



## Don't make the mistake of incinerating AFFF!

***Safe destruction technologies are in final stages of development at the Department of Defense***

Sending AFFF to incinerators is a prescription for trouble. PFAS chemicals, including those found in AFFF, are highly toxic. So, experts expect even small increases in exposures (including any new air emissions) to impact local communities and surrounding ecosystems.<sup>1</sup>

PFAS chemicals are extremely persistent in the environment and highly resistant to thermal destruction. Bonds between carbon and fluorine in PFAS are among the strongest in all of nature and much stronger than carbon to chlorine or bromine. Existing incinerator technologies designed to treat other hazardous wastes cannot be expected to completely destroy PFAS.<sup>2</sup>

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***If incinerators fail to completely destroy AFFF, they will simply push PFAS and transformation products into the air and further spread them throughout the environment.***

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<sup>1</sup> Grandjean, P., Budtz-Jørgensen, E. Immunotoxicity of perfluorinated alkylates: calculation of benchmark doses based on serum concentrations in children. *Environ Health* 12, 35 (2013).

<https://doi.org/10.1186/1476-069X-12-35>

<sup>2</sup> Taylor, P.H., T. Yamada, R.C. Striebich, J.L. Graham, and R.J. Giraud. 2012. "P23—Investigation of Waste Incineration of Fluorotelomer-Based Polymers and Fluoropolymers as a Potential Source of PFOA in the Environment." *Reproductive Toxicology* 33 (4): 606–7. <https://doi.org/10.1016/j.reprotox.2011.11.057>.

**Sierra Club's concerns include: Large quantities of PFAS AFFF need to be addressed.** When incinerated, even if the failure rate were small, their emissions would greatly increase exposures to people and the environment. Congress mandated the military and airports end their use of AFFF in firefighting. As a result, many communities are considering shipping their AFFF to incinerators in order to eliminate their AFFF and the associated liability. Soon after, newer generation replacement AFFF foams will likely follow the same path for disposal.

Incinerator communities will suffer the price of higher exposures to PFAS. If your state doesn't have a hazardous waste incinerator burning AFFF, it will transfer them to a handful of heavily impacted locations. In the United States, hazardous waste incinerators are disproportionately located in lower income, communities of color.<sup>3</sup>

PFASs distribute via airborne transport to locations far from their source. As highly persistent, mobile and bioaccumulative pollutants, PFAS accumulate in wildlife in regions with no known industrial sources. Arctic predators (polar bears and seals) now show high body burdens. Other wildlife including fish, waterfowl, raptors, seagulls, and deer have elevated PFAS levels in blood and tissues. Recent studies found combined PFAS levels in the rain exceeding 4 parts per trillion (ppt), indicating a significant threat to large surface water systems with long retention times, including the Great Lakes.<sup>4</sup>

Currently, no proof exists that incinerators completely destroy AFFF. Even if under ideal circumstances an incinerator could destroy PFAS on paper, real-world operational experience demonstrates incinerators fail to achieve theoretical conditions. PFAS put in the current fleet of hazardous waste incinerators under normal operating conditions can be expected to form harmful by-products and products of incomplete combustion.<sup>5</sup> Shorter chain PFAS can be just as toxic, persistent & bioaccumulative - and even more mobile.<sup>6</sup>

Based on actual operational history, compliance violations, operating malfunctions, and failed environmental performance audits plague the hazardous waste incinerator industry. Many hazardous waste incinerators have a poor history of complying with their operating permits even at optimal operations. Additional startup, shutdown

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<sup>3</sup> Waste Dive. 2019. Nearly 80% of US incinerators located in marginalized communities, report reveals, <https://www.wastedive.com/news/majority-of-us-incinerators-located-in-marginalized-communities-report-r/555375/>

<sup>4</sup> Wisconsin State Lab of Hygiene presentation to WisPAC January 16, 2020 <https://dnr.wi.gov/topic/Contaminants/documents/wispac/WSLHPresentation20200116.pdf>

<sup>5</sup> EPA 2019. Technical Brief: PFAS incineration to manage PFAS waste streams, [https://www.epa.gov/sites/production/files/2019-09/documents/technical\\_brief\\_pfas\\_incineration\\_ioaa\\_approved\\_final\\_july\\_2019.pdf](https://www.epa.gov/sites/production/files/2019-09/documents/technical_brief_pfas_incineration_ioaa_approved_final_july_2019.pdf)

<sup>6</sup> "Short-Chain and Long-Chain PFAS Show Similar Toxicity." 2019. C&EN Global Enterprise 97 (33): 23–23. <https://doi.org/10.1021/cen-09733-polcon6>.

and malfunction events will produce additional problem emissions.<sup>7</sup>

Due to concerns about incineration, Congress directed the Department of Defense to end incinerating PFAS until incinerators used by them can demonstrate Clean Air Act compliance. In 2019, Congress passed the National Defense Authorization Act with provisions that restrict DOD incineration, mandate compliance with the CAA, and require EPA to set guidance for disposal and destruction of PFAS wastes (including AFFF) within 12 months.<sup>8</sup>

US EPA has yet to approve any Clean Air Act standards to allow for monitoring or testing emissions from incinerators to either assess efficiency of destruction (the percentage of the compound destroyed) or establish methods to assess breakdown products. Everyone is already exposed to PFAS from food, water and dust. Some experts consider these exposures to already exceed body burdens impacting health.<sup>9</sup> PFAS incineration could also produce potent fluorinated greenhouse gasses and hydrofluoric acid (HF). HF is the strongest acid known and an acutely hazardous air pollutant. HF can also corrode components of incinerators leading to increasing malfunctions.<sup>10</sup>

*Advanced technology from the Department of Defense developed for other persistent hazardous chemical destruction shows great promise for addressing AFFF and PFAS. Sierra Club recommends communities hold AFFF in stockpiles until these safer technologies can operate at scale.*

The DOD's Strategic Environmental Research and Development Program (SERDP) invested millions of taxpayer dollars in developing safer technologies to address chemical warfare agents, explosives and other chemicals where incineration and landfilling pose concerns. These efforts include a contract to adapt technologies like Super Critical Water Oxidation. SCWO has been in the pipeline as a destruction technology since prior to year 2000 to comply with international laws as required under treaties for dealing with chemical warfare agent stockpiles. It has been demonstrated to handle brominated flame retardants, chemical nerve agents, PCBs and dioxins to a demonstrated removal efficiency (DRE) of 99.9999%. SCWO represents one of a number of emerging technologies becoming available to address chemicals like PFAS.<sup>11</sup>

Safer technologies like SCWO systems contain PFAS and other wastes to ensure treatment achieves the necessary destruction efficiencies before releasing wastes into the environment. SCWO technology is a

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<sup>7</sup> Lundin, S. Jansson. 2017. *Destruction of Persistent Organic Compounds in Combustion Systems*. Norway Umea University, <https://www.divaportal.org/smash/get/diva2:1155115/FULLTEXT01.pdf>

<sup>8</sup> 2019 National Defense Authorization Act. <https://www.congress.gov/115/bills/hr5515/BILLS-115hr5515enr.pdf>

<sup>9</sup> Ibid 1

<sup>10</sup> Ibid 6

<sup>11</sup> SBIR-STIR funding. 2017 <https://www.sbir.gov/sbirsearch/detail/1586851> and <https://www.sbir.gov/sbirsearch/detail/1586079> and [General Atomics. Industrial Super Critical Water Oxidation.](http://www.ga.com/hazardous-waste-destruction)

completely closed-loop system – meaning if a batch does not achieve the desired DRE, it can be put back through and treated again to achieve the necessary results.

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