Exhibit C

Incineration is not a safe disposal method for PFAS

Incineration is not proven to safely destroy per- and polyfluoroalkyl substances (PFAS). Commercial incinerators do not, and often cannot, measure their PFAS releases, and the limited laboratory testing that has been conducted does not reflect real-world incineration conditions. PFAS chemicals' carbon-fluorine bond is particularly resistant to combustion, making PFAS unusually difficult and dangerous to incinerate. Yet, despite an acknowledged lack of data, the federal government has already incinerated millions of gallons of PFAS-containing waste, placing the communities surrounding incinerators at risk.

Under the National Defense Authorization Act for Fiscal Year 2020, the Department of Defense cannot incinerate PFAS unless it first establishes that the incineration is "conducted at a temperature range adequate to break down PFAS chemicals while also ensuring the maximum degree of reduction in emission of PFAS, including elimination of such emissions where achievable" and is "conducted in accordance with the requirements of the Clean Air Act, including controlling hydrogen fluoride."[1]

The National Defense Authorization Act for Fiscal Year 2022 imposed a federal moratorium on PFAS incineration until DOD "issues guidance implementing" the foregoing requirements, as well as the recommendations in the Environmental Protection Agency's interim guidance on the destruction and disposal of PFAS and materials containing PFAS.[2] The information that would be required to inform and support that guidance does not currently exist, as there is no proof that existing incinerators are capable of breaking down PFAS chemicals without generating additional PFAS emissions or other harmful products of incomplete combustion.

We reviewed published studies related to PFAS incineration. Scientists are plagued by measurement challenges—studies have unacceptably high detection limits and/or analyze for just a limited number of potential breakdown products, or analyze the incineration of tiny amounts of PFAS compounds. Indeed, the sentinel study done for 3M on PFAS incineration used a bench scale burner and incinerated about an ounce of PFAS. As EPA itself has recognized, "the effectiveness of incineration to destroy PFAS compounds and the tendency for formation of fluorinated or mixed halogenated organic

[1] National Defense Authorization Act for Fiscal Year 2020, Pub. L. 116-92, § 330, 133 Stat. 1198 (enacted Dec. 20, 2019),
[2] National Defense Authorization Act for Fiscal Year 2022, Pub. L. No. 117–81, § 343(a), 135 Stat. 1643 (enacted Dec. 27, 2021).

byproducts is not well understood" and "[e]mission studies … have been incomplete due to lack of necessary measurement methods suitable for the comprehensive characterization of fluorinated and mixed halogenated organic compounds."[3] Instead of returning to an unproven and dangerous PFAS disposal technology, the Department of Defense should heed EPA's recommendation of "interim storage" of PFAS-containing waste "until identified uncertainties are addressed and appropriate destruction and disposal technologies can be recommended."[4]

1. PFAS may not be eliminated in the operating conditions of a hazardous waste incinerator

Two original industry studies of PFOS breakdown products lack the sensitivity to ensure a high level of thermal destruction. Destruction efficiencies of 99.9999% are usually required for highly toxic, persistent wastes, like PCBs and PFAS.[5] The 3M-sponsored studies from 2003 and 2005 didn't detect PFOS and PFOA in waste gasses, but had a detection limit of 0.1%, which means concentrations of up to 1,000 parts per million of PFOS or PFOA in air would not be detected under the conditions of this study.[6],[7] Indeed, given the large stockpiles that DOD holds of PFOS-based AFFF, allowing 0.1% of the PFAS to escape unreacted from incinerators could result in a massive amount of PFAS entering the environment.

EPA is developing methods to measure individual PFAS chemicals at a higher level of sensitivity in air samples, but until these methods are perfected it will be impossible to accurately gauge how much of the PFAS in military waste passes through into the atmosphere.

a. Thermal breakdown of PFAS can form a range of harmful breakdown products.

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[3] United States Environmental Protection Agency, 2020a. Per- and Polyfluoroalkyl Substances (PFAS): Incineration to Manage PFAS Waste Streams. https://www.epa.gov/sites/default/files/2019-09/documents/technical_brief_pfas_incineration_ioaa_approved_final_july_2019.pdf

[4] United States Environmental Protection Agency, 2020b. Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances. https://www.epa.gov/system/files/documents/2021-11/epa-hq-olem-2020-0527-0002_content.pdf

[5] United States Environmental Protection Agency, 2019. Guidance for Applicants Requesting to Treat/Dispose of PCBs Using Incineration or an Alternative Method. https://www.regulations.gov/docket?D=EPA-HQ-OLEM-2018-0305

[6] Philip Taylor & Tak Yamada, Final Report – Laboratory-Scale Thermal Degradation of Perfluoro-Octanyl Sulfonate and Related Precursors (May 2003), https://clu-in.org/download/contaminantfocus/pfas/UDR-TR-03-00044.pdf.

[7] Tak Yamada et al., Thermal Degradation of Fluorotelomer Treated Articles and Related Materials , 61 Chemosphere 974–84 (Nov. 2005), https://doi.org/10.1016/j.chemosphere.2005.03.025.

Even if the carbon-fluorine bonds in PFAS could be broken by incineration, the resulting, highly reactive fluorine molecules can form a range of harmful breakdown products with varied physical and chemical qualities. Much of the published incineration research for PFAS has been done at bench scale using just milligrams of starting materials, and in optimized temperature and handling protocols. These findings are not reflective of actual incineration conditions, and they have not been replicated at an operational scale.

As many scientists have acknowledged, "There are no proven analytical technologies which have been demonstrated to detect all potential fluoro-organic by-products."[8] Of particular concern are PFAS that get volatilized or transformed into volatile organofluorine compounds and escaped detection.[9]

Independent studies detect a range of concerning breakdown products in bench scale incineration studies. They include:

Greenhouse gasses - The original 3M studies measured several potent greenhouse gases and other breakdown products.[4,5] In Taylor (2003) PFOS byproducts include: fluorobenzene, one- and two- carbon fluoroalkanes (tetrafluoromethane, fluoroform, and hexafluoroethane), and fluoroalkenes (1,1-difluoroethene and 1,2-difluoroethene). Yamada (2005) heated PTFE (a polytetrafluoroethylene polymer) to a maximum of 1000C with a 2 second residency time, and detected one- and two- carbon fluorochemicals (fluoroform ion and fluoropropene ion). Concentrations of these breakdown products were estimated to be less than or equal to 1,000 parts per million or 0.1%. Garcia (2007) detected one-, two- and three-chain fluorochemical formation from the thermal degradation of PTFE at temperatures between 750 to 1050C.[10]

The global warming potential of fluorine-containing byproducts is thousands of times more potent than carbon dioxide.[11]

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[8] Horst, et al. 2020. Understanding and Managing the Potential By-Products of PFAS Destruction. Groundwater Monitoring & Remediation. https://ngwa.onlinelibrary.wiley.com/doi/abs/10.1111/gwmr.12372

[9] Watanabe, et al. 2018. Thermal mineralization behavior of PFOA, PFHxA, and PFOS during reactivation of granular activated carbon (GAC) in nitrogen atmosphere. Environ. Sci. Pollut. Res. Int. 25 (8), 7200e7205. https://doi.org/10.1007/s11356-015-5353-2

[10] García, et al. 2007. Products obtained in the fuel-rich combustion of PTFE at high temperature. J. Anal. Appl. Pyrol. 80 (1), 85e91. https://doi.org/10.1016/j.jaap.2007.01.004

[11] Greenhouse Gas Protocol. 2016. Global Warming Potential Values. https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

Fluorinated acetic acids - Mono-, di-, and tri-fluoroacetic acids are common thermal breakdown products of PTFE, particularly at lower temperatures (Ellis 2001). They are toxic to aquatic ecosystems and widely detected in the atmosphere and in precipitation. Some scientists suggest they may be partially responsible for pulmonary edema seen in workers at PTFE plants.[8]

Dioxins and furans - Dioxins and furans can be formed in municipal solid waste incinerators when PFAS are incinerated alongside other wastes.[12] Methodological constraints hinder monitoring for dioxins and furans in other PFAS incineration studies.[13]

Un- or partially-reacted PFAS - EPA lists "shorter chain PFAS, partially fluorinated PFAS, and defunctionalized perfluorinated carbon chains" as other potential thermal by-products.[2] Short-chain polyfluorinated alkyl acids require higher temperatures to achieve thermal destruction than long-chain acids.[14] Wang tested for PFAS in air at two municipal solid waste incinerator facilities in China. They reporting higher concentrations of PFOA in air at the incinerator sites compared to an upwind site, while fluorotelomer concentrations were comparable across all samples.[15]

Hydrogen fluoride - The complete liberation of fluorine from carbon sources in the incinerator would produce hydrogen fluoride, an acutely toxic and corrosive gas. Hydrogen fluoride has to be managed to ensure it doesn't impact machinery of the incinerator itself.[16] As the ITRC reports in its PFAS destruction guidance related to incineration, "there have not been sufficient pilot studies to determine the validity of this concern. This could pose serious health and safety issues and could compromise equipment components."[17]

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[12] Merino, et al. 2016. Degradation and removal methods for perfluoroalkyl and polyfluoroalkyl substances in water. Environ. Eng. Sci. 33 (9), 615e649. https://doi.org/10.1089/ees.2016.0233

[13] Aleksandrov et al. 2019. Waste incineration of Polytetrafluoroethylene (PTFE) to evaluate potential formation of per- and Poly-Fluorinated Alkyl Substances (PFAS) in flue gas. Chemosphere. 226. 898-906.

[14] Watanabe et al. 2016. Residual organic fluorinated compounds from thermal treatment of PFOA, PFHxA and PFOS adsorbed onto granular activated carbon (GAC). Journal of Material Cycles and Waste Management. 18:625-630. https://link.springer.com/article/10.1007/s10163-016-0532-x

[15] Wang, et al. 2013. Mineralization behavior of fluorine in perfluorooctanesulfonate (PFOS) during thermal treatment of lime-conditioned sludge. Environ. Sci. Technol. 47 (6), 2621e2627. https://doi.org/10.1021/es305352p

[16] United States Environmental Protection Agency, 2020. Thermal Treatment of PFAS in Environmental Media: A review of the state-of-the-science. Mark Mills, Diana Bless Environmental Protection Agency; Kavitha Dasu, Dinsuah Siriwardena, Amy Dindal Battelle Memorial Institute.

[17] ITRC. 2020. PFAS - Per- and Polyfluoroalkyl Substances: Treatment Technologies. Interstate

Chemours, under a consent decree with the federal government and the state of North Carolina, has developed a non-target analytical method which will help map the "dark matter" of PFAS breakdown products. One recent study to develop non-target methods examined a sample of waste gasses from the thermal oxidizer at Chemours Fayetteville facility in North Carolina and found a number of unidentifiable fluorochemicals and GenX (HFPO-DA) in waste gasses. Ninety-nine percent of the waste fluorine gases were unidentified chemicals, and 1 percent was GenX.[18]

b. Current monitoring methods aren't able to determine exactly what is coming out of incinerator stacks

EPA is working to develop and validate the analytical methods that will allow it and others to reliably measure PFAS and breakdown products in air and other media. Such tools are essential to allow regulators to determine whether the extremely strong carbon-fluorine bonds in PFAS can be broken in the conditions of a hazardous waste incinerator, and whether emissions controls can trap and remove byproducts. Until these methods are available there is no way to substantiate the degree of breakdown and removal of PFAS and other organic-fluorine compounds from incinerator stacks. These methods are listed as "coming soon" on the EPA website.[19]

2. Hazardous waste incinerators and other kilns and thermal oxidizers do not operate in compliance with existing permits

There is no evidence that any incinerator operating in the United States can safely destroy concentrated PFAS waste such as AFFF. In part this is because neither EPA nor any other agency has established the temperatures and other operating conditions required to destroy PFAS without the formation of harmful products of incomplete combustion, and it is in part because incinerators do not conduct the monitoring required to determine the effects of their PFAS incineration. But even if minimum temperatures and operating conditions could be established, several of the hazardous waste incinerators on the Defense Logistics Agency's Qualified Facilities List have a long track record of environmental non-compliance, raising questions about their ability to maintain those temperatures and other operational requirements.

HERITAGE THERMAL SERVICES, INC. – EAST LIVERPOOL, OHIO

Technology Regulatory Council. https://pfas-1.itrcweb.org/12-treatment-technologies/

[18] Alexandria Forester, et al. Development of Total Organic Fluorine Method for the Analysis of Progress Wastewater Streams and Air from Fayetteville Works (NC). Final report. December 31, 2021.

[19] EPA. 2022. PFAS Analytical Methods Development and Sampling Research. https://www.epa.gov/water-research/pfas-analytical-methods-development-and-sampling-research

Publicly available records indicate that, since the beginning of 2018, the facility reported at least ***25*** instances where it exceeded the emissions standard for total hydrocarbons. Of these, at least two seem to coincide with violations of the minimum temperature limits for the combustor. Several of the THC exceedances were quite severe, with records showing THC levels at over three times the MACT emission standard. The facility also documented ***2*** exceedances of its opacity limits over this span.

The facility has been under heavy scrutiny from state regulators, the EPA, and the general public. Documents filed by the U.S. Department of Justice ("DOJ") indicate that there have been "numerous" documented violations of the minimum combustion temperature OPLs for the rotary kiln and the secondary combustion chamber at the Heritage East Liverpool incinerator.[20] In comments on the facility's draft permit, Save Our County, a local community group, noted 13 violations of the minimum combustion temperature OPLs from January 2015 through March of 2016.[21] In a March 2015 Finding of Violation, EPA documented an additional 13 violations of the facility's minimum combustion temperature OPLs from January 2011 through April 2014.[22] DOJ also notes "numerous" violations of the maximum flue gas flow rate OPL,[23] which, as discussed above, reflects poor operating conditions that increase the propensity for PIC formation.

CLEAN HARBORS ENVIRONMENTAL SERVICES – DEER PARK, TEXAS

Publicly available records indicate that, since the beginning of 2018, the facility reported at least ***20*** deviations from OPLs. At least ***2*** of these deviations appear to relate to exceedances of the opacity standard, indicating emissions of particulate matter from the facility that could reflect inefficient combustion.

Records maintained by the state regulatory agency – the Texas Commission on Environmental Quality ("TCEQ") indicate that the most recent Semi-Annual Excess Emissions Report was filed in April of 2017, for the reporting period from April through September 2016. That report shows that the facility's two incinerator trains reported excess emissions of opacity for 13.5 minutes and of total hydrocarbons for just over 1

[20] Complaint ¶¶ 92, 101, *USA v. Heritage Thermal Servs., Inc.*, No. 4:18-cv-2419 (E.D. Ohio Oct. 18, 2018), ECF No. 1.
[21] Save Our County, Inc., Comment on Heritage Thermal Services, Inc.'s Draft Hazardous Waste Renewal Permit and Draft Title V Permit at 7 (Aug. 18, 2017), https://static1.squarespace.com/static/52d06637e4b03daab13b67f6/t/5a2ed345ec212d1fdd6093bf/1513018190690/SOC+Comment+on+Heritage+RCRA+and+Title+V+permit+renewal.pdf
[22] Finding of Violation ¶ 59, *In re Heritage Thermal Servs., Inc.*, No. EPA-5-15-OH-12 (EPA Mar. 23, 2015).
[23] Complaint, *supra* note 20, ¶ 108.

hour. That same report documented that one of the incinerators was in an upset mode (resulting in a startup/shutdown event) for 1 hour and 39 minutes.

VEOLIA TECHNICAL SOLUTIONS – PORT ARTHUR, TEXAS

Publicly available records indicate that, since the beginning of 2018, the facility reported at least ***86*** violations of emission limits or OPLs. There were **40** unique exceedances of the emissions standard for carbon monoxide, and an additional ***6*** exceedances of the facility's minimum combustion chamber temperature OPL.

TCEQ has issued notices of violation ("NOVs") and cited the facility for these and other violations related to its hazardous waste incineration. In responding to a recent NOV, the facility acknowledged that "compliance with the [CO] authorized emission limit requires precise timing and control by highly skilled [o]perators to balance the fuel to oxygen ratio to achieve optimal combustion and control of CO emissions."[24] The facility has suggested that they will be able to limit CO exceedances through additional training. But state records indicate that the facility's struggles in minimizing CO emissions are longstanding, dating back at least a decade.

CLEAN HARBORS ENVIRONMENTAL SERVICES – KIMBALL, NEBRASKA

Publicly available records indicate that, since the beginning of 2019, there were at least ***105*** total violations of emission limits, OPLs, or other permit terms. The facility reported at least ***57*** instances where it exceeded the emissions standard for THC. Of these, two were expressly linked in the facility's reports to problems maintaining adequate minimum temperature for the combustor. There was ***1*** additional reported violation during this span where the facility violated its minimum temperature requirement. The facility also documented ***10*** exceedances of the particulate matter standard.

However, these reports may actually undercount the compliance problems at the facility. A separate report related to leak-detection also requires reporting of startup/shutdown events; the list presented in such reports includes incidents that are not reflected in the list of OPL and emission limit violations reported for 2019.

Summary reports filed by the facility show that, during 2019, the facility was in "upset" mode and reporting excess THC emissions for a total of 45.7 hours. Of this total, 27.25 hours were attributable to "startup/shutdown" events with the remaining being attributable to "process problems." The facility reported an additional 0.4 hours of excess emissions related to O_2-related upset conditions.

[24] Tex. Council on Envtl. Qual., Investigation Report: Veolia ES Technical Solutions, Investigation No. 1591996 at 9–10 (Sept. 2019).

Another permit term violation related to the incineration of prohibited waste. In issuing the facility a NOV, the state regulatory agency – the Nebraska Department of Environmental Quality ("NDEQ") – classified the violation as a "high-priority violation" of its RCRA permit. The facility also reported two other incidents in 2019 that led to fires igniting on the premises. And in September of 2019, the facility received a notice of violation from EPA related to deficiencies in its processing and storage of hazardous wastes; similar violations were noted in a May 2019 notice of violation issued earlier by NDEQ.

Conclusion - PFAS incineration is unnecessary as new and promising destruction technologies on their way.

While PFAS incineration is fraught with technical and operational challenges and poses a serious threat to the communities surrounding incinerators, new destruction technologies could provide a safer and more effective disposal alternative. These novel technologies use heat, pressure, enzymes or other forces to deconstruct PFAS in confined systems. This means that breakdown products can be contained and studied to ensure destruction was complete before waste products are released in the environment. Among the most promising technologies are Super Critical Water Oxidation (SCWO) which EPA has said appears to be a promising alternative to incineration for AFFF waste.[25] Instead of returning to PFAS incineration, DOD and other federal agencies should be leading the transition to safer and more effective PFAS destruction technologies.

[25] EPA. 2021. Supercritical water oxidation as an innovative technology for PFAS destruction. https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=354238&Lab=CEMM