The “forever” problem of PFAS disposal

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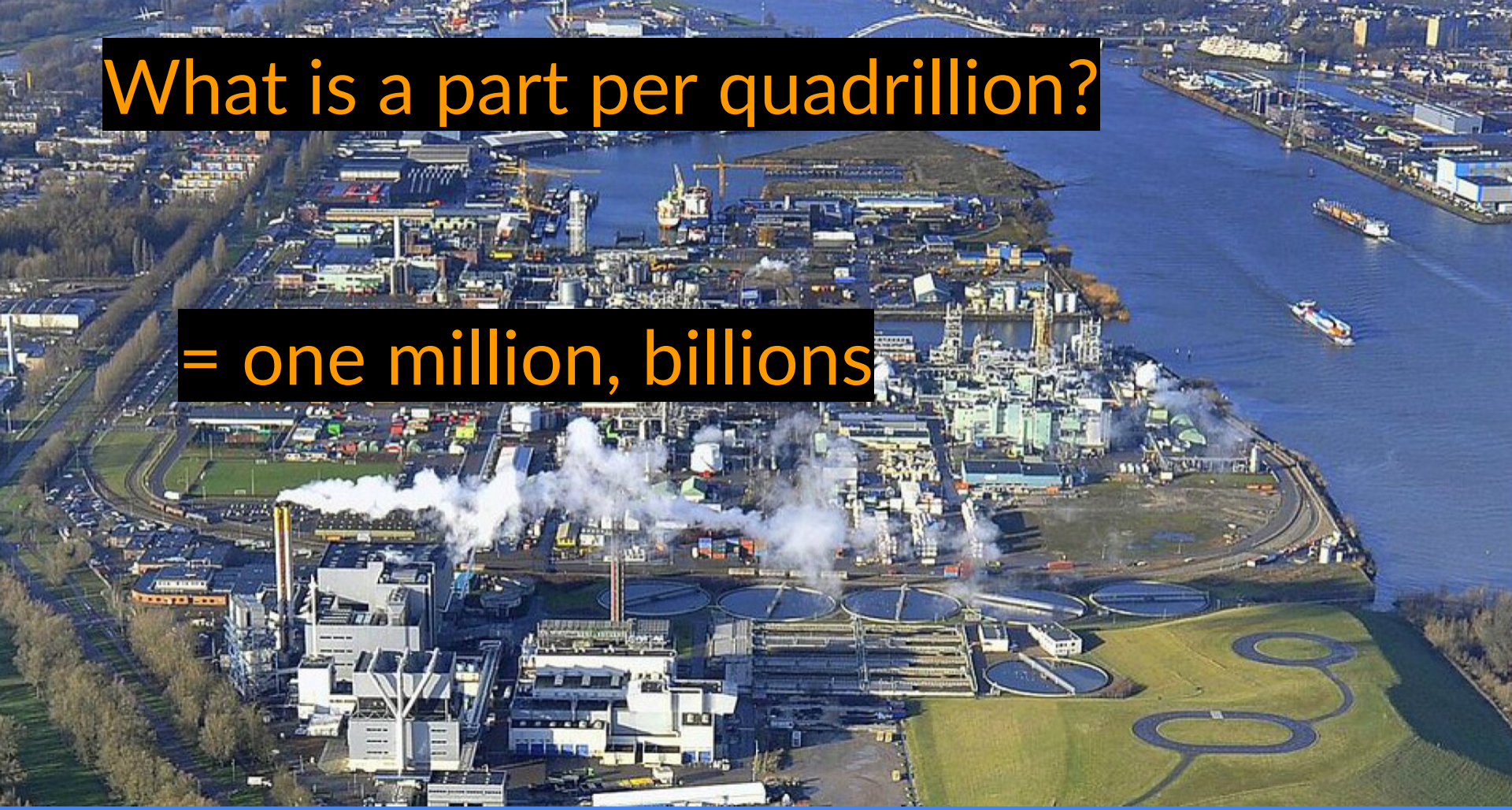

What is a part per quadrillion?
= one million, billions

PFAS waste pose unique management challenges

- Persistence
- Mobility in water
- Volatility

... and toxicity

Virtually no regulation of discharge from current uses of PFAS

Chemical production

Metal plating

Production of consumer products

Fire fighting

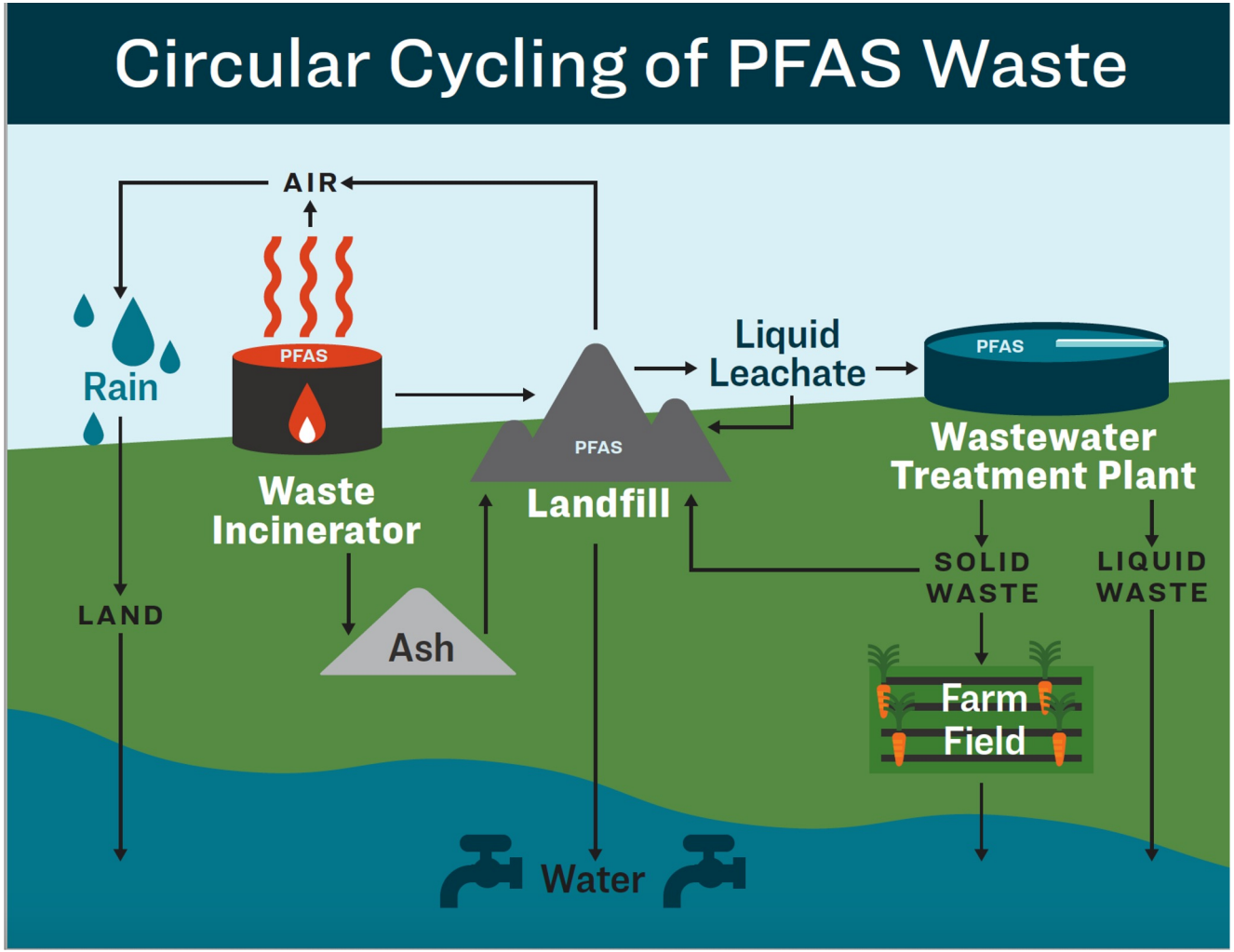
Little clean up of wastes from contaminated sites

Used water filters

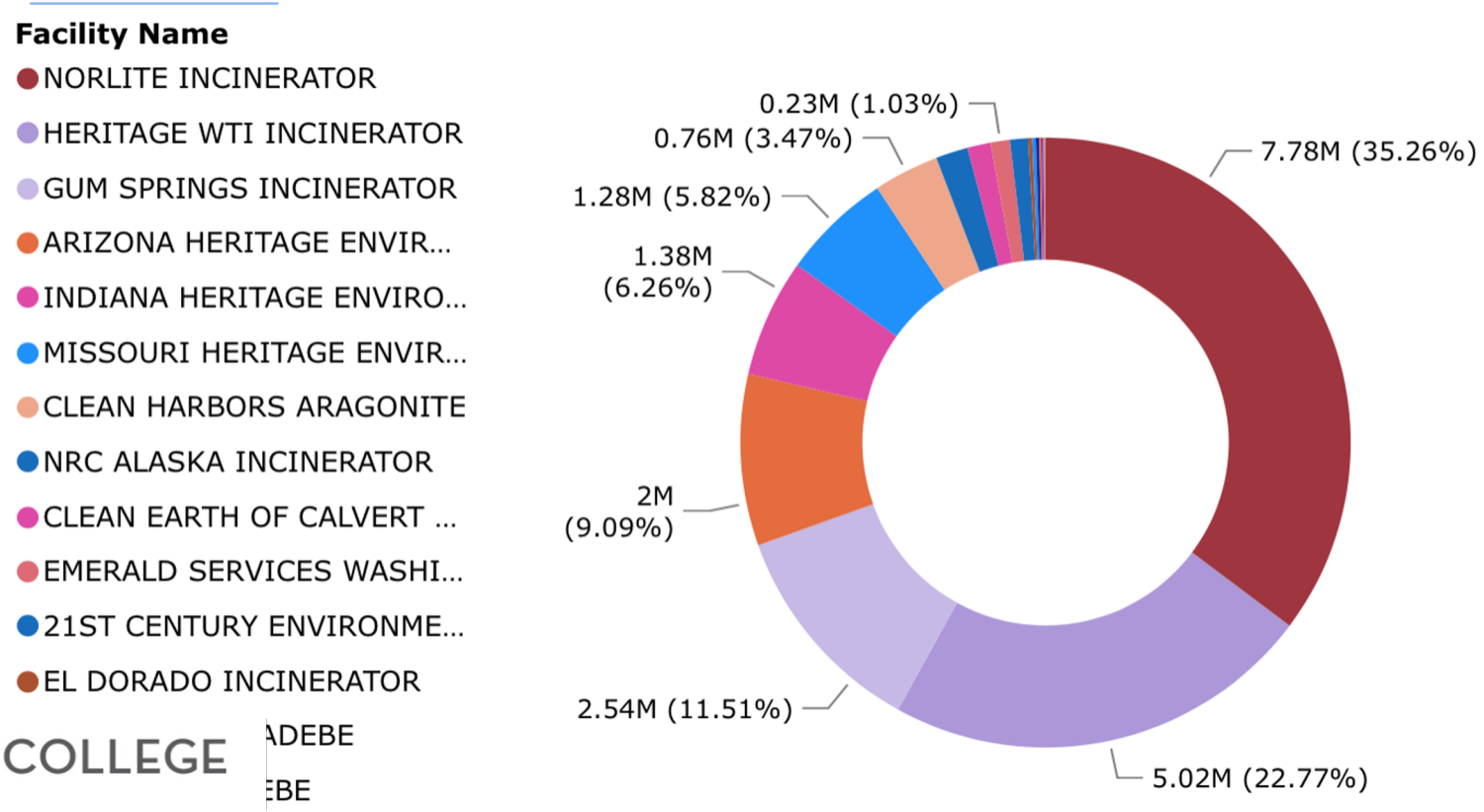
Soil

AFFF-containing waste water

Landfill leachate


Circular Cycling of PFAS Waste
AIR
Rain
PFAS
Waste Incinerator
Ash
LAND
PFAS
Landfill
Liquid Leachate
PFAS
Wastewater Treatment Plant
SOLID WASTE
LIQUID WASTE
Farm Field
Water

Millions of gallons of AFFF incinerated



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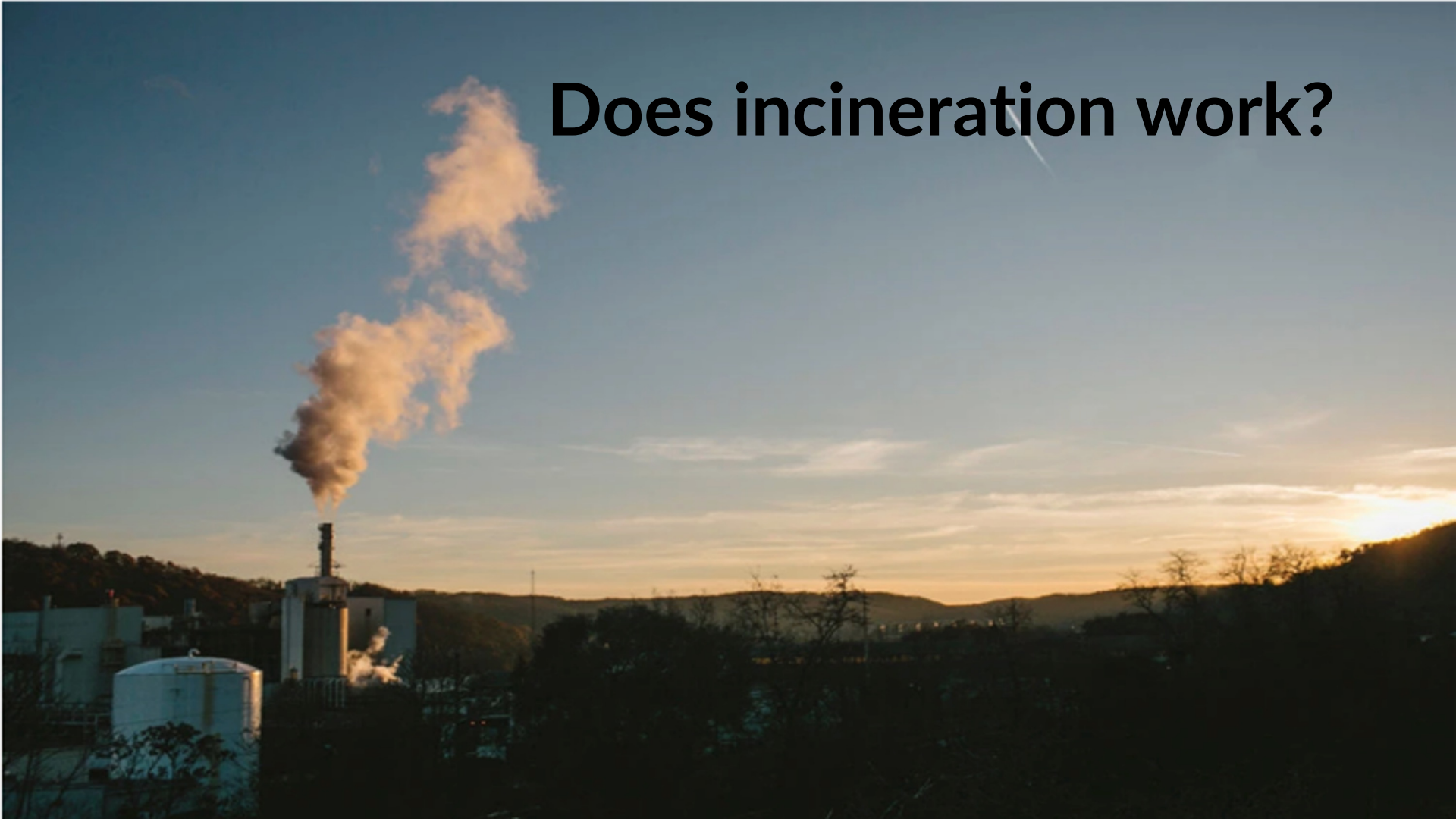

Does incineration work?

Thermal oxidation?

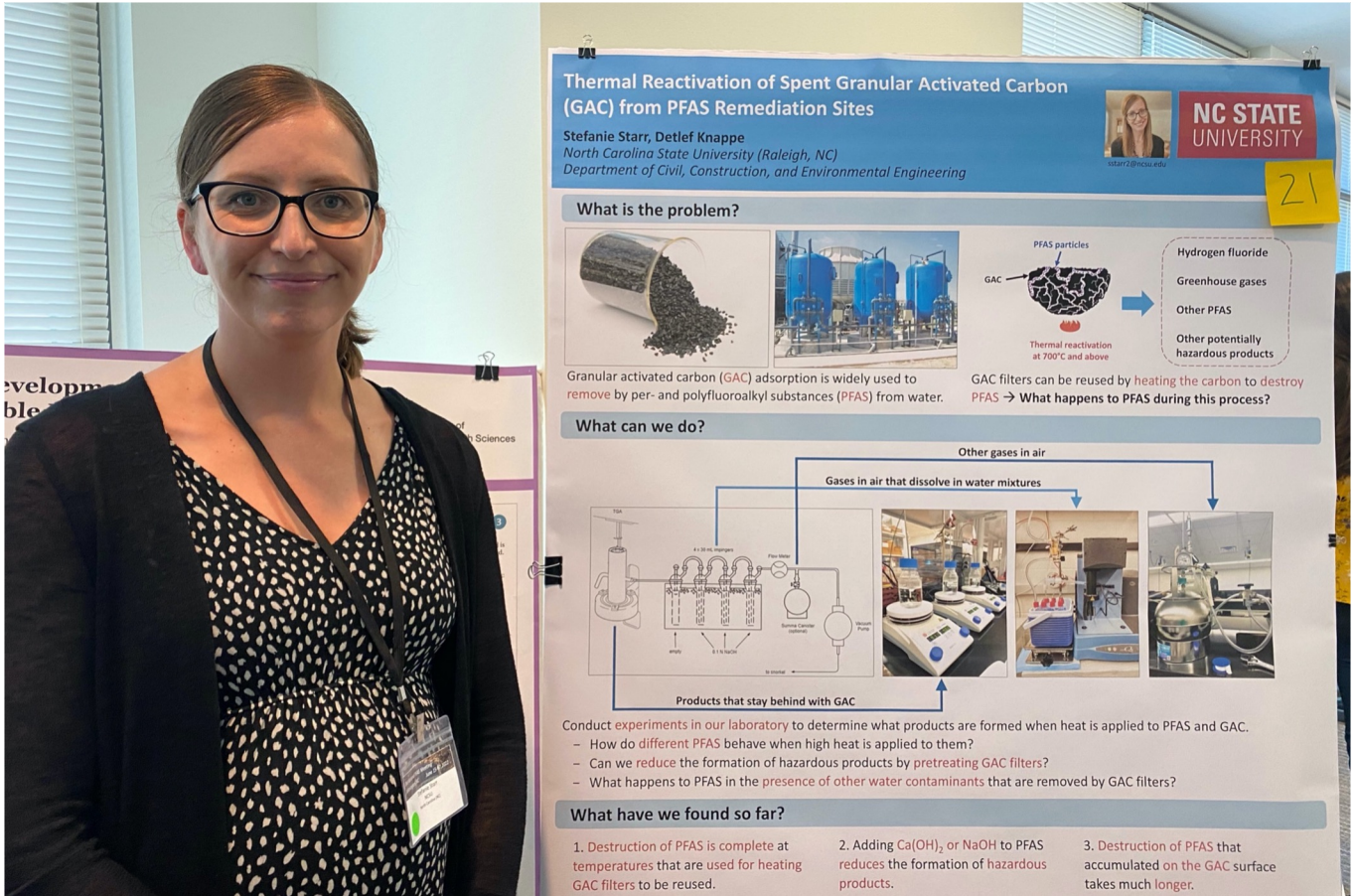
Lawmakers call for Saint-Gobain closure following state's discovery of continued PFAS pollution

By Amanda Gokee N.H. Bulletin Nov 30, 2021

Lawmakers are calling on the Department of Environmental Services to shut down Saint-Gobain Performance Plastics in Merrimack after a September test conducted by the state showed the company is still emitting toxic PFAS chemicals into the air.

The Department of Environmental Services found several deficiencies at the facility, most stemming from an unauthorized bypass stack that Saint-Gobain built without the state's permission. Per- and polyfluoroalkyl substances went into the air untreated, passing through the bypass stack, according to DES.

Carbon regeneration?



What can we do?

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Ad-hoc advocacy strategy to date

Halt bad disposal practices

Hold and contain PFAS-waste

Invest and scale destruction technologies

Ensure local and state progress doesn't push waste into more marginalized communities

Safe waste principles

Fully destroy PFAS

Use contained systems

Require testing of byproducts to guarantee elimination

Treat waste on-site where possible

AFFF Foams

- 2 states ban incineration
- 11 states ban sale or use
- 9 state take back programs
  - 3 holding foams for safe disposal options

PERSISTENT POLLUTANTS

PFAS destruction technologies are starting to emerge

Supercritical water oxidation spotlighted at congressional hearing

by **Cheryl Hogue**

December 29, 2021 | A version of this story appeared in **Volume 100, Issue 1**

Credit: Battelle

This mobile version of Battelle's PFAS Annihilator technology is one emerging avenue for destroying these "forever chemicals."

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MOST POPULAR IN ENVIRONMENT

Chemical recycling of plastic gets a boost in 18 US states—but environmentalists question whether it really is recycling

As nuclear waste piles up, scientists seek the best long-term storage solutions

Industrial ammonia production emits more CO_2 than any other chemical-making reaction. Chemists want to change that

Water flies through fluorine-lined channels

Supercritical Water Oxidation as an Innovative Technology for PFAS Destruction

Max J. Krause[1]; Eben Thoma[2]; Endalkachew Sahle-Damesessie[3]; Brian Crone[4]; Andrew Whitehill[5]; Erin Shields[6]; and Brian Gullett[7]

Abstract: Water above 374°C and 22.1 MPa becomes supercritical, a special state where organic solubility increases and oxidation processes are accelerated. Supercritical water oxidation (SCWO) has been previously shown to destroy hazardous substances such as halogenated compounds. Three separate providers of SCWO technology were contracted to test the efficacy of SCWO systems to reduce per- and poly-fluoroalkyl substances (PFAS) concentrations from solutions of dilute aqueous film-forming foam (AFFF). The findings of all three demonstration
alysis, including
perfluorooctane
g/L, 30.4 mg/L
to 0.310 μg/L,
Similarly, PFOA
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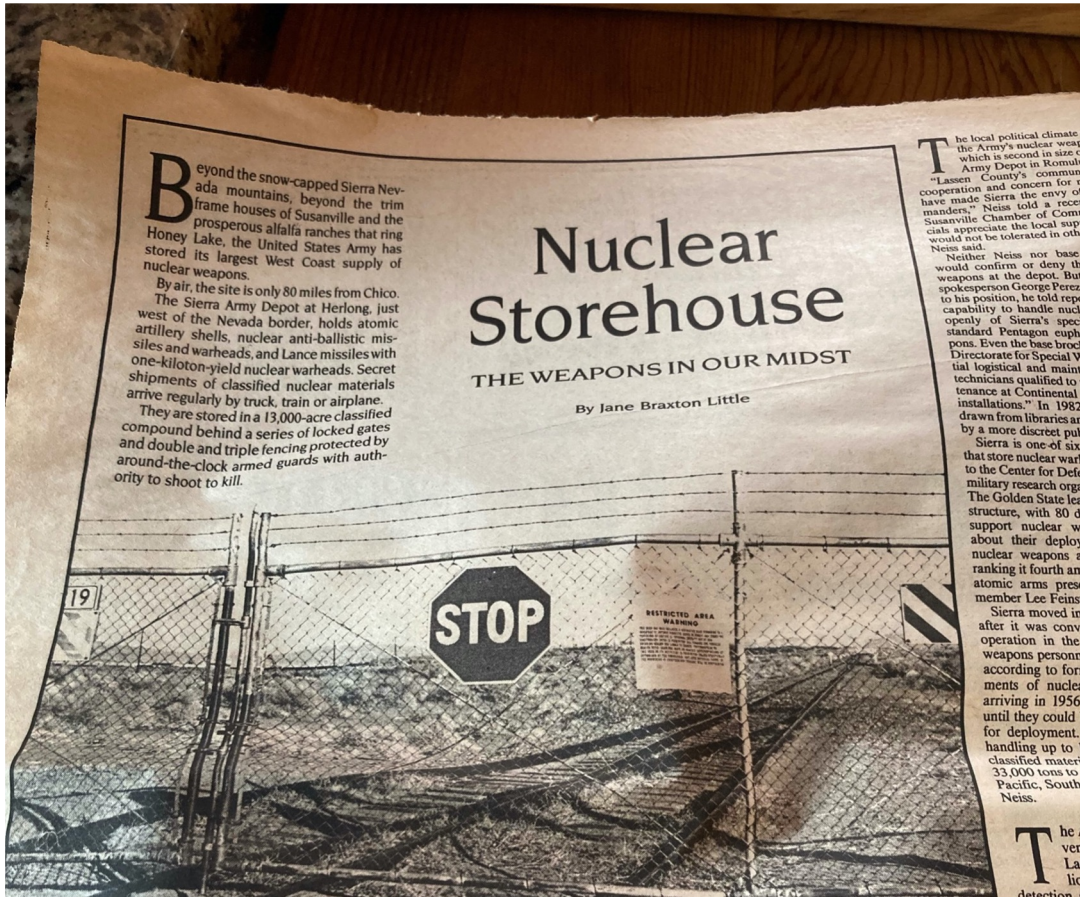
"SCWO may be an alternative to incineration and could be a permanent solution to PFAS-laden wastewater rather than disposal by injection into a deep well or landfilling"

The nuclear waste of our time…



Nuclear Storehouse

THE WEAPONS IN OUR MIDST

By Jane Braxton Little

Beyond the snow-capped Sierra Nevada mountains, beyond the trim frame houses of Susanville and the prosperous alfalfa ranches that ring Honey Lake, the United States Army has stored its largest West Coast supply of nuclear weapons.

By air, the site is only 80 miles from Chico.

The Sierra Army Depot at Herlong, just west of the Nevada border, holds atomic artillery shells, nuclear anti-ballistic missiles and warheads, and Lance missiles with one-kiloton-yield nuclear warheads. Secret shipments of classified nuclear materials arrive regularly by truck, train or airplane.

They are stored in a 13,000-acre classified compound behind a series of locked gates and double and triple fencing protected by around-the-clock armed guards with authority to shoot to kill.

STOP

RESTRICTED AREA
WARNING

19

The local political climate
the Army's nuclear weap
which is second in size
Army Depot in Romul
"Lassen County's commun
cooperation and concern for
have made Sierra the envy o
manders," Neiss told a rece
Susanville Chamber of Com
cials appreciate the local sup
would not be tolerated in oth
Neiss said.
Neither Neiss nor base
would confirm or deny th
weapons at the depot. But
spokesperson George Perez
to his position, he told repo
capability to handle nucl
openly of Sierra's spec
standard Pentagon euph
pons. Even the base broc
Directorate for Special W
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nuclear weapons
ranking it fourth an
atomic arms pres
member Lee Feins
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arriving in 1956
until they could
for deployment.
handling up to
classified materi
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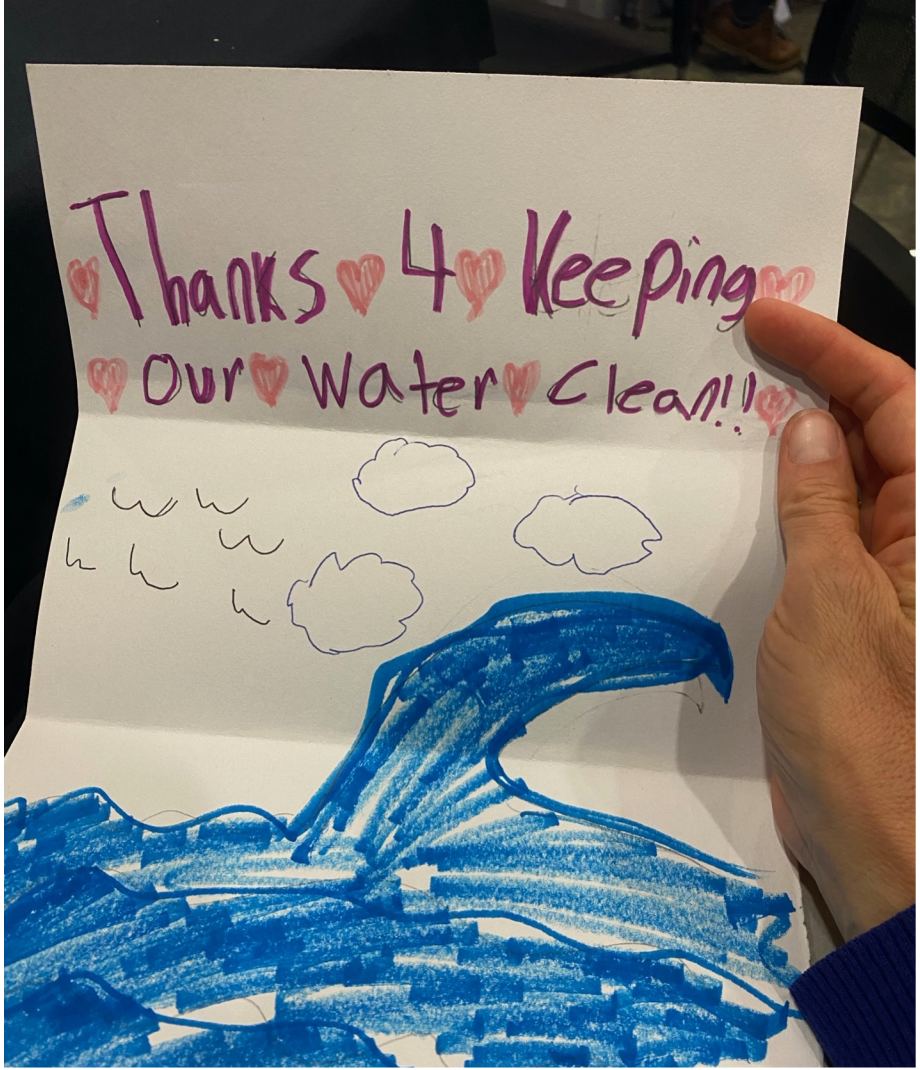
Thank you!

Sierra Club members and volunteer leaders

National PFAS Contamination Coalition

Conference organizers!

…and everyone else