

The Reckless Rush to Burn AFFF

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Webinar:
PFAS Disposal and Remediation
Monday, August 9, 2021

Forever Chemicals (PFAS)

PFAS chemicals invented by US military in 1940s as synthetic chemical of profound inertness (use in atomic bomb construction and submarine fire suppression). Popularized in industrial production of plastics (1960s-2018) and as fire-fighting foam for petroleum fires at airports, military bases, and refineries (1970s-present).

From the moment the military and US plastics and petrochemical industry started using PFAS chemicals, they amassed overwhelming evidence of their toxicity. But DOD, DuPont, and 3M chose to bury those facts.

The toxicology of PFAS chemicals is now settled: exposure to trace amounts of these chemicals is strongly linked to developmental disorders, immune dysfunction, reproductive harm, and a host of cancers. PFAS are toxic.

They are also virtually indestructible, surprisingly mobile once released into the environment, and bio-accumulate in plants, animals, and humans.

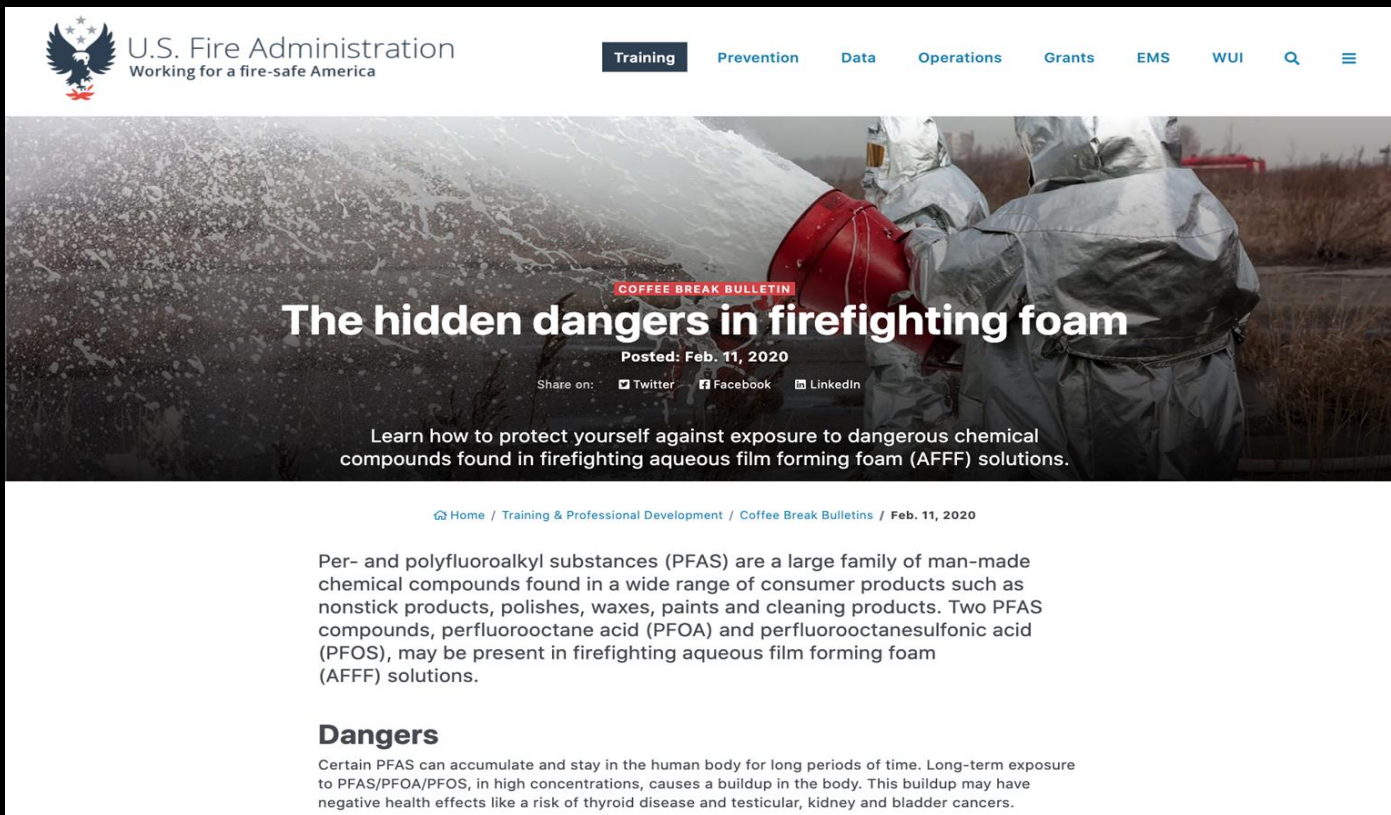
These properties – their toxicity, durability, mobility, and affinity for living creatures – make them a profound new threat to public health. Policy is now moving to catch up with the science. In the lag between the science and the policy, reckless rush to incinerate PFAS.

Aqueous Film Forming Foam (AFFF)

AFFF is one of the strongest fire-suppressants known to man.

AFFF is made of synthetically engineered PFAS compounds (“forever chemicals”).

Exposure to trace amounts of PFAS chemicals is linked to cancers, developmental disorders, immune dysfunction, and infertility.



The screenshot shows a webpage from the U.S. Fire Administration. The header includes the organization's logo and name, along with navigation links for Training, Prevention, Data, Operations, Grants, EMS, and WUI. The main content area features a large image of firefighters in protective gear, with a red fire helmet in the foreground. Overlaid on the image is the article title "The hidden dangers in firefighting foam" and a sub-header "COFFEE BREAK BULLETIN". Below the title, it says "Posted: Feb. 11, 2020" and provides social media sharing options for Twitter, Facebook, and LinkedIn. A short introductory paragraph reads: "Learn how to protect yourself against exposure to dangerous chemical compounds found in firefighting aqueous film forming foam (AFFF) solutions." Below this is a breadcrumb trail: "Home / Training & Professional Development / Coffee Break Bulletins / Feb. 11, 2020". The main text begins with: "Per- and polyfluoroalkyl substances (PFAS) are a large family of man-made chemical compounds found in a wide range of consumer products such as nonstick products, polishes, waxes, paints and cleaning products. Two PFAS compounds, perfluorooctane acid (PFOA) and perfluorooctanesulfonic acid (PFOS), may be present in firefighting aqueous film forming foam (AFFF) solutions." A section titled "Dangers" follows, stating: "Certain PFAS can accumulate and stay in the human body for long periods of time. Long-term exposure to PFAS/PFOA/PFOS, in high concentrations, causes a buildup in the body. This buildup may have negative health effects like a risk of thyroid disease and testicular, kidney and bladder cancers."

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Contracted Burn

Pentagon: AFFF displays “unacceptable toxicity” (2017) [military had concerns earlier]

Congress: Department of Defense must phase out AFFF by 2024

In 2016, Department of Defense orders the incineration of the military's stockpile of AFFF (DOD stockpile of AFFF estimated to be between **24 – 33 million pounds**).

At least 20 million pounds of AFFF sent to incinerators across US.

Notes to Offerors

1. This Defense Logistics Agency (DLA) Disposition Services disposal contract is for the removal, **destruction and disposal of Aqueous Film-Forming Foam (AFFF)** related wastes, including AFFF concentrates, rinsates, contaminated water and solids. Removals will be performed at various Department of Defense (DOD) and Department of Homeland Security (DHS) military installations throughout the Continental United States (CONUS). This requirement is split up into three regions as follows:

Eastern Region of the United States. This region includes installations located in any of the following states: Alabama, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

Western Region of the United States. This region includes installations located in any of the following states: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Mid-America Region of the United States. This region includes installations located in any of the following states: Arkansas, Iowa, Kansas, Louisiana, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas.

2. All AFFF-related wastes being discarded by the Government under this contract will meet the EPA definition of a solid waste, but will not meet the definition of a hazardous waste under the Resource Conservation and Recovery Act (RCRA) at the time of award of this contract. See Section 1.1.1.b for additional information.

3. All AFFF-related wastes will be thermally destroyed at a fully permitted RCRA incineration facility that is currently listed on the DLA Qualified Facility List (QFL). AFFF concentrates, rinsates, and solids are defined in Section 1.2.10.3 of this contract. For purposes of this

Incineration and AFFF: *An Unproven Method*

EPA: “It is not well understood how effective high-temperature combustion is in completely destroying PFAS” (2020)

ITRC: Ability of incineration to destroy AFFF “as active area of research.” (2020)

EPA: “Thermal destructibility” of AFFF poorly understood. (2019)

Air Force: “The high-temperature of PFOS has not been characterized.” (2016)

**Interim Guidance on the
Destruction and Disposal of
Perfluoroalkyl and Polyfluoroalkyl
Substances and Materials
Containing Perfluoroalkyl and
Polyfluoroalkyl Substances**

*INTERIM GUIDANCE FOR PUBLIC COMMENT
DECEMBER 18, 2020*


Incineration and AFFF: A *Dangerous Mix*

AFFF is “an extremely efficient flame retardant” (EPA)

Subjecting AFFF to high-temperatures can generate new PFAS compounds and other fluorinated toxins (like hydrofluoric acid).

There are no technologies nor analytical standards to monitor PFAS emissions from an incinerator.

Burning AFFF may emit dangerous chemicals into surrounding neighborhoods.



Products of Incomplete Combustion (PICs)

- When formed in flames, F radicals quickly terminate chain branching reactions to act as an extremely efficient flame retardant, inhibiting flame propagation
- PICs are more likely formed with F radicals than other halogens such as chlorine (Cl)
- PICs may be larger or smaller than the original fluorinated Principal Organic Hazardous Constituents (POHC) of concern
 - CF_2 radicals preferred and relatively stable, suggesting the possibility of reforming fluorinated alkyl chains
 - Remaining C-F fragments may recombine to produce a wide variety of fluorinated PICs with no analytical method or calibration standards
 - May result in adequate PFAS destruction but unmeasured and unquantified PICs
- Very little information is published on PFAS destruction
 - Fluorine chemistry sufficiently different than Cl that we cannot extrapolate
 - Analytical methods and PFAS standards are minimal with more needed
 - Measurements focusing on POHC destruction may miss the formation of PICs

PFAS levels around Incinerator

Sampling of PFAS levels in soil and surface water around incinerator burning AFFF found high levels of PFAS chemicals found in AFFF. Especially PFBA.

Studies in Australia found high levels of PFAS in ash after incinerating AFFF.

Studies in Holland found high levels of PFAS in eggs and milk from farms near hazardous incinerator burning PFAS.

The screenshot shows a webpage from c&en (Chemical & Engineering News) with a red header. The main article is titled "Incineration may spread, not break down PFAS" and is categorized under "PERSISTENT POLLUTANTS". The sub-headline reads "Preliminary data show soil and water near New York facility are contaminated" and is by Cheryl Hogue, dated April 27, 2020. The article features a photograph of a brick industrial facility with a white picket fence in the foreground. Below the photo is a caption: "The Norlite facility, which incinerates hazardous waste, abuts a public housing complex in Cohoes, New York." The article text begins with a large "N" and states: "ew data suggest that commercial incineration of per- and polyfluoroalkyl substances (PFAS) doesn't break down these hardy chemicals. Instead, it spreads them into surrounding areas." A small credit line reads "Credit: David Bond, Bennington College". To the right of the article is a sidebar with a "CALL" button, a "Joint Virtual Sp... Epigen" advertisement, and a "MOST POPULAR ENVIRONMENT" section listing several environmental topics.

Operation Crackpot

20 million pounds of AFFF and AFFF wastewater incinerated between 2016-20.

No evidence hazardous waste incinerators can destroy this toxic firefighting foam.

Contracted incinerators are habitual violators of environmental law.

Contracted incinerators are located in poor and working-class communities.

40% of all known shipments of AFFF were sent to “fuel-blending” facilities where documentation stops. Where did it go?

970,000 pounds of AFFF was burned overseas.



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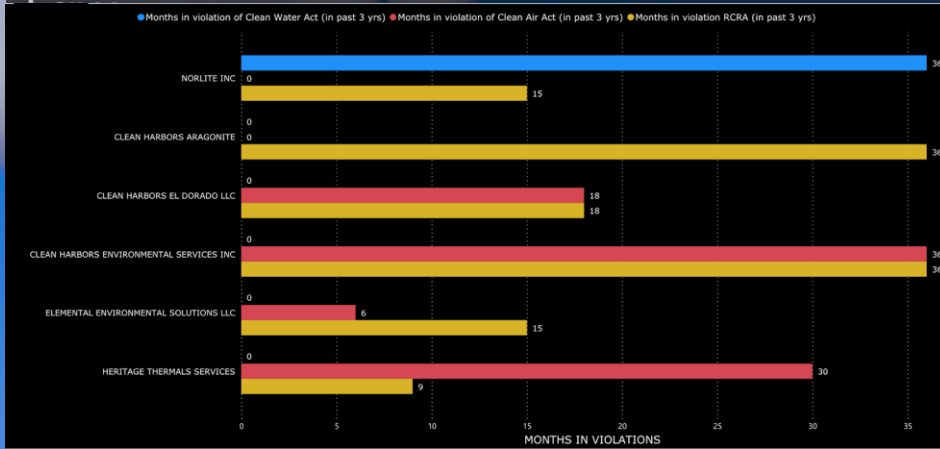
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Operation Crackpot

Months in Violation of Environmental



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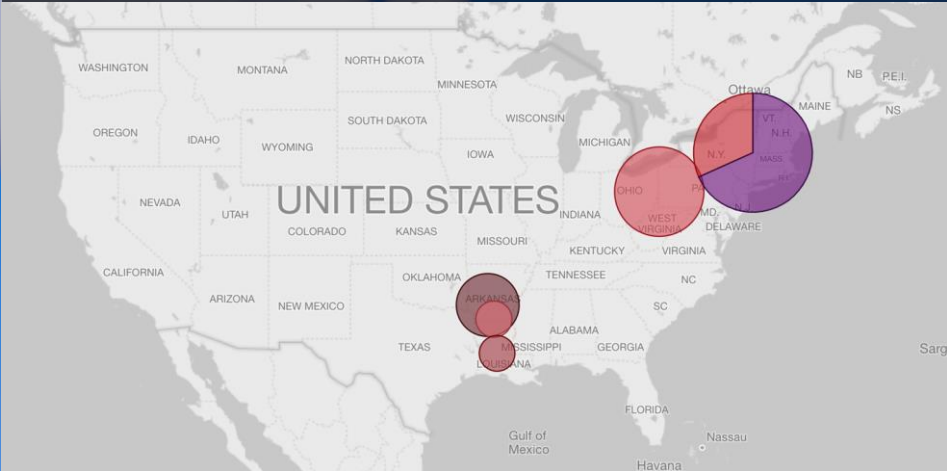
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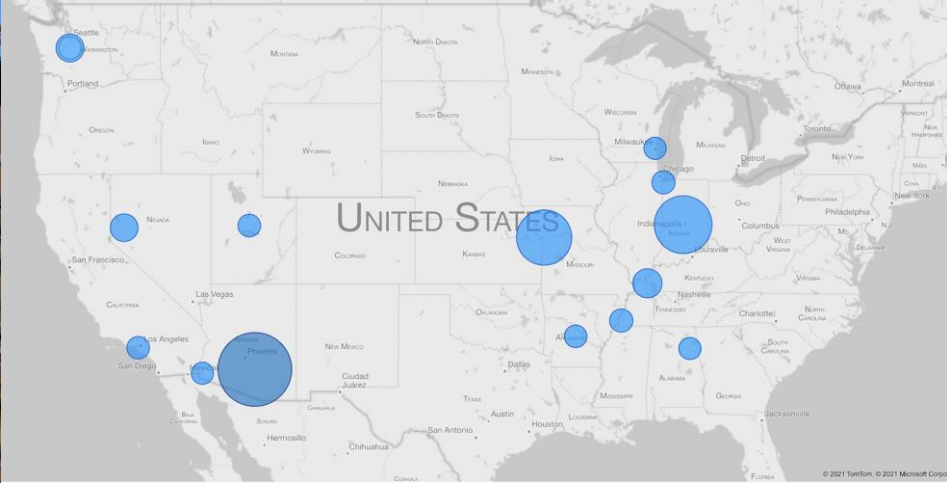


Operation Crackpot

AFFF Incineration Facilities



AFFF Fuel Blending Facilities



Operation Crackpot

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Norlite Hazardous Waste Incinerator *Cohoes, New York*

35% of known AFFF shipments went to Norlite.

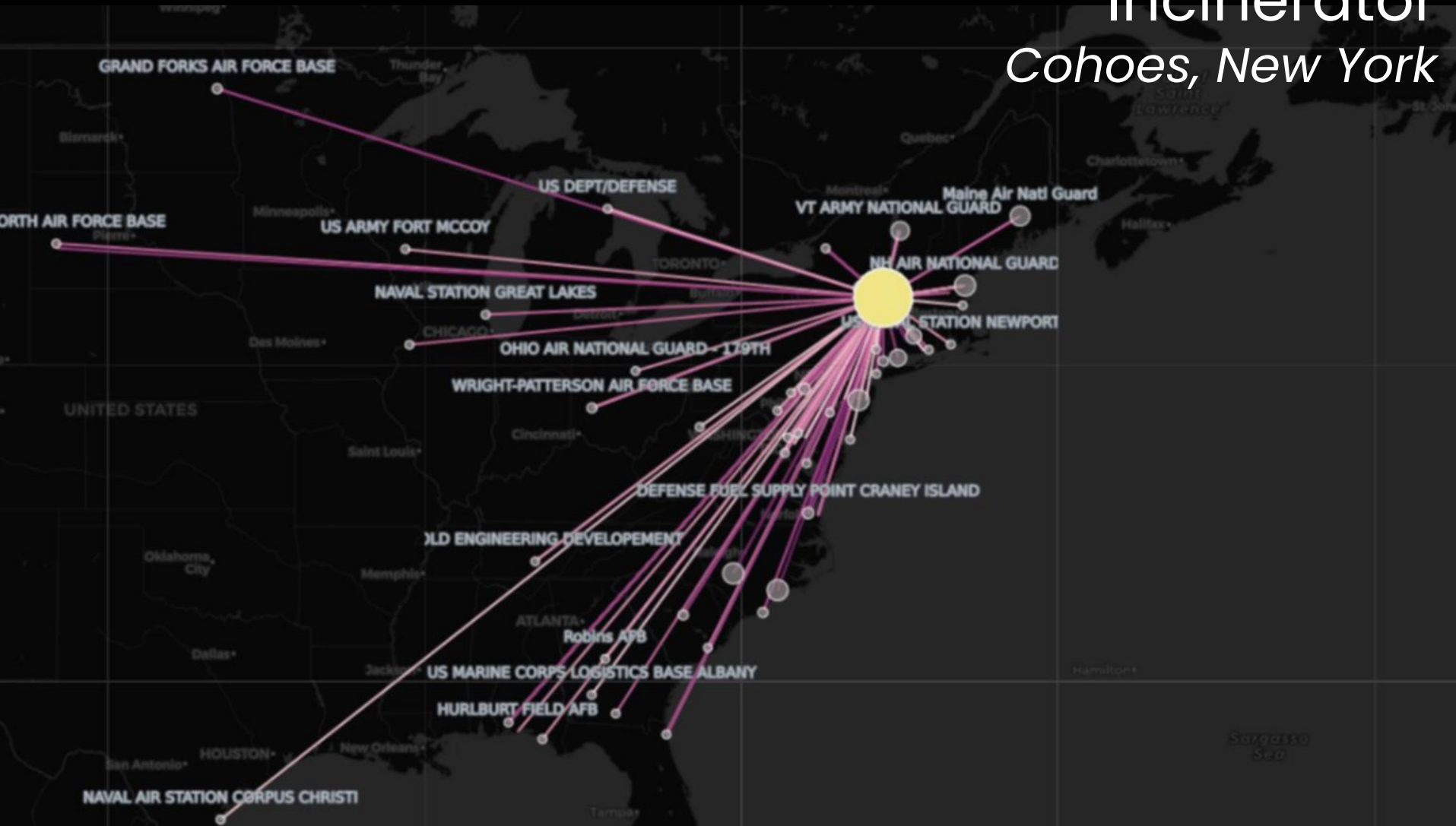
2.47 million pounds of AFFF and 900,000 gallons of AFFF wastewater were burned at Norlite.

Norlite is 400 feet from Saratoga Sites Public Housing Complex, home to some 70 families.

Norlite is located in a densely populated city.

Norlite is a serial violator of environmental law.

Norlite Hazardous Waste Incinerator *Cohoes, New York*



The Reckless Rush to Burn AFFF

Between 2016-2020, the Department of Defense authorized the burning of at least 20 million pounds of toxic firefighting foam.

There is no evidence that incineration destroys the toxic chemistry of AFFF.

The burning of AFFF happened hidden from public view and in defiance of environmental expertise.

Most the incinerators that attempted to burn AFFF are located in environmental justice communities.

In effect, the Pentagon redistributed its AFFF problem into poor and working class neighborhoods across the US.

There is reason to think the military continues to burn AFFF. Its well past time for a sensible ban on the burning of AFFF nationwide.

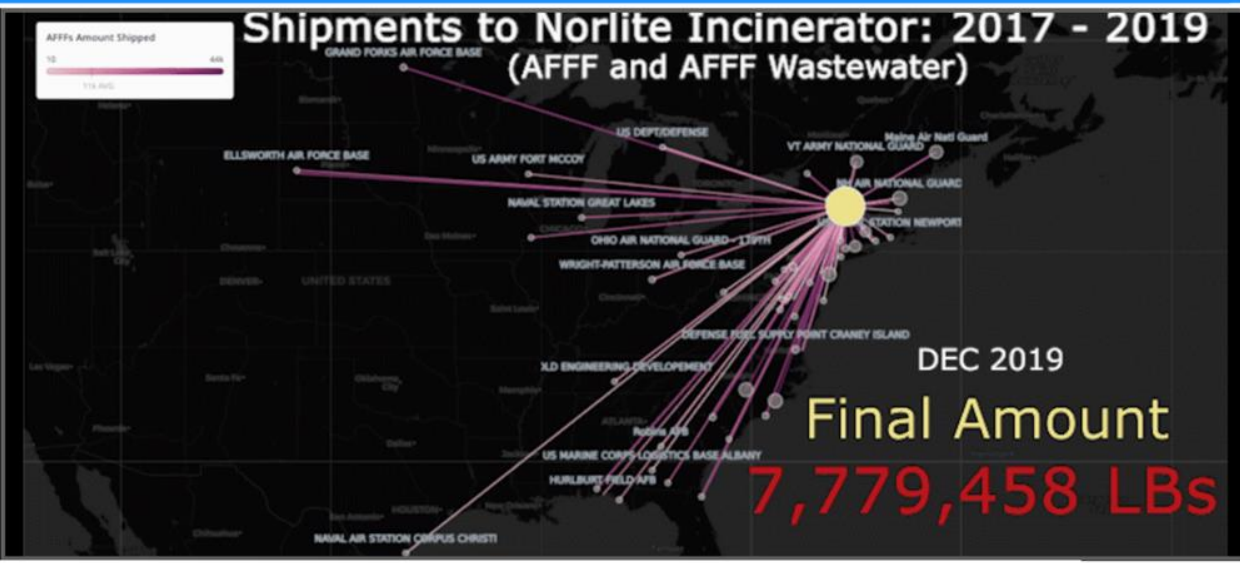
The Reckless Rush to Burn AFFF

AFFF is a toxic firefighting foam.

Since 2016, over **20 million pounds** of toxic firefighting foam was shipped to hazardous waste incinerators. There is no evidence that incineration destroys AFFF.

While the proper way to dispose of these "forever chemicals" is debated, the dangers they pose to human health is not. Exposure to trace amounts of the chemicals in AFFF is strongly linked to a host of cancers, developmental disorders, immune dysfunction and infertility.

A fundamental question hangs over this shady operation: If incineration is an unproven means of destroying these toxins, is burning AFFF



BACKGROUND INFORMATION



SITES



VIOLATIONS



TIMELINE



NORLITE



SUMMARY



MORE INFORMATION

Made in collaboration by [Ahmad Yassir](#), [Cedric Lam](#), [David Bond](#)

Opinion US news

This article is more than 4 months old

The US military is poisoning communities across the US with toxic chemicals

David Bond

The Department of Defense has ordered the burning of 20m pounds of AFFF - despite risks to human health



Thu 25 Mar 2021 06.24 EDT



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thank you
(dbond@bennington.edu)

DEC Report of PFAS at Norlite

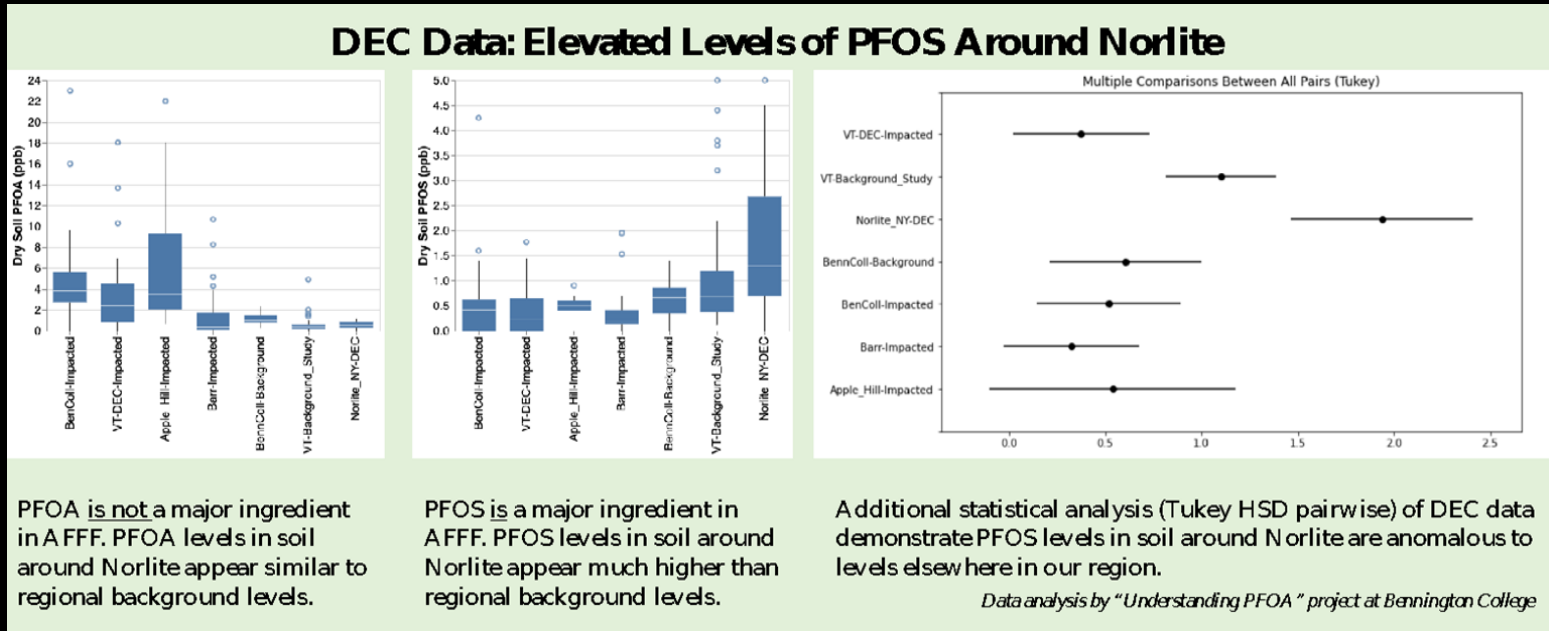
DEC: “comprehensive study” of PFAS deposition // “No Clear Link to Norlite’s Operations”

DEC’s conclusion is not supported by its data. DEC’s own data identifies worrisome patterns of contaminated soil downwind of Norlite (mercury, lead, and PFOS)

DEC’s analysis neglects standard scientific practices for investigating airborne deposition of PFAS.

DEC’s study is too tightly bound to Norlite (PFAS emissions travel far) and ignores reasonable possibility that incineration generated new PFAS compounds we don’t have standards for.

It is not clear why DEC continues to place its reputation on the line in defense of the reckless burning of AFFF.



PAPER



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PFAS soil and groundwater contamination via industrial airborne emission and land deposition in SW Vermont and Eastern New York State, USA†

Tim Schroeder, * David Bond and Janet Foley

In order to understand the extent to which airborne PFAS emission can impact soil and groundwater, we conducted a sampling campaign in areas of conserved forest lands near Bennington, VT/Hoodick Falls, NY. This has been home to sources of PFAS air-emissions from Teflon-coating operations for over 50 years. Since 2015, the Vermont and New York Departments of Environmental Conservation have documented ~1200 residential wells and two municipal water systems across a 200 km² area contaminated with perfluorooctanoic acid (PFOA). Given the large areal extent of the plume, and the fact that much of the contaminated area lies up gradient, and across rivers from manufacturers, we seek to determine if groundwater contamination could have resulted primarily from air-emission, land deposition, and subsequent leaching to infiltrating groundwater. Sampling of soils and groundwater in the Green Mountain National Forest (GMNF) downwind of factories shows that both soil and groundwater PFOA contamination extend uninterrupted from inhabited areas into conserved forest lands. Groundwater springs and streams in the GMNF located 8 km downwind, but >200 meters vertically above factories, contain up to 100 ppt PFOA. Our results indicate that air-emitted PFAS can contaminate groundwater and soil in areas outside of those normally considered down-gradient, of a source with respect to regional groundwater flow.

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en.ei

Environmental significance

Poly- and perfluoroalkyl-substances (PFAS) are a class of widely used chemicals of emerging environmental concern. Most instances of PFAS contamination have resulted from direct land applications at industrial sites, locations of firefighting foam use, or biosolids application. In these cases, groundwater contamination or episodic migration in the direction of regional groundwater flow, where PFAS contamination results from airborne emission, contamination needs to be investigated in areas outside of those normally considered at risk relative to the location of manufacturing facilities. In our study area, >200 km² of upland regions may have been contaminated by airborne PFAS emission.

Introduction

Poly- and perfluoroalkyl-substances (PFAS) are contaminants of emerging widespread concern. They have been used to apply non-stick, water repellent, and stain resistant coatings to a wide range of manufactured products since the 1950's.¹ PFAS have been found to be bioaccumulative, and have been linked by epidemiological and animal-based studies to a wide range of health issues, including kidney and testicular cancers,^{2,3} ulcerative colitis,⁴ thyroid disease,^{5,6} and immunological problems.⁷ PFAS are present in the blood serum of nearly all people and animals.^{8–11} Blood serum levels in people are highly variable and dependent on proximity to manufacturers, military bases, or

other point sources.^{12,13} Primary exposure pathways are through drinking water, eating contaminated food, food packaging, exposure to other products manufactured using PFAS, and/or occupational exposure.^{14–17} PFAS are highly persistent in the environment and have been found in soil, lakes, rivers, and oceans in all corners of the globe, including polar regions.^{18–20} PFAS are not broken down by any known natural process, and can be transported as anions in surface water or groundwater, through the atmosphere as dust and/or aerosols, and may be mobilized as aerosols from sea spray.^{3,14} The qualities of many PFAS – bioaccumulative, highly persistent, and mobile – pose new questions to environmental science and regulation.

This study seeks to test the hypothesis that airborne PFAS emissions from manufacturers in southwest Vermont and eastern New York State contaminated soil and groundwater at significant distances (>8 km) from emission sources. Air emission of PFAS has been shown to have impacted water from manufacturers in West Virginia^{21,22} and North Carolina.²³

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† Electronic supplementary information (ESI) available. See DOI: 10.1039/d0em00427a