

You asked and we answered!

This Fact Sheet provides a preliminary comparison of PFAS levels in Nantucket Compost with PFAS levels published in a 2020 Report “Characterizing and Comparing Per- and Polyfluoroalkyl Substances in Commercially Available Biosolid and Organic Non-Biosolid-Based Products¹.”

Waste Options Nantucket, LLC (WON), the operator of the Landfill site and the Co-Compost Facility at Madaket Road, is required to perform PFAS sampling in accordance with new MassDEP requirements for Approval of Suitability (AOS) permit holders relative to land application of Co-Compost (also known as Nantucket Natural Compost). Specifically, WON was required to sample their Co-Compost product by the end of October 2020, and then quarterly thereafter (i.e. January, April, July, and October). The PFAS concentrations of the Co-Compost are provided in Table A1. This Fact Sheet presents a comparison summary of Co-Compost results with the PFAS concentrations of compost materials reported in the 2020 report by Lazcano, et.al. cited below.

Table A1. PFAS Concentrations in Nantucket Co-Compost for Samples on 10/28/2020

Client Sample ID		Units	FC1028	FC1028 (DUP)
Laboratory Sample ID			320-66089-1	320-66089-2
Sample Date			10/28/2020	10/28/2020
			Qual	Qual
EPA 537 Modified				
365-22-4	Perflourobutanoic Acid (PFBA)	ng/g	0.48	0.41
2706-90-3	Perflouropentanoic Acid (PFPeA)	ng/g	0.92	0.86
307-24-4	Perflourohexanoic Acid (PFHxA)	ng/g	1.7	1.5
375-85-9	Perflouroheptanoic Acid (PFHpA)	ng/g	0.40	0.34
335-67-1	Perflourooctanoic Acid (PFOA)	ng/g	1.4	1.1
375-95-1	Perflouroonanoic Acid (PFNA)	ng/g	0.40	0.34
335-76-2	Perflourodecanoic Acid (PFDA)	ng/g	0.91	0.78
2058-94-8	Perflouroundecanoic Acid (PFUnA)	ng/g	0.27 F1	0.26 JI
307-55-1	Perflourododecanoic Acid (PFDoA)	ng/g	0.41	0.34
72638-94-8	Perflourotridecanoic Acid (PFTriA)	ng/g	0.092 J	0.082 J
375-73-5	Perflourobutanesulfonic Acid (PFBS)	ng/g	0.46	0.40
2706-91-4	Perflouropentanesulfonic Acid (PFPeS)	ng/g	ND F1	ND
355-46-4	Perflourohexanesulfonic Acid (PFHxS)	ng/g	0.12 J	0.11 J
1763-23-1	Perflourooctanesulfonic Acid (PFOS)	ng/g	3.5	3.20
68259-12-1	Perflouroonanesulfonic Acid (PFNS)	ng/g	ND	ND
335-77-3	Perflourodecanesulfonic Acid (PFDS)	ng/g	0.059 J	ND
Total Sum		ng/g	11.12	9.72
General Chemistry				
STL00177	Percent Moisture	%	26.4	26.0
STL00234	Percent Solids	%	73.6	74.0

Notes:

Data provided by Waste Options Nantucket, LLC.

ND: Non detect. Laboratory reporting limits for all compounds in FC1028 was 0.26 ng/g, and for FC1028 (DUP) was 0.27 ng/g.

Qual: Laboratory qualifier

F1: MS and/or MSD recovery exceeds control limits

J: Value is EMPC (estimated maximum possible concentration)

I: Result is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL) and the concentration is an approximate value.

¹ Rooney Kim Lazcano, Youn Jeong Choi, Michael L. Mashtare, and Linda S. Lee. *Characterizing and Comparing Per- and Polyfluoroalkyl Substances in Commercially Available Biosolid and Organic Non-Biosolid-Based Products*. Environmental Science & Technology, 2020. <https://doi.org/10.1021/acs.est.9b07281>

The Nantucket Co-Compost is produced from organic Municipal Solid Waste (compostable waste) from the residents and businesses of Nantucket and includes dewatered sludge, which is an output from the Wastewater Treatment Facilities (WWTFs) that serve Nantucket. The Municipal Solid Waste combined with dewatered sludge is processed through a large industrial drum and then screened and further processed through the compost facility. The product is then mixed with leaf/yard waste and windrowed outside for six months to finish. The final product is referred to as Co-Compost.

The first round of AOS permit Co-Compost sampling was conducted by SITEC Environmental on behalf of WON and analyzed by Eurofins Test America, Sacramento. The AOS permit samples were analyzed by EPA PFAS Drinking Water Method 537.1 Modified, as a method specific to analyzing PFAS in biosolids and co-compost is not available. At this time there are no applicable criteria for biosolids or co-compost for comparison, therefore Table A1 presents only the analytical results.

Testing of compost for concentrations of PFAS compounds is an area of evolving science. A recent study of PFAS levels in compost materials was published in the peer-reviewed journal, *Environmental Science and Technology*, 2020, by Lazcano, et.al. When we talk about PFAS showing up in the environment, it is mostly referring to perfluoroalkyl substances, specifically perfluoroalkyl acids (PFAAs). This study examined the occurrence of perfluoroalkyl acids (PFAAs) present in commercially available biosolid-based products, organic composts, and food and yard waste compost. The following information from the study is presented below:

- Table 1 which details the Organic (All Natural Material) Products (A–G) and Biosolid-Based Products (H–R) Analyzed in the Study, and
- Figure 1 which presents a bar graph of the perfluoroalkyl acid (PFAA) concentrations as measured in the products tested.

Additional Study background information includes:

- “The objective of this study was to quantify and compare perfluoroalkyl acid (PFAA) concentrations in 13 commercially available biosolid-based products (mostly obtained in 2014 except for one each in 2016 and 2018), 6 products consisting of composted natural organic materials (manure, mushroom, peat, or untreated wood), and the composted food and yard waste-based product.”
- “All organic products were obtained in 2014 from different states within the United States and consisted of 11 biosolid-based products and 7 organic (non-biosolid-based) products (Table 1) except for two obtained later from one vendor (Milorganite, Product J).” Table 1 below provides a brand, description, and source of Products labeled A through G.
- “PFAA concentrations (refer to Figure 1 below) were measured in the <2 mm particle size fraction of products A–G and M–R. The granular heat-treated products H–L were not sieved. Product A is a food and yard compost.”

Table 1. Details for the Organic (All Natural Material) Products (A–G) and Biosolid-Based Products (H–R) Analyzed in the Study^a

Table from Lazcano, et.al.

ID	brand	description	available form
Organic Non-Biosolid Products			
A	undisclosed source	food and yard compost	truck loads at vendors
B	EKO Organic Compost Soil	composts of tree and grass clippings and discarded Christmas trees	bags at any major stores
C	Gardener's Pride Composted Manure	manure compost	bags at any major stores
D	New Plant Life Manure	manure and peat compost	bags at any major stores
E	New Plant Life Mushroom	mushroom compost	bags at any major stores
F	Country Soil Mushroom Compost	mushroom compost	bags at any major stores
G	Promix Ultimate Organic Mix	Canadian sphagnum peat moss, perlite, limestone, gypsum, soy-based natural fertilizer	bags at any major stores
Biosolid-Based Products			
H	Bay State Fertilizer	heat-treated granular biosolids	bags at local stores
I	Hou-Actinite	heat-treated granular biosolids	bags at local stores
J	Milorganite	heat-treated granular biosolids	bags at any major stores
K	OceanGro	heat-treated granular biosolids	bags at local stores
L	undisclosed source	heat-treated granular biosolids	local vendors
M	TAGRO Potting Soil	biosolids blended with maple sawdust and aged bark	bags and truck loads at local vendors
N	undisclosed source	composted biosolids with woodchips	truck loads at vendors
O	undisclosed source	composted biosolids with woodchips	truck loads at vendors
P	undisclosed source	composted biosolids with municipal solid waste	truck loads at vendors
Q	Dillo Dirt	composted biosolids with residential yard trimmings	bags at local stores
R	Elite Lawn	composted biosolids with plant materials	bags at local stores

^aProducts H–L are heat-treated.

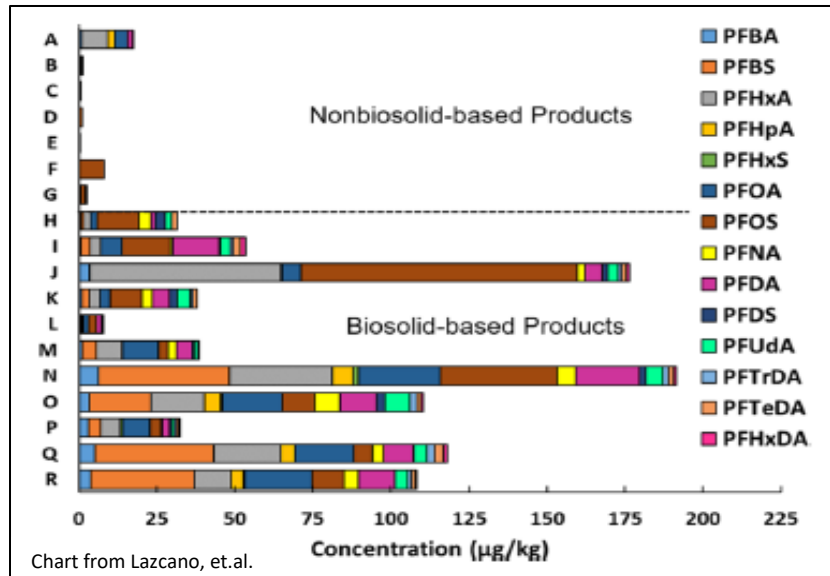
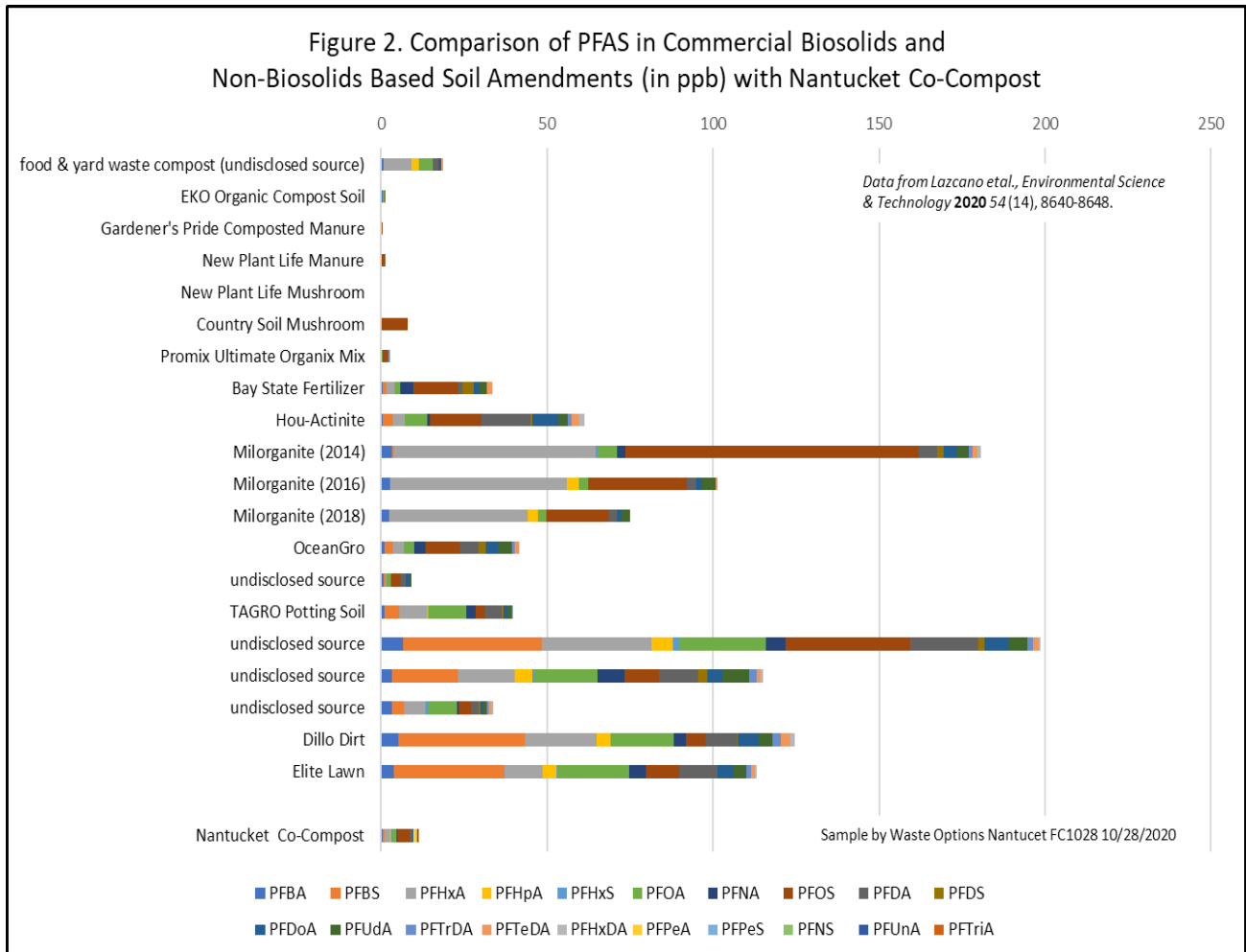


Figure 1. PFAA concentrations in the <2 mm particle size fraction of products A–G and M–R. The granular heat-treated products H–L were not sieved. Product A is a food and yard compost.



The data for Figure 2 was produced by WON and shows the PFAS testing results for Nantucket Co-Compost (bottom bar) plotted with the results of the study by Lazcano, et.al. The data used to produce this chart is in the Appendix of the Fact Sheet. Units of PFAS concentration presented in Figure 2, ppb (parts per billion), µg/kg (micrograms per kilogram) presented in Figure 1. The comparison of the study commercial products and Nantucket Co-Compost PFAS concentrations demonstrates that the Nantucket Co-Compost PFAA concentrations seem to fall at the lower end of the concentrations reported for the range of compost products in the study by Lazcano, et.al. It must be understood, this is simply a comparison with one published study and is not necessarily representative of what might be found in comparison to other reports. As stated earlier, this is an area of evolving science and additional research would be helpful to confirm results.

Why are PFAS found in Nantucket Co-Compost?

The Nantucket Co-Compost is produced from organic Municipal Solid Waste (compostable waste) from the residents and businesses of Nantucket and includes dewatered sludge, which is an output from the WWTFs that serve Nantucket. Co-Compost made from biosolids (i.e., dewatered sludge) and/or from food scraps and other household waste seems likely to contain trace amounts of PFAS chemicals.

Nantucket Natural Co-Compost has not been distributed to the public since August 2019 due to an overabundance of lawn and yard waste compost. The Town will wait for guidance from MassDEP before reinstating Co-Compost distribution. Leaf and yard compost is produced and available for public use.

Leaf and yard compost is NOT made from biosolids and/or food scrap/household waste and therefore does not contain the materials with PFAS compounds that may exist in those waste streams.

PFAS are chemicals produced since the 1940s and are currently found in many common products such as household cleaners, food packaging, clothing, carpeting and beauty products.

- This includes household products like non-stick pans, stain resistant furniture and carpets, wrinkle free and water repellent clothing, cosmetics, lubricants, paint, pizza boxes, popcorn bags, some dental flosses, and firefighting foam.
- Because of this, PFAS are also present in our bodies, our environment, and biosolids.

Nantucket is following the guidance and testing requirements of MassDEP as it pertains to PFAS. Efforts are focused on identifying sources of PFAS in our waste materials and developing plans so PFAS can be reduced or eliminated from the environment. Screening levels for PFAS compounds in biosolids and compost have not been established by EPA or MassDEP and are expected to be available in the next few years.

Additional information on PFAS, including more Frequently Asked Questions, is provided on the Town's website at: <https://nantucket-ma.gov/1574/PFAS>

Appendix: Data from Lazcano, et.al., and Waste Options Nantucket used to produce Figure 2.

PFAS Concentration (ppb) Details for the Organic (All Natural Material) Products (A–G), Biosolid-Based Products (H–R) with Nantucket Co-compost for Comparison																				
Soil Amendment Product	PFBA	PFPeA	PFPeS	PFBS	PFHxA	PFHpA	PFHxS	PFOA	PFNA	PFOS	PFDA	PFDS	PFNS	PFUdA	PFUnA	PFDoA	PFTriA	PFTrDA	PFTeDA	PFHxDA
A. food & yard waste compost (undisclosed source)	0.8	No data	No data	0	8.4	2.3	0	4.1	0	0	1.7	0	No data	*	No data	0.9	No data	*	0.4	*
B. EKO Organic Compost Soil	0.6	No data	No data	0	0	0	0	0.5	0	0.2	0	0	No data	*	No data	0	No data	*	*	*
C. Gardener's Pride Composted Manure	0	No data	No data	0	0	0	0	0	0	0.6	0	0	No data	*	No data	0	No data	*	*	*
D. New Plant Life Manure	0	No data	No data	0	0	0	0	0	0	1.2	0	0	No data	*	No data	0	No data	*	*	*
E. New Plant Life Mushroom	0.1	No data	No data	0	0	0	0	0	0	0	0	0	No data	*	No data	0	No data	*	*	*
F. Country Soil Mushroom	0	No data	No data	0	0	0	0	0	0	8.1	0	0	No data	*	No data	0	No data	*	*	*
G. Promix Ultimate Organix Mix	0	No data	No data	0	0	0	0	0.5	0	1.6	0	0	No data	0.15	No data	0	No data	0.4	*	*
H. Bay State Fertilizer	0.6	No data	No data	1.1	2.3	0	0	1.9	3.9	13.4	1.4	3.2	No data	2.1	No data	1.9	No data	*	1.6	*
I. Hou-Actinite	0.6	No data	No data	3	3.5	0	0	6.9	0.8	15.4	14.9	0.6	No data	2.9	No data	7.7	No data	1	2.4	1.6
J. Milorganite (2014)	3.3	No data	No data	0.4	61	0	0.42	6.1	2.3	88.5	5.5	1.8	No data	3.5	No data	4.1	No data	1.2	1.3	1.1
J. Milorganite (2016)	2.8	No data	No data	0	53.1	3.75	0	2.7	0	29.7	2.9	0	No data	4.1	No data	1.7	No data	*	0.6	*
J. Milorganite (2018)	2.5	No data	No data	0	41.63	3.02	0	2.72	0	18.7	2.6	0	No data	2.4	No data	1.42	No data	*	*	*
K. OceanGro	0.9	No data	No data	2.6	3.3	0	0	3.3	3.3	10.3	5.5	2.3	No data	4.3	No data	3.7	No data	0.7	1.5	*
L. undisclosed source	0.7	No data	No data	0.5	0.5	0	0	1.4	0	2.6	1.7	0	No data	0.6	No data	1.1	No data	*	*	*
M. TAGRO Potting Soil	1.1	No data	No data	4.4	8.3	0.4	0	11.4	2.8	3	4.9	0.67	No data	1.3	No data	1.1	No data	0.1	*	*
N. undisclosed source	6.5	No data	No data	41.9	33	6.5	1.9	26	6.1	37.5	20.5	1.87	No data	5.6	No data	7.3	No data	1.7	1.6	0.7
O. undisclosed source	3.4	No data	No data	19.7	17.3	5.3	0.45	19.1	8.1	10.4	11.7	2.8	No data	8	No data	4.6	No data	2.3	1.2	0.8
P. undisclosed source	3.2	No data	No data	3.8	6.4	0	0.82	8.6	0.7	3.5	2.2	0.6	No data	1	No data	1	No data	0.6	0.7	0.6
Q. Dillo Dirt	5.2	No data	No data	38.1	21.5	4.4	0	19	3.6	5.9	9.6	0.2	No data	4.2	No data	6.3	No data	2.5	2.7	1.3
R. Elite Lawn	3.9	No data	No data	33.2	11.6	4.1	0.47	21.5	4.9	10.1	11.5	0	No data	4	No data	4.8	No data	1.3	1.2	0.5
Nantucket Co-Compost Sample FC1028 10/28/2020	0.48	0.92	ND	0.46	1.7	0.4	0.12	1.4	0.4	3.5	0.91	0.059	ND	No data	0.27	0.41	0.092	No data	No data	No data
Notes	* Less than Limits of Quantification; ND Non-detect; See the source data for more complete information																			