

## Supplementary Material

### Advanced PFAS precursor digestion methods for biosolids

*Samuel Hutchinson,<sup>A,B</sup> Tarsha Rieck<sup>A</sup> and XiangLan Wu<sup>A</sup>*

<sup>A</sup>Urban Utilities, SAS Laboratory, 180 Ashridge Road, Darra, Qld 4076, Australia.

<sup>B</sup>Corresponding author. Email: [Samuel.Hutchinson@urbanutilities.com.au](mailto:Samuel.Hutchinson@urbanutilities.com.au)

**Supplementary Table S1 Quality Control Data**

Compound	Working-digest Blank (µg/kg)	Blank (µg/kg)	QC 1 (µg/kg)	Recovery %	QC 1 (µg/kg)	Recovery %	QC 10 (µg/kg)	Recovery %	QC 10 (µg/kg)	Recovery %
PFBA	0.00	0.00	0.97	97.3%	1.01	101%	10.5	105%	10.3	103%
PFPeA	0.00	0.00	1.10	110%	1.11	111%	11.6	116%	11.6	116%
PFHxA	0.00	0.00	1.08	108%	0.86	86.2%	9.36	93.6%	10.9	109%
PFHpA	0.00	0.00	1.04	104%	0.93	93.5%	9.55	95.5%	10.8	108%
PFOA	0.00	0.00	1.11	111%	1.14	114%	12.0	120%	11.8	118%
PFNA	0.00	0.00	1.13	113%	1.17	117%	12.0	120%	11.8	118%
PFDA	0.00	0.00	1.03	103%	1.06	107%	11.0	110%	11.2	112%
PFUdA	0.00	0.00	1.06	106%	1.10	110%	11.2	117%	11.5	115%
PFDoA	0.00	0.00	1.00	100%	1.02	102%	10.5	105%	10.8	108%
PFTTrDA	0.00	0.00	1.04	105%	1.00	99.8%	12.9	129%	12.8	128%
PFTeDA	0.00	0.00	1.07	107%	1.06	106%	11.1	111%	11.5	115%
PFOSA	0.00	0.00	0.83	83.4%	0.86	86.2%	8.86	88.6%	8.74	87.4%
MeFOSA	0.00	0.00	0.92	91.6%	0.90	89.7%	9.27	92.7%	9.26	92.6%
EtFOSA	0.00	0.00	1.10	110%	1.12	112%	10.8	108%	11.1	111%
MeFOSE	0.00	0.00	1.05	105%	1.11	111%	11.2	112%	11.5	115%
EtFOSE	0.00	0.00	1.20	120%	1.06	106%	11.0	110%	11.1	111%
EtFOSAA	0.00	0.00	0.71	71.0%	0.70	69.5%	7.71	77.1%	7.27	72.7%
MeFOSAA	0.00	0.00	0.97	96.8%	0.95	95.2%	10.1	101%	9.74	97.4%
PFBS	0.00	0.00	0.91	90.9%	0.87	87.1%	8.71	87.1%	9.58	95.8%
PFPeS	0.00	0.00	1.00	100%	0.91	90.9%	8.58	85.8%	10.4	104%
PFHxS	0.00	0.00	0.89	89.0%	0.89	88.8%	10.7	107%	9.80	98.0%
PFHpS	0.00	0.00	0.85	85.0%	0.78	78.0%	9.88	98.8%	10.6	106%
PFOS	0.00	0.00	0.91	90.9%	0.91	91.1%	8.70	87.0%	9.4	94.3%
PFDS	0.00	0.00	0.80	80.3%	0.87	86.6%	9.37	93.7%	8.87	88.7%
4:2 FTS	0.00	0.00	1.05	105%	0.97	97.1%	10.3	103%	10.5	105%
6:2 FTS	0.00	0.00	0.99	98.6%	0.96	96.1%	9.98	99.8%	9.8	98.4%
8:2 FTS	0.00	0.00	1.02	102%	1.05	105%	9.82	98.2%	10.8	108%
10:2 FTS	0.00	0.00	1.19	120%	0.88	87.5%	8.65	86.5%	12.6	126%

All analysis was undertaken in an ISO/IEC 17025:2017 accredited laboratory following GLP.

**Supplementary Table S2 Digest Recovery Data**

Compound	Working Method (µg/kg)	Standard Deviation	Working Method Spike (µg/kg)	Standard Deviation	Recovery %
PFBA	43.7	5.70	76.7	4.15	132%
PFPeA	56.8	8.48	89.6	3.94	131%
PFHxA	29.6	4.84	53.2	1.33	94.4%
PFHpA	26.1	3.66	62.7	6.01	147%
PFOA	25.9	3.67	59.3	5.99	134%
PFNA	17.8	2.51	47.5	3.15	119%
PFDA	17.2	2.46	45.6	3.67	114%
PFUdA	8.32	1.63	34.7	1.82	106%
PFDoA	7.15	1.47	30.7	3.70	94.3%
PFTTrDA	2.57	0.26	23.3	4.06	83.1%
PFTeDA	3.31	0.62	26.0	2.34	90.8%
PFOSA	0.00	0.00	0.00	0.00	-
MeFOSA	0.00	0.00	0.00	0.00	-
EtFOSA	0.00	0.00	0.00	0.00	-
MeFOSE	0.00	0.00	0.00	0.00	-
EtFOSE	0.00	0.00	0.00	0.00	-
EtFOSAA	0.00	0.00	0.00	0.00	-
MeFOSAA	0.00	0.00	0.00	0.00	-
PFBS	0.00	0.00	0.00	0.00	-
PFPeS	0.00	0.00	0.00	0.00	-
PFHxS	0.00	0.00	0.00	0.00	-
PFHpS	0.00	0.00	0.00	0.00	-
PFOS	19.1	0.53	21.2	0.79	111%
PFDS	0.00	0.00	0.00	0.00	-
4:2 FTS	0.00	0.00	0.00	0.00	-
6:2 FTS	0.00	0.00	0.00	0.00	-
8:2 FTS	0.00	0.00	0.00	0.00	-
10:2 FTS	0.00	0.00	0.00	0.00	-
Sum	258		571		114%

25 µg/Kg of all measured PFCAs was added before digestion of samples. Recovery is calculated based on final PFCA concentration in the spiked samples vs the unspiked. All samples analysed in triplicate

**Supplementary Table S3 Method Detection limits.**

Compound	MDL 99% (µg/kg)	PQL (practical quantitation limit) (µg/kg)
PFBA	0.24	1.19
PFPeA	0.59	2.96
PFHxA	0.39	1.93
PFHpA	0.48	2.42
PFOA	0.69	3.44
PFNA	0.66	3.29
PFDA	0.66	3.32
PFUdA	0.90	4.52
PFDaA	0.94	4.71
PFTrDA	0.60	3.01
PFTeDA	0.30	1.52
PFOSA	0.44	2.21
MeFOSA	0.41	2.04
EtFOSA	0.45	2.25
MeFOSE	0.50	2.51
EtFOSE	0.60	2.99
EtFOSAA	0.58	2.90
MeFOSAA	0.39	1.97
PFBS	0.44	2.19
PFPeS	0.50	2.51
PFHxS	0.55	2.76
PFHpS	0.66	3.32
PFOS	0.92	4.61
PFDS	0.61	3.07
4:2 FTS	0.50	2.49
6:2 FTS	0.73	3.64
8:2 FTS	0.65	3.24
10:2 FTS	0.78	3.88

Detection limits are calculated by standard deviation of spike recoveries at 2µg/kg.

**Supplementary Table S4 Working Method on Various Biosolids**

	Biosolid 1	Biosolid 2	Biosolid 3	Biosolid 4	Biosolid 5	Biosolid 6	Biosolid 7	Biosolid 8	Biosolid 9	Biosolid 10
	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)	(µg/kg)
PFBA	56.3	62.6	39.1	50.5	26.1	35.0	20.6	41.9	14.8	25.5
PFPeA	52.7	81.8	40.9	47.8	22.0	32.2	22.6	36.6	18.5	23.5
PFHxA	37.0	69.6	25.7	37.0	14.9	23.3	15.1	24.8	14.7	17.0
PFHpA	35.9	78.7	20.8	34.7	14.6	23.8	14.7	29.7	17.6	15.8
PFOA	25.2	63.0	16.5	29.4	13.3	20.6	12.5	22.3	17.1	12.5
PFNA	18.7	47.9	10.1	17.8	7.6	12.0	7.8	13.2	8.9	7.0
PFDA	20.4	46.4	10.6	16.0	8.9	14.2	5.7	10.7	8.6	5.9
PFuDA	9.3	22.6	5.2	7.8	<5	7.0	<5	5.6	<5	<5
PFDoA	8.1	19.0	5.1	6.5	<5	<5	<5	6.6	<5	<5
PFTTrDA	<5	6.6	<5	<5	<5	<5	<5	<5	<5	<5
PFTeDA	<5	8.3	<5	<5	<5	<5	<5	<5	<5	<5
FOSA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MeFOSA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
EtFOSA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MeFOSE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
EtFOSE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
EtFOSAA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
MeFOSAA	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
PFBS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
PFPeS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
PFHxS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
PFHpS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
PFOS	11.0	6.6	30.0	8.9	5.3	5.5	<5	6.3	5.5	<5
PFDS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
4:2 FTS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
6:2 FTS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
8:2 FTS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
10:2 FTS	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
SUM	274.6	513.2	204.0	256.3	112.6	173.6	99.0	197.7	105.8	107.3