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Supporting Information

Drying Reduces the Total PFAS Concentration in Biosolids and Alters the PFAS Profile

Patrick J McNamara[1,2], Jessica Calteux[2], Eric Redman[3], Taryn McKnight[3], Lynne Moss[1], Webster Hoener[1], Scott Carr[1], Zhongzhe Liu[4]

[1]Black & Veatch

[2]Marquette University

[3]Eurofins Environment Testing USA

[4]California State University - Bakersfield

Section A. Classified PFAS Analytes and Isotopes

Table S1. PFAS Analytes and Isotopes used for Analysis of Samples.

Class		PFAS Analyte	Cas. Num	Associated Isotope Dilution Analyte (IDA)	Cas. Num
Perfluoroalkyl acids (PFAA) [terminal]	Perfluoroalkyl carboxylic acids (PFCA) [terminal]	Perfluoropropionic (PFPrA)	422-64-0	13C3 PFPrA	STL03194
		Perfluorobutanoic acid (PFBA)	375-22-4	13C4 PFBA	STL00992
		Perfluoropentanoic acid (PFPeA)	2706-90-3	13C5 PFPeA	STL01893
		Perfluorohexanoic acid (PFHxA)	307-24-4	13C2 PFHxA	STL00993
		Perfluoroheptanoic acid (PFHpA)	375-85-9	13C4 PFHpA	STL01892
		Perfluorooctanoic acid (PFOA)	335-67-1	13C4 PFOA	STL00990
		Perfluorononanoic acid (PFNA)	375-95-1	13C5 PFNA	STL00995
		Perfluorodecanoic acid (PFDA)	335-76-2	13C2 PFDA	STL00996
		Perfluoroundecanoic acid (PFUnA)	2058-94-8	13C2 PFUnA	STL00997
		Perfluorododecanoic acid (PFDoA)	307-55-1	13C2 PFDoA	STL00998
		Perfluorotridecanoic acid (PFTrDA)	72629-94-8	13C2 PFDoA	STL00998
		Perfluorotetradecanoic acid (PFTeA)	376-06-7	13C2 PFTeDA	STL02116
		Perfluoro-n-hexadecanoic acid (PFHxDA)	67905-19-5	13C2 PFHxDA	STL02115
		Perfluoro-n-octadecanoic acid (PFODA)	16517-11-6	13C2 PFHxDA	STL02115

Perfluoroalkyl acids (PFAA) [terminal]	Perfluoroalkyl sulfonic acids (PFSA) [terminal]	Perfluoropropanesulfonic acid (PFPrS)	423-41-6	13C3 PFBS	STL02337
		Perfluorobutanesulfonic acid (PFBS)	375-73-5	13C3 PFBS	STL02337
		Perfluoropentanesulfonic acid (PFPeS)	2706-91-4	13C3 PFBS	STL02337
		Perfluorohexanesulfonic acid (PFHxS)	355-46-4	18O2 PFHxS	STL00994
		Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	13C4 PFOS	STL00991
		Perfluorooctanesulfonic acid (PFOS)	1763-23-1	13C4 PFOS	STL00991
		Perfluorononanesulfonic acid (PFNS)	68259-12-1	13C4 PFOS	STL00991
		Perfluorodecanesulfonic acid (PFDS)	335-77-3	13C4 PFOS	STL00991
		Perfluorododecanesulfonic acid (PFDoS)	79780-39-5	13C4 PFOS	STL00991
		Perfluoroethylcyclohexanesulfonic acid (PFECHS)	133201-07-7	13C4 PFOA	STL00990
		PFECA G (PFPE-1)	801212-59-9	13C-6:2 FTCA	STL02802

Perfluoroether carboxylic acids (PFECA) [terminal]	Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	13C2 PFHxA	STL00993
	Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	13C5 PFPeA	STL01893
	Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	13C5 PFPeA	STL01893
	PFO4DA	39492-90-5	13C4 PFHpA	STL01892
	PFO3OA	39492-89-2	13C2 PFHxA	STL00993
	Hydro-EVE Acid	773804-62-9	13C4 PFHpA	STL01892
	4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	919005-14-4	13C4 PFOS	STL00991
	Hexafluoropropylene oxide dimer acid (HFPO-DA)	13252-13-6	13C3 HFPO-DA	STL02255
Branched isomers of PFECA [terminal]	PMPA	13140-29-9	13C4 PFBA	STL00992
	PEPA	267239-61-2	13C5 PFPeA	STL01893
Monocarboxylic acid [terminal]	PFMOAA	674-13-5	13C4 PFBA	STL00992
	PFO2HxA	39492-88-1	13C5 PFPeA	STL01893

Perfluoroether sulfonic acids (PFESA) [terminal]	Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA)	113507-82-7	13C3 PFBS	STL02337
	Hydro-PS Acid	749836-20-2	13C4 PFHpA	STL01892
	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)	756426-58-1	13C4 PFOS	STL00991
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)	763051-92-9	13C4 PFOS	STL00991
	NVHOS	1132933-86-8	13C4 PFBA	STL00992
Misc.	PFO5DA	39492-91-6	13C4 PFOA	STL00990
	R-PSDCA	2416366-21-5	13C4 PFHpA	STL01892
Perfluoroalkyl sulfonamides [precursors]	Perfluorooctanesulfonamide (FOSA)	754-91-6	13C8 FOSA	STL01056
	N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2355-31-9	d3-NMeFOSAA	STL02118
	N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2991-50-6	d5-NEtFOSAA	STL02117
	N-methylperfluoro-1-octanesulfonamide (NMeFOSA)	31506-32-8	d-N-MeFOSA-M	STL02275
	N-ethylperfluoro-1-octanesulfonamide (NEtFOSA)	4151-50-2	d-N-EtFOSA-M	STL02282
	2-(N-methylperfluoro-1-octanesulfonamido ethanol (NMeFOSE)	24448-09-7	d7-N-MeFOSE-M	STL02277
	2-(N-ethylperfluoro-1-octanesulfonamido ethanol (NEtFOSE)	1691-99-2	d9-N-EtFOSE-M	STL02278

Fluorotelomer substances (FTS) [precursors]	1H,1H,2H,2H-Perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	13C2-4:2 FTS	STL02395
	1H,1H,2H,2H-Perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	13C2-6:2 FTS	STL02279
	1H,1H,2H,2H-Perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	13C2-8:2 FTS	STL02280
	1H,1H,2H,2H-Perfluorododecane sulfonic acid (10:2 FTS)	120226-60-0	13C2-10:2 FTS	STL02814
	3-Perfluoropropylpropanoic acid (3:3 FTCA)	356-02-5	13C3 PFBS	STL02337
	3-Perfluoropentylpropanoic acid (5:3 FTCA)	914637-49-3	13C-6:2 FTCA	STL02802
	3-Perfluoroheptylpropanoic acid (7:3 FTCA)	812-70-4	13C5 PFNA	STL02803
	6:2 FTCA (FHEA)	53826-12-3	13C-6:2 FTCA	STL02802
	8:2 FTCA (FOEA)	27854-31-5	13C-8:2 FTCA	STL02803

Section B. PFAS Concentration Data, Reporting Limits, and Statistics for Full-Scale Dryer and Lab-Scale Oven Experiments

A note from the authors: Eurofins analytical reports include qualifiers. After discussion with Eurofins, it was determined that the integrity of the data was strong enough to merit the inclusion of these qualified data in this report. To ensure transparency, all qualifiers are indicated in the following tables. It should be noted that the figures in the report include only the detected species, while the statistics on the data (i.e., p-values and percent removals) were calculated by substituting non-detects in the data (indicated with "BRL") with the reporting limits given in the Eurofins reports; this avoided the assumption that 100% removal of a species was achieved if the species was not present above reporting limits in a post-drying sample. This approach balances the uncertainty inherent in PFAS detection methods with a conservative statistical analysis. Case-by-case descriptions of the data are given, as each set was subject to its own nuances.

Furthermore, the selection of a t-test was based upon the relationship between the pre-drying sample and the post-drying sample. For post-drying samples that were initially extracted from a pre-drying sample and then dried in a lab-scale oven, paired t-tests were used. For post-drying samples that were collected from a WRRF's full-scale dryer, it was impossible to ascertain that the pre-drying sample was collected from the same batch of biosolids as that which was recovered from the full-scale dryer, so unpaired t-tests were used.

Table S2. PFAS concentrations for pre-drying and post-drying samples from full-scale dryer and corresponding lab-scale oven (units of µmol F F/kg biosolids). Data are shown in Figures 1 and 2. BRL: species concentration was "below reporting limit". I qualifier: value is estimated maximum possible concentration. H qualifier: "Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements." F1 qualifier: "MS and/or MSD recovery exceeds control limits." Total row only includes species detected above reporting limits.

µmol F/kg biosolids	Pre-drying			Lab-scale oven post-drying			Full-scale dryer post-drying		
	1	2	3	1	2	3	1	2	3
PFBA	BRL	BRL	BRL	BRL	BRL	BRL	0.0095	BRL	BRL
PFPeA	BRL	BRL	BRL	0.021	BRL	0.022	0.095	0.030	0.055
PFHxA	0.081	0.081[H]	0.070	0.022	BRL	0.021	0.095	0.024	0.029
PFOA	BRL	BRL	BRL	BRL	BRL	BRL	0.012	BRL	BRL
PFDA	0.055[I]	0.048[H]	0.044	BRL	BRL	BRL	0.018	BRL	BRL
PFUnA	BRL	BRL	BRL	BRL	BRL	BRL	0.010	BRL	BRL
PFDoA	BRL	BRL	BRL	BRL	BRL	BRL	0.0097	BRL	BRL
PFBS	BRL	BRL	BRL	0.018	BRL	BRL	BRL	BRL	BRL
PFHxS	BRL	BRL	BRL	0.039[I]	0.049[I]	0.039[I]	0.025[I]	0.018[I]	0.012[I]
PFHpS	BRL	BRL	BRL	BRL	BRL	BRL	0.010[I]	BRL	BRL
PFOS	0.54[H]	0.54[H]	0.31[F1]	0.092	0.078	0.075	0.18	0.054	0.061
PFDS	BRL	BRL	0.25[I, F1]	BRL	BRL	BRL	BRL	BRL	0.0084[I]
NMeFOSAA	0.13	0.12[H]	0.11	0.019	BRL	0.016	0.039	0.014	0.014
NEtFOSAA	0.076	0.076[H]	0.064	BRL	BRL	BRL	0.026	0.0067	0.0081
NMeFOSE	0.061	0.070[H]	0.061	0.020	0.020	0.025	0.017	0.010	0.011
NEtFOSE	BRL	BRL	BRL	BRL	BRL	BRL	0.012	BRL	BRL
5:3 FTCA	3.2	3.2[H]	2.0	0.45	0.35	0.35	0.39	0.26	0.27
6:2 FTCA	0.45	0.34[H]	0.096	BRL	BRL	BRL	BRL	BRL	BRL
7:3 FTCA	0.18	0.19[H]	0.11	0.025	0.021	0.019	0.034	BRL	0.011
6:2 FTS	0.11	0.085[H]	0.088	0.019	BRL	0.021	0.043	0.014	0.011
Total:	4.89	4.78	3.17	0.72	0.52	0.59	1.02	0.43	0.49

Table S3. PFAS concentrations for pre-drying and post-drying samples from full-scale dryers and corresponding lab-scale oven (units of µg/kg biosolids). BRL: species concentration was "below reporting limit". I qualifier: value is estimated maximum possible concentration. H qualifier: "Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements." F1 qualifier: "MS and/or MSD recovery exceeds control limits." Total row only includes species detected above reporting limits.

µg/kg biosolids	Pre-drying			Lab-scale oven post-drying			Full-scale dryer post-drying		
	1	2	3	1	2	3	1	2	3
PFBA	BRL	BRL	BRL	BRL	BRL	BRL	0.29	BRL	BRL
PFPeA	BRL	BRL	BRL	0.62	BRL	0.66	2.8	0.87	1.6
PFHxA	2.3	2.3[H]	2	0.63	BRL	0.61	2.7	0.68	0.82
PFOA	BRL	BRL	BRL	BRL	BRL	BRL	0.34	BRL	BRL
PFDA	1.5[I]	1.3[H]	1.2	BRL	BRL	BRL	0.49	BRL	BRL
PFUnA	BRL	BRL	BRL	BRL	BRL	BRL	0.28	BRL	BRL
PFDoA	BRL	BRL	BRL	BRL	BRL	BRL	0.26	BRL	BRL
PFBS	BRL	BRL	BRL	0.6	BRL	BRL	BRL	BRL	BRL
PFHxS	BRL	BRL	BRL	1.2[I]	1.5[I]	1.2[I]	0.76[I]	0.54[I]	0.36[I]
PFHpS	BRL	BRL	BRL	BRL	BRL	BRL	0.30[I]	BRL	BRL
PFOS	16[H]	16[H]	9.2[F1]	2.7	2.3	2.2	5.2	1.6	1.8
PFDS	BRL	BRL	7.1[I, F1]	BRL	BRL	BRL	BRL	BRL	0.24[I]
NMeFOSAA	4.3	4.1[H]	3.7	0.64	BRL	0.55	1.3	0.46	0.48
NEtFOSAA	2.6	2.6[H]	2.2	BRL	BRL	BRL	0.89	0.23	0.28
NMeFOSE	2	2.3[H]	2	0.65	0.64	0.82	0.56	0.34	0.37
NEtFOSE	BRL	BRL	BRL	BRL	BRL	BRL	0.41	BRL	BRL
5:3 FTCA	100	100[H]	61	14	11	11	12	8	8.4
6:2 FTCA	13	10[H]	2.8	BRL	BRL	BRL	BRL	BRL	BRL
7:3 FTCA	5.2	5.7[H]	3.3	0.73	0.63	0.55	1	BRL	0.32
6:2 FTS	3.6	2.8[H]	2.9	0.63	BRL	0.69	1.4	0.45	0.37
Total:	150.5	147.1	97.4	22.4	16.1	18.3	31.0	13.2	15.0

Table S4. Reporting limits of PFAS species for each sample (units of µg/kg biosolids). **Bold** indicates detection of species.

Reporting limits (µg/kg biosolids)	Pre-drying			Lab-scale oven post-drying			Full-scale dryer post-drying		
	1	2	3	1	2	3	1	2	3
PFBA	1.2	1.2	1.2	0.51	0.61	0.52	**0.25**	0.21	0.21
PFPeA	1.2	1.2	1.2	**0.51**	0.61	**0.52**	**0.25**	**0.21**	**0.21**
PFHxA	**1.2**	**1.2**	**1.2**	**0.51**	0.61	**0.52**	**0.25**	**0.21**	**0.21**
PFOA	1.2	1.2	1.2	0.51	0.61	0.52	**0.25**	0.21	0.21
PFDA	**1.2**	**1.2**	**1.2**	0.51	0.61	0.52	**0.25**	0.21	0.21
PFUnA	1.2	1.2	1.2	0.51	0.61	0.52	**0.25**	0.21	0.21
PFDoA	1.2	1.2	1.2	0.51	0.61	0.52	**0.25**	0.21	0.21
PFBS	1.2	1.2	1.2	**0.51**	0.61	0.52	0.25	0.21	0.21
PFHxS	1.2	1.2	1.2	**0.51**	**0.61**	**0.52**	**0.25**	**0.21**	**0.21**
PFHpS	1.2	1.2	1.2	0.51	0.61	0.52	**0.25**	0.21	0.21
PFOS	**1.2**	**1.2**	**1.2**	**0.51**	**0.61**	**0.52**	**0.25**	**0.21**	**0.21**
PFDS	1.2	1.2	**1.2**	0.51	0.61	0.52	0.25	0.21	**0.21**
NMeFOSAA	**1.2**	**1.2**	**1.2**	**0.51**	0.61	**0.52**	**0.25**	**0.21**	**0.21**
NEtFOSAA	**1.2**	**1.2**	**1.2**	0.51	0.61	0.52	**0.25**	**0.21**	**0.21**
NMeFOSE	**1.2**	**1.2**	**1.2**	**0.51**	**0.61**	**0.52**	**0.25**	**0.21**	**0.21**
NEtFOSE	1.2	1.2	1.2	0.51	0.61	0.52	**0.25**	0.21	0.21
5:3 FTCA	**1.2**	**1.2**	**1.2**	**0.51**	**0.61**	**0.52**	**0.25**	**0.21**	**0.21**
6:2 FTCA	**1.7**	**1.9**	**1.8**	0.76	0.91	0.78	0.37	0.31	0.31
7:3 FTCA	**1.2**	**1.2**	**1.2**	**0.51**	**0.61**	**0.52**	**0.25**	0.21	**0.21**
6:2 FTS	**1.2**	**1.2**	**1.2**	**0.51**	0.61	**0.52**	**0.25**	**0.21**	**0.21**

Table S5. Statistical significance of removal by PFAS species, indicated by p-values. Non-detects within triplicate data were filled in with reporting limits provided in the analytical PFAS report. The type of t-test conducted is indicated in parentheses according to the comparison being made. Statistically significant differences are considered p-values < 0.05. Reporting limits were substituted in for non-detects.

p-values for removal	Pre-drying to Lab-scale oven post-drying (paired)	Pre-drying to Full-scale dryer post-drying (unpaired)	Lab-scale oven post-drying vs. Full-scale dryer post-drying (unpaired)
PFBA	0.0024	<0.0001	0.0017
PFPeA	0.0007	0.3785	0.1159
PFHxA	0.0037	0.2915	0.2954
PFOA	0.0024	<0.0001	0.0055
PFDA	0.0163	0.0013	0.0691
PFUnA	0.0024	<0.0001	0.0014
PFDoA	0.0024	<0.0001	0.0009
PFBS	0.0021	<0.0001	0.0004
PFHxS	0.4226	0.0050	0.0081
PFHpS	0.0024	<0.0001	0.0022
PFOS	0.0348	0.0130	0.7122
PFDS	0.3168	0.2101	0.0008
NMeFOSAA	0.0019	0.0006	0.6257
NEtFOSAA	0.0041	0.0013	0.7282
NMeFOSE	0.0100	0.0002	0.0362
NEtFOSE	0.0024	0.0002	0.0217
5:3 FTCA	0.0268	0.0040	0.1925
6:2 FTCA	0.1234	0.0523	0.0007
7:3 FTCA	0.0276	0.0054	0.6422
6:2 FTS	0.0107	0.0047	0.7852
Total PFAS	0.0196	0.0026	0.4621

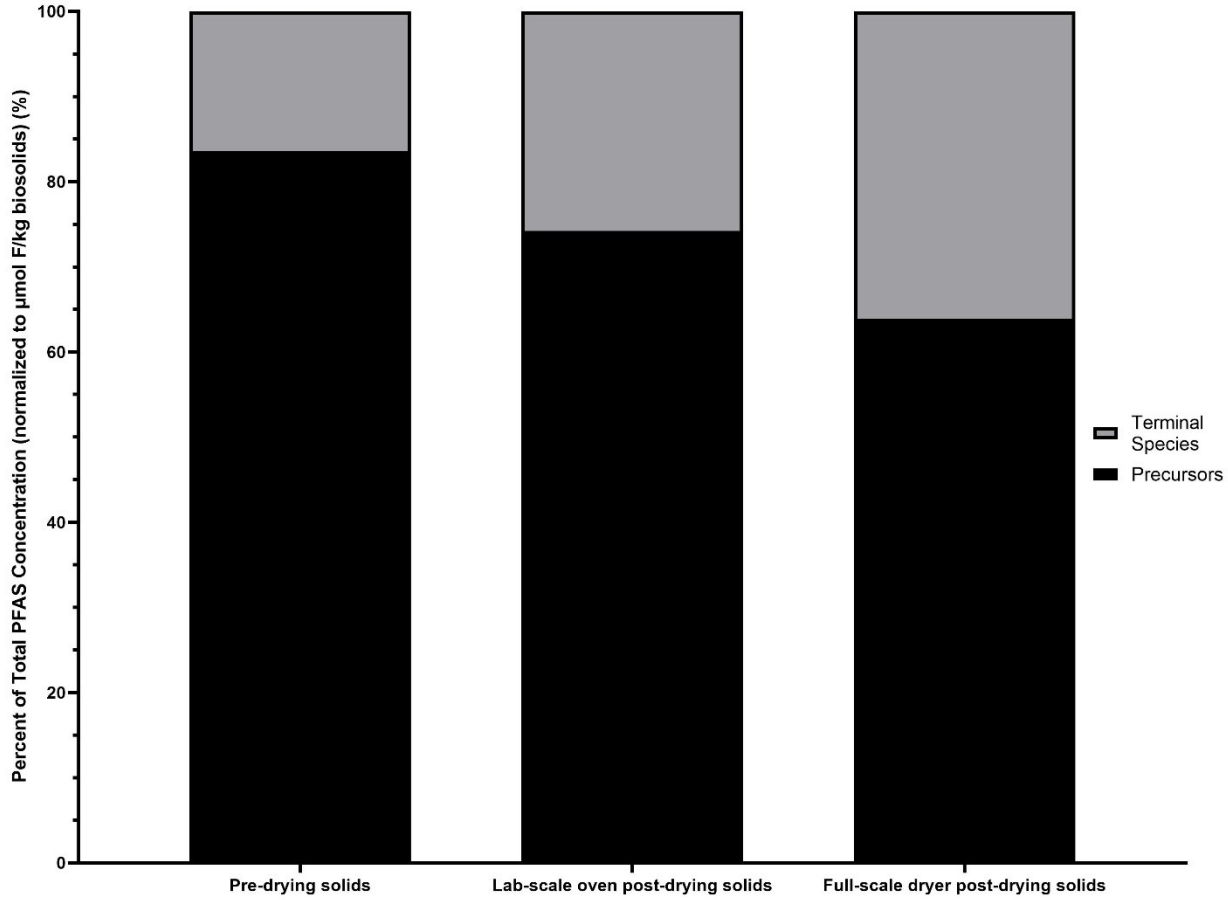

Figure S1. The portion of total PFAS (normalized to µmol F/kg) as precursors was reduced by lab-scale oven and full-scale dryer drying. Only detected species were included in this figure. Species were categorized as precursors or terminal species according to Buck et al., 2011 and Zhang et al., 2019, shown in Table S6 below.[1,2]

Table S6: Categorization of PFAS species for Figure S1, above.

Terminal Species	Precursor Species
PFBA	NMeFOSAA
PFPeA	NEtFOSAA
PFHxA	NMeFOSE
PFOA	NEtFOSE
PFDA	5:3 FTCA
PFUnA	6:2 FTCA
PFDoA	7:3 FTCA
PFBS	6:2 FTS
PFHxS	
PFHpS	
PFOS	
PFDS	

Table S7. Precursor vs. terminal PFAS species data used in Figure S1. Only detected species were included in this data.

µmol F/kg biosolids	Pre-drying samples			Lab-scale oven post-drying samples			Full-scale dryer post-drying samples		
	1	2	3	1	2	3	1	2	3
Terminal Species	0.68	0.67	0.68	0.19	0.13	0.16	0.46	0.13	0.16
Precursor Species	4.21	4.11	2.49	0.53	0.39	0.43	0.56	0.30	0.33
Total PFAS	4.89	4.78	3.17	0.72	0.52	0.59	1.02	0.43	0.49
Precursor Species/ Total PFAS	0.86	0.86	0.79	0.74	0.76	0.73	0.55	0.71	0.66
Terminal Species/ Total PFAS	0.14	0.14	0.21	0.26	0.24	0.27	0.45	0.29	0.34

Table S8. Statistical significance of changes to precursor fraction, indicated by p-values. Reporting limits were substituted in for non-detects for the sake of statistical analysis. The type of t-test conducted is indicated in parentheses according to the comparison being made. Statistically significant differences are considered p-values < 0.05.

Ratio of precursor species to total PFAS (as µmol F/kg)	Pre-drying to Lab-scale oven post-drying (paired)	Pre-drying to Full-scale dryer post-drying (unpaired)	Lab-scale oven post-drying vs. Full-scale dryer post-drying (unpaired)
p-value	0.039457	0.012440	0.531417

Table S9. Average percent removal of total PFAS in units of µmol F/kg biosolids. Total PFAS shown in Figure 3. Percent removals calculated from data in Table S2. Reporting limits were substituted in for non-detects. An unpaired t-test on the triplicate percent removal data yielded a p-value of 0.3773, demonstrating that the percent removal of total PFAS was not significantly different between lab-scale oven drying and full-scale drying.

	Pre-drying samples			Lab-scale oven post-drying samples			Full-scale dryer post-drying samples		
	1	2	3	1	2	3	1	2	3
Total PFAS (µmol F/kg biosolids)	5.30	5.18	3.53	0.908	0.838	0.795	1.047	0.510	0.559
Average Total PFAS	4.67			0.847			0.705		
Average percent removal of total PFAS (%)				81.9			84.9		

Section C. PFAS Concentration Data, Reporting Limits, and Statistics for Sites A, B, and C

Table S10. PFAS concentrations for pre-drying and post-drying samples from three different WRRFs (units of µmol F/kg biosolids). Data are shown in Figure 4. BRL: species concentration was "below reporting limit". E qualifier: result exceeded calibration range. I qualifier: value is estimated maximum possible concentration. Total row only includes species detected above reporting limits.

µmol F/kg biosolids	A pre-drying	A post-drying	B pre-drying	B post-drying	C pre-drying	C post-drying
PFBA	BRL	0.01	BRL	BRL	BRL	0.007
PFPeA	BRL	0.017	BRL	0.008	BRL	0.016
PFHxA	BRL	0.014	BRL	0.015	BRL	0.03
PFOA	0.08	0.024	0.062	0.015	0.032	0.03
PFNA	0.051	0.016	0.051	0.01	BRL	0.012
PFDA	0.24	0.074	0.281	0.052	0.144[I]	0.078
PFUnA	0.052	0.014	0.048	0.01[I]	0.063	0.037
PFDoA	0.064	0.016	0.056	0.009	0.075	BRL
PFTeA	BRL	BRL	BRL	BRL	BRL	0.012
PFHxS	0.094	BRL	BRL	BRL	BRL	BRL
PFOS	4.079[E]	1.054[E]	0.337	0.071[I]	0.578	0.201
PFDS	BRL	0.01	BRL	BRL	BRL	BRL
PEPA	BRL	0.024	BRL	BRL	BRL	BRL
FOSA	0.034	BRL	BRL	BRL	BRL	BRL
NMeFOSAA	0.185	0.042	0.265	0.042	0.089	0.036
NEtFOSAA	0.078	0.019	0.134	0.018	0.093	0.044
NMeFOSE	0.113	0.017	0.14	0.07	0.265	0.055
NEtFOSE	BRL	0.006	BRL	BRL	BRL	0.022
5:3 FTCA	2.154	0.251	1.608	0.45	1.19	0.264
6:2 FTCA	0.413	BRL	0.237	BRL	0.413	0.013[I]
7:3 FTCA	0.142	0.041	0.475	0.129	0.166	0.068
8:2 FTCA	0.06	BRL	0.082	BRL	0.078	BRL
6:2 FTS	0.033	0.01[I]	BRL	BRL	BRL	BRL
8:2 FTS	0.1	0.028	0.042	0.007	BRL	BRL
10:2 FTS	BRL	BRL	0.04	0.007	0.047	BRL
Total:	7.97	1.69	3.86	0.913	3.23	0.922

Table S11. PFAS concentrations for pre-drying and post-drying samples from three different WRRFs (units of µg/kg biosolids). BRL: species concentration was "below reporting limit". E qualifier: result exceeded calibration range. I qualifier: value is estimated maximum possible concentration. Total row only includes species detected above reporting limits.

µg/kg biosolids	A pre-drying	A post-drying	B pre-drying	B post-drying	C pre-drying	C post-drying
PFBA	BRL	0.31	BRL	BRL	BRL	0.21
PFPeA	BRL	0.51	BRL	0.24	BRL	0.47
PFHxA	BRL	0.39	BRL	0.44	BRL	0.85
PFOA	2.2	0.67	1.7	0.41	0.88	0.82
PFNA	1.4	0.45	1.4	0.28	BRL	0.32
PFDA	6.5	2	7.6	1.4	3.9[I]	2.1
PFUnA	1.4	0.37	1.3	0.27[I]	1.7	1
PFDoA	1.7	0.42	1.5	0.24	2	BRL
PFTeA	BRL	BRL	BRL	BRL	BRL	0.31
PFHxS	2.9	BRL	BRL	BRL	BRL	BRL
PFOS	120[E]	31[E]	9.9	2.1[I]	17	5.9
PFDS	BRL	0.28	BRL	BRL	BRL	BRL
PEPA	BRL	0.74	BRL	BRL	BRL	BRL
FOSA	1	BRL	BRL	BRL	BRL	BRL
NMeFOSAA	6.2	1.4	8.9	1.4	3	1.2
NEtFOSAA	2.7	0.64	4.6	0.61	3.2	1.5
NMeFOSE	3.7	0.56	4.6	2.3	8.7	1.8
NEtFOSE	BRL	0.2	BRL	BRL	BRL	0.75
5:3 FTCA	67	7.8	50	14	37	8.2
6:2 FTCA	12	BRL	6.9	BRL	12	0.37[I]
7:3 FTCA	4.2	1.2	14	3.8	4.9	2
8:2 FTCA	1.7	BRL	2.3	BRL	2.2	BRL
6:2 FTS	1.1	0.32[I]	BRL	BRL	BRL	BRL
8:2 FTS	3.1	0.88	1.3	0.21	BRL	BRL
10:2 FTS	BRL	BRL	1.2	0.2	1.4	BRL
Total:	239	50.1	117	27.9	97.9	27.8

Table S12. Reporting limits of PFAS species for each sample (units of µg/kg biosolids). Bold indicates detection of species.

Reporting limits (µg/kg biosolids)	A pre-drying	A post-drying	B pre-drying	B post-drying	C pre-drying	C post-drying
PFBA	1.0	**0.2**	0.95	0.19	0.8	**0.19**
PFPeA	1.0	**0.2**	0.95	**0.19**	0.8	**0.19**
PFHxA	1.0	**0.2**	0.95	**0.19**	0.8	**0.19**
PFOA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
PFNA	**1.0**	**0.2**	**0.95**	**0.19**	0.8	**0.19**
PFDA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
PFUnA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
PFDoA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	0.19
PFTeA	1.0	0.2	0.95	0.19	0.8	**0.19**
PFHxS	**1.0**	0.2	0.95	0.19	0.8	0.19
PFOS	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
PFDS	1.0	**0.2**	0.95	0.19	0.8	0.19
PEPA	1.0	**0.2**	0.95	0.19	0.8	0.19
FOSA	**1.0**	0.2	0.95	0.19	0.8	0.19
NMeFOSAA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
NEtFOSAA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
NMeFOSE	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
NEtFOSE	1.0	**0.2**	0.95	0.19	0.8	**0.19**
5:3 FTCA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
6:2 FTCA	**1.6**	0.3	**1.4**	0.29	**1.2**	**0.28**
7:3 FTCA	**1.0**	**0.2**	**0.95**	**0.19**	**0.8**	**0.19**
8:2 FTCA	**1.0**	0.2	**0.95**	0.19	**0.8**	0.19
6:2 FTS	**1.0**	**0.2**	0.95	0.19	0.8	0.19
8:2 FTS	**1.0**	**0.2**	**0.95**	**0.19**	0.8	0.19
10:2 FTS	1.0	0.2	**0.95**	**0.19**	**0.8**	0.19

Table S13. Average percent removal of total PFAS in units of µmol F/kg biosolids from three WRRFs. Percent removals calculated from data in Table S10. Reporting limits were substituted in for non-detects.

	A pre-drying	A post-drying	B pre-drying	B post-drying	C pre-drying	C post-drying
Total PFAS (µmol F/kg biosolids)	8.24	1.73	4.17	0.980	3.56	0.979
Percent removal of total PFAS (%)	79.0		76.5		72.4	
Average percent removal of total PFAS (%)	76.0					

Section D. PFAS Concentration Data, Reporting Limits, and Statistics for 30°C Oven and 105°C Oven Experiments (high moisture content)

Table S14. PFAS concentrations for pre-drying and post-drying samples from 30°C oven drying and 105°C oven drying (units of µmol F/kg biosolids). Data are shown in Figure 5. BRL: species concentration was "below reporting limit". I qualifier: value is estimated maximum possible concentration. H qualifier: "Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements." Total row only includes species detected above reporting limits.

µmol F/kg biosolids	30°C post-drying			105°C post-drying		
	1	2	3	1	2	3
PFBA	BRL	BRL	BRL	BRL	BRL	0.088[H]
PFDA	0.085[H]	0.10[H]	0.081[H]	0.081[H]	0.092[H]	0.070[H]
PFDoA	0.037[H]	0.037[H]	0.036[H]	0.034[H]	0.033[H]	0.032[H]
PFOS	0.32[I, H]	0.33[I, H]	0.32[I, H]	0.31[I, H]	0.33[I, H]	0.30[I, H]
PEPA	BRL	BRL	0.058[H]	BRL	BRL	BRL
NMeFOSAA	0.062[H]	0.065[H]	0.060[H]	0.048[H]	0.060[H]	0.054[H]
NEtFOSAA	0.029[H]	0.032[H]	0.029[H]	BRL	0.029[H]	0.026[H]
NMeFOSE	0.064[H]	0.064[H]	0.064[H]	0.040[H]	0.043[H]	0.037[H]
5:3 FTCA	0.42[H]	0.42[H]	0.48[H]	0.32[H]	0.32[H]	0.35[H]
6:2 FTCA	0.065[H]	0.076[H]	0.058[H]	BRL	BRL	BRL
7:3 FTCA	0.068[H]	0.064[H]	0.081[H]	0.051[H]	0.054[H]	0.058[H]
Total:	1.15	1.19	1.27	0.88	0.96	1.02

Table S15. PFAS concentrations for pre-drying and post-drying samples from 30°C oven drying and 105°C oven drying (units of µg/kg biosolids). BRL: species concentration was "below reporting limit". I qualifier: value is estimated maximum possible concentration. H qualifier: "Sample was prepped or analyzed beyond the specified holding time. This does not meet regulatory requirements." Total row only includes species detected above reporting limits.

µg/kg biosolids	30°C post-drying			105°C post-drying		
	1	2	3	1	2	3
PFBA	BRL	BRL	BRL	BRL	BRL	2.7[H]
PFDA	2.3[H]	2.7[H]	2.2[H]	2.2[H]	2.5[H]	1.9[H]
PFDoA	0.98[H]	1.0[H]	0.96[H]	0.9[H]	0.88[H]	0.85[H]
PFOS	9.4[I, H]	9.7[I, H]	9.5[I, H]	9.1[I, H]	9.6[I, H]	8.9[I, H]
PEPA	BRL	BRL	1.8[H]	BRL	BRL	BRL
NMeFOSAA	2.1[H]	2.2[H]	2.0[H]	1.6[H]	2.0[H]	1.8[H]
NEtFOSAA	1.0[H]	1.1[H]	0.99[H]	BRL	1.0[H]	0.9[H]
NMeFOSE	2.1[H]	2.1[H]	2.1[H]	1.3[H]	1.4[H]	1.2[H]
5:3 FTCA	13[H]	13[H]	15[H]	10[H]	9.9[H]	11[H]
6:2 FTCA	1.9[H]	2.2[H]	1.7[H]	BRL	BRL	BRL
7:3 FTCA	2[H]	1.9[H]	2.4[H]	1.5[H]	1.6[H]	1.7[H]
Total:	34.8	35.9	38.7	26.6	28.9	31.0

Table S16. Statistical significance in difference between post-drying samples at two temperatures, indicated by p-values. Reporting limits were substituted in for non-detects. Unpaired t-tests were used. Statistically significant differences are considered p-values < 0.05.

Species	P-value (30°C post-drying vs. 105°C post-drying)
PFBA	0.3244
PFDA	0.4353
PFDoA	0.0086
PFOS	0.2144
PEPA	0.4749
NMeFOSAA	0.0808
NEtFOSAA	0.1148
NMeFOSE	0.0002
5:3 FTCA	0.0111
6:2 FTCA	0.0093
7:3 FTCA	0.0376
Total PFAS	0.0058

Table S17. Reporting limits of PFAS species for each sample (units of µg/kg biosolids). **Bold** indicates detection of species.

Reporting limits (µg/kg biosolids)	30°C post-drying			105°C post-drying		
	1	2	3	1	2	3
PFBA	510	0.66	0.70	0.77	0.85	0.73
PFDA	510	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**
PFDoA	510	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**
PFOS	**510**	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**
PEPA	510	0.66	0.70	**0.77**	0.85	0.73
NMeFOSAA	**510**	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**
NEtFOSAA	510	**0.66**	**0.70**	**0.77**	0.85	**0.73**
NMeFOSE	**510**	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**
5:3 FTCA	**510**	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**
6:2 FTCA	760	**0.99**	**1.1**	**1.2**	1.3	1.1
7:3 FTCA	**510**	**0.66**	**0.70**	**0.77**	**0.85**	**0.73**

Section E. Moisture Content vs. Percent Removal of Total PFAS

Table S18. Moisture content of pre-drying sample and percent removal of total PFAS across experiments. Only paired data were used. Concentrations for percent removal were µmol F/kg biosolids. Reporting limits were substituted in for non-detects. Data are shown in Figure 6.

Sample	Moisture Content (%)	% Removal of Total PFAS
Lab-scale dryer 1	84.1	82.86
Lab-scale dryer 3	84.1	77.50
Lab-scale dryer 2	84.0	83.84
Site A	81.7	79.01
Site B	79.2	76.52
Site C	75.8	72.45

Section F. Precursor fraction of total PFAS decreases in most experiments.

Figure S2. The portion of total PFAS (normalized to µmol F/kg) as precursors was reduced by drying in most experiments. Species were categorized as precursors or terminal species according to Buck et al., 2011 and Zhang et al., 2019, shown in Table S20 below.[1,2]

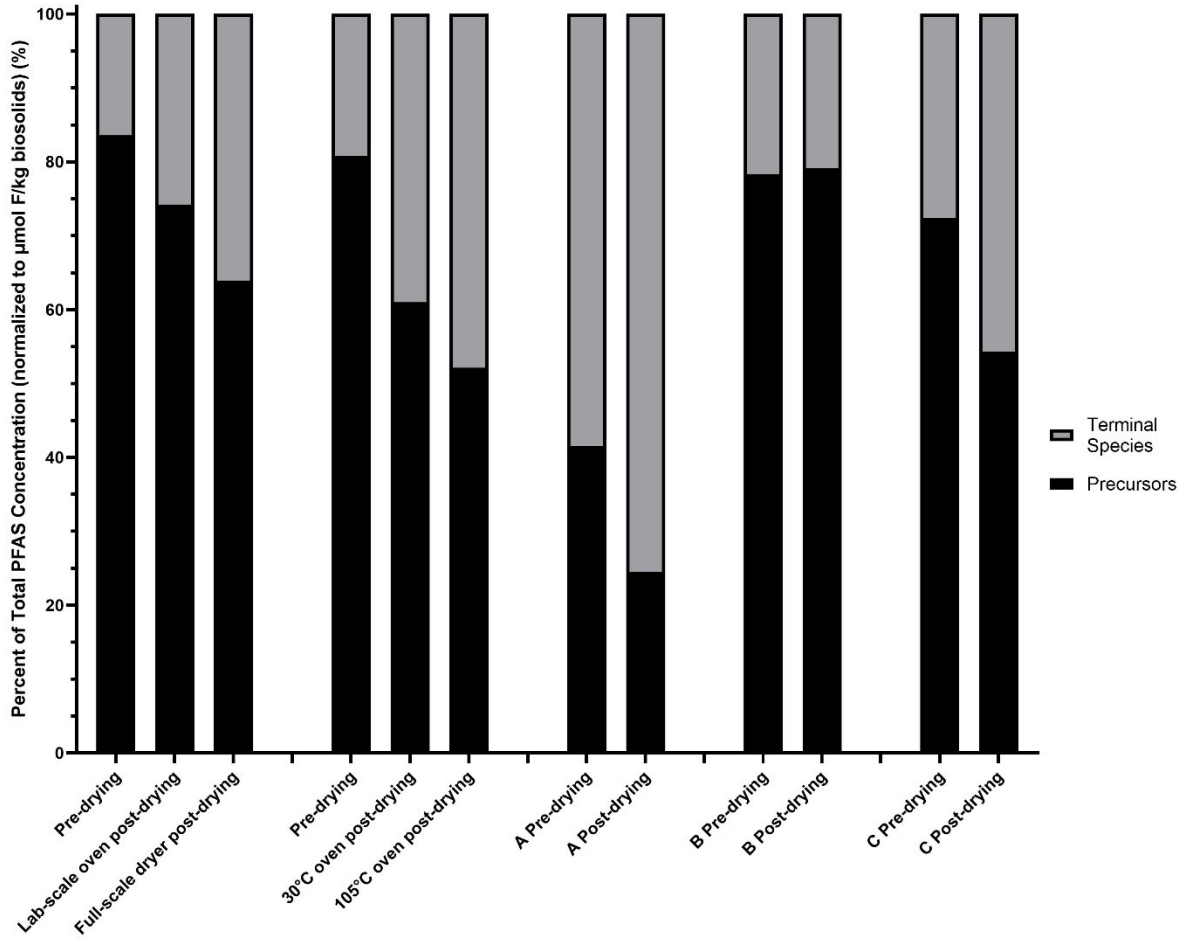

Table S19: Categorization of PFAS species for Figure S2, above.

Terminal Species	Precursor Species
PFBA	FOSA
PFPeA	NMeFOSAA
PFHxA	NEtFOSAA
PFOA	NMeFOSE
PFNA	NEtFOSE
PFDA	5:3 FTCA
PFUnA	6:2 FTCA
PFDoA	7:3 FTCA
PFTeA	8:2 FTCA
PFBS	6:2 FTS
PFHxS	8:2 FTS
PFHpS	10:2 FTS
PFOS	
PFDS	
PEPA	

References

1. Buck RC, Franklin J, Berger U, et al. Perfluoroalkyl and Polyfluoroalkyl Substances in the Environment : Terminology , Classification , and Origins. 2011;7(4):513-541. doi:10.1002/ieam.258

2. Zhang C, Hopkins ZR, McCord J, Strynar MJ, Knappe DRU. Fate of Per- And Polyfluoroalkyl Ether Acids in the Total Oxidizable Precursor Assay and Implications for the Analysis of Impacted Water. *Environ Sci Technol Lett*. 2019;6(11):662-668. doi:10.1021/acs.estlett.9b00525