending on the source, sludge or biosolids is disposed of in landfill or used as a fuel nutrient source for agriculture purposes.

WHAT DO WE TEST FOR THESE CONTAMINANTS TODAY?

- Gas Chromatography/ Mass Spectrometry
- Inductively Coupled Plasma/ Mass Spectrometry
- Liquid Chromatography/ Mass Spectrometry

While regulatory methods target those identified as posing the highest risk, non-targeted screening helps to determine newly identified, emerging contaminants, for future research and risk assessment.

WHAT NEW TECHNOLOGIES ARE BEING DEVELOPED TO IDENTIFY EMERGING CONTAMINANTS?

These technologies help researchers determine new technologies and platforms to address emerging contaminants. Researchers use high-performance LC–QTOF, GC–QTOF, and LC–Q-TOF to identify emerging contaminants. These techniques address many or all existing contaminant removal processes.

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