Supporting Information

Source identification of VOCs and their environmental health risk in a petrochemical industrial area

Nattaporn Pinthong[1], Sarawut Thepanondh[1,2*], Akira Kondo[3]

[1] Department of Sanitary Engineering, Faculty of Public Health, Mahidol University, Bangkok, 10400, Thailand
[2] Center of Excellence on Environmental Health and Toxicology (EHT), Bangkok 10400, Thailand
[3] Graduate School of Engineering, Osaka University, Osaka 565-0871, Japan

[*] Corresponding author. Tel: 0 2354 8540; Fax: 0 2354 8540
E-*mail address*: sarawut.the@mahidol.ac.th

Table S1. The lists of VOCs compounds monitored in industrial areas and community areas.

Community areas		
Alkene	Chlorobenzene	Dichloromethane
1,3-Butadiene	Chloroethane	1-Ethyl-4-methylbenzene
Aromatics	Chloroform	1,1,2,2-Tetrachloroethane
Benzene	Chloromethane	Tetrachloroethylene
Ethylbenzene	3-Chloropropene	1,1,1-Trichloroethane
m-,p-Xylene	1,2-Dibromoethane	Trichloroethylene
o-Xylene	1,2-Dichlorobenzene	Vinyl chloride
Styrene	1,3-Dichlorobenzene	Freon 12
Toluene	1,4-Dichlorobenzene	Freon 113
1,2,4-Trimethylbenzene	1,1-Dichloroethane	Freon 114
1,3,5-Trimethylbenzene	1,2-Dichloroethane	Hexachloro-1,3-butadiene
Halogenated Hydrocarbon	1,1-Dichloroethylene	Tetrachloroethylene
Acrylonitrile	1,2-Dichloropropane	Trichloroethylene
Benzyl Chloride	cis-1,2-Dichloroethylene	Vinyl chloride
Bromomethane	cis-1,3-Dichloropropene	
Carbon Tetrachloride	trans-1,3-Dichloropropene	
Industrial areas		
Alkene	Chloroform	Trichloroethylene
1,3-Butadiene	1,2-Dibromoethane	Vinyl chloride
Aromatics	1,4-Dichlorobenzene	**OVOC**
Benzene	1,2-Dichloroethane	Acetaldehyde
Halogenated Hydrocarbon	Dichloromethane	Acrolein
Benzyl chloride	1,2-Dichloropropane	**Others**
Bromomethane	Tetrachloroethylene	Carbon Disulfide
Carbon Tetrachloride	1,1,2,2-Tetrachloroethane	1,4-Dioxane

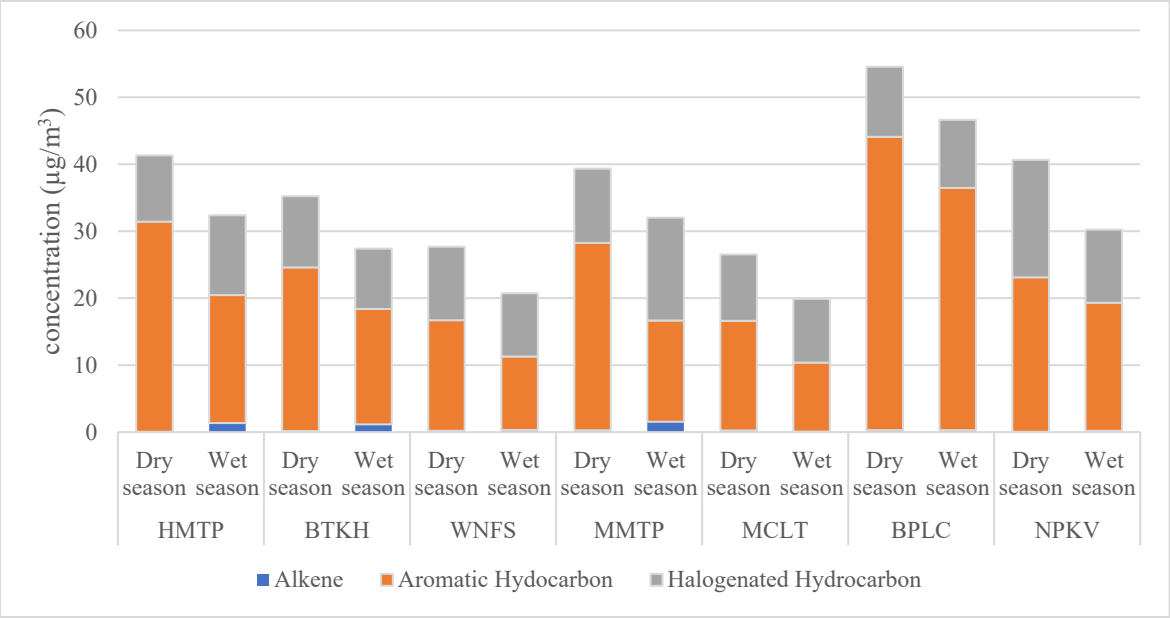

Fig. S1. Seasonal variation of VOCs concentration in each monitoring station in community area

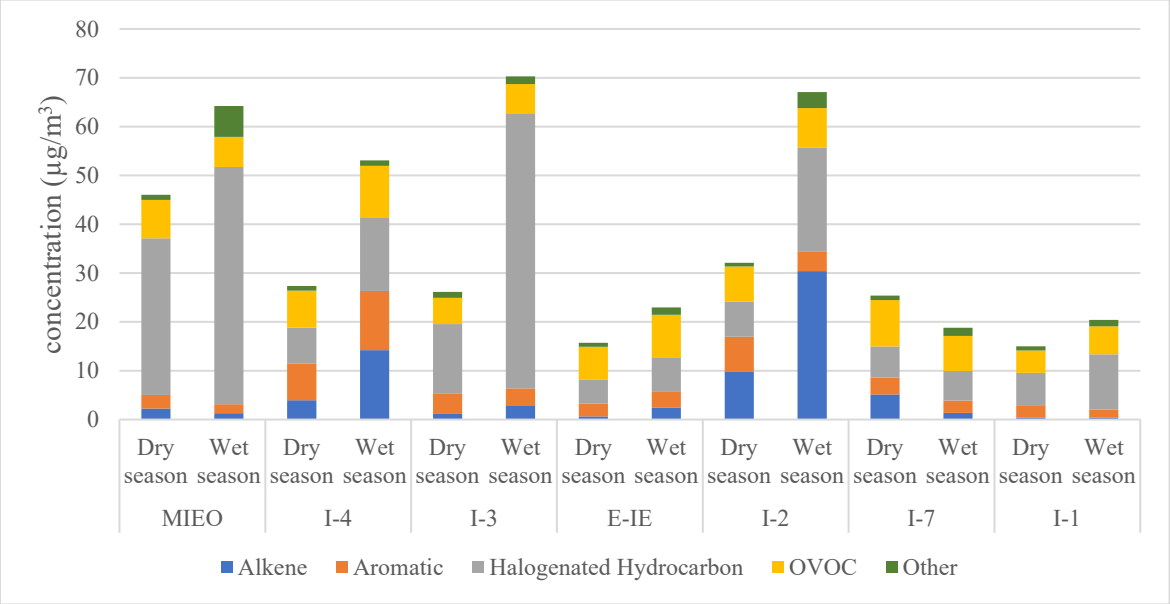

Fig. S2. Seasonal variation of VOCs concentration in each monitoring station within industrial area

Table S2. Inter-annual variation of total VOCs concentration in different monitoring station in 2012-2016.

Station	2012	2013	2014	2015	2016
HMTP	43.45	35.01	33.78	30.89	37.01
BTKH	40.63	29.58	27.45	25.51	29.37
WNFS	25.00	22.71	20.37	25.27	26.63
MMTP	39.45	39.69	32.83	28.86	33.84
MCLT	23.47	23.05	24.63	23.48	21.07
BPLC	63.31	52.83	39.51	56.06	39.91
NPKV	36.93	39.98	44.65	31.51	23.64
MIEO	48.62	70.54	60.05	66.55	26.70
I-4	46.98	30.07	40.90	39.023	45.25
I-3	28.502	57.82	76.66	48.06	34.02
E-IE	22.65	14.75	20.45	18.45	19.77
I-2	54.557	24.94	52.59	82.34	53.03
I-7	17.81	22.83	21.65	23.81	22.89
I-1	19.51	15.04	18.83	19.44	15.38

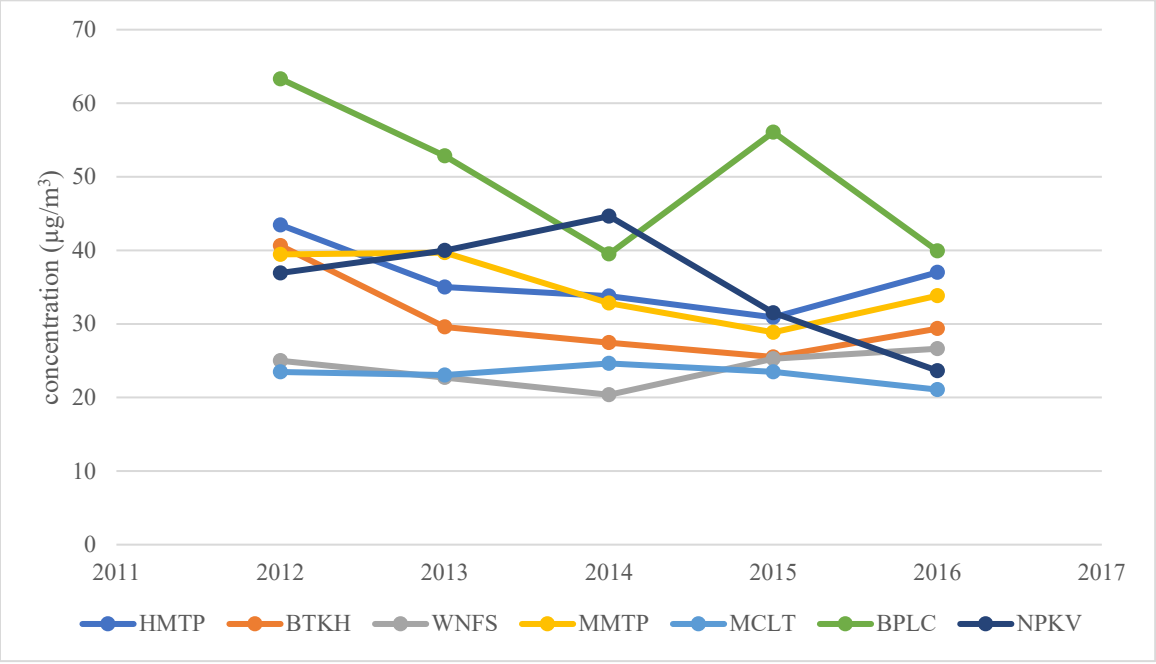

Fig. S3. Inter-annual variation of total VOCs concentration in different monitoring station in 2012-2016 in community area.

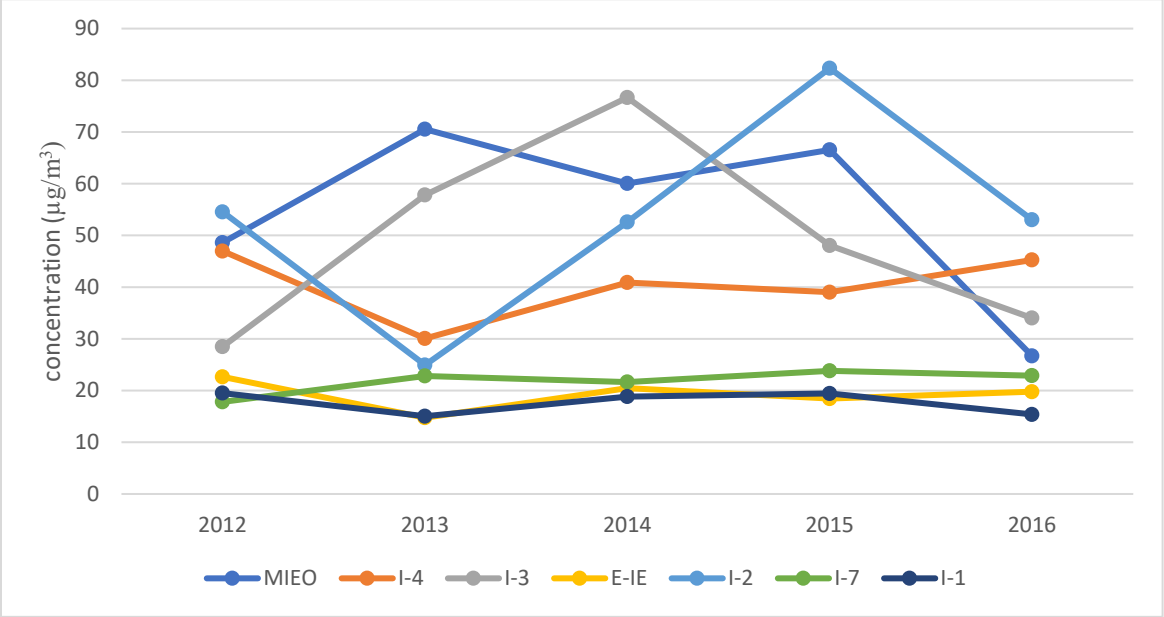

Fig. S4. Inter-annual variation of total VOCs concentration in different monitoring station in 2012-2016 within industrial area

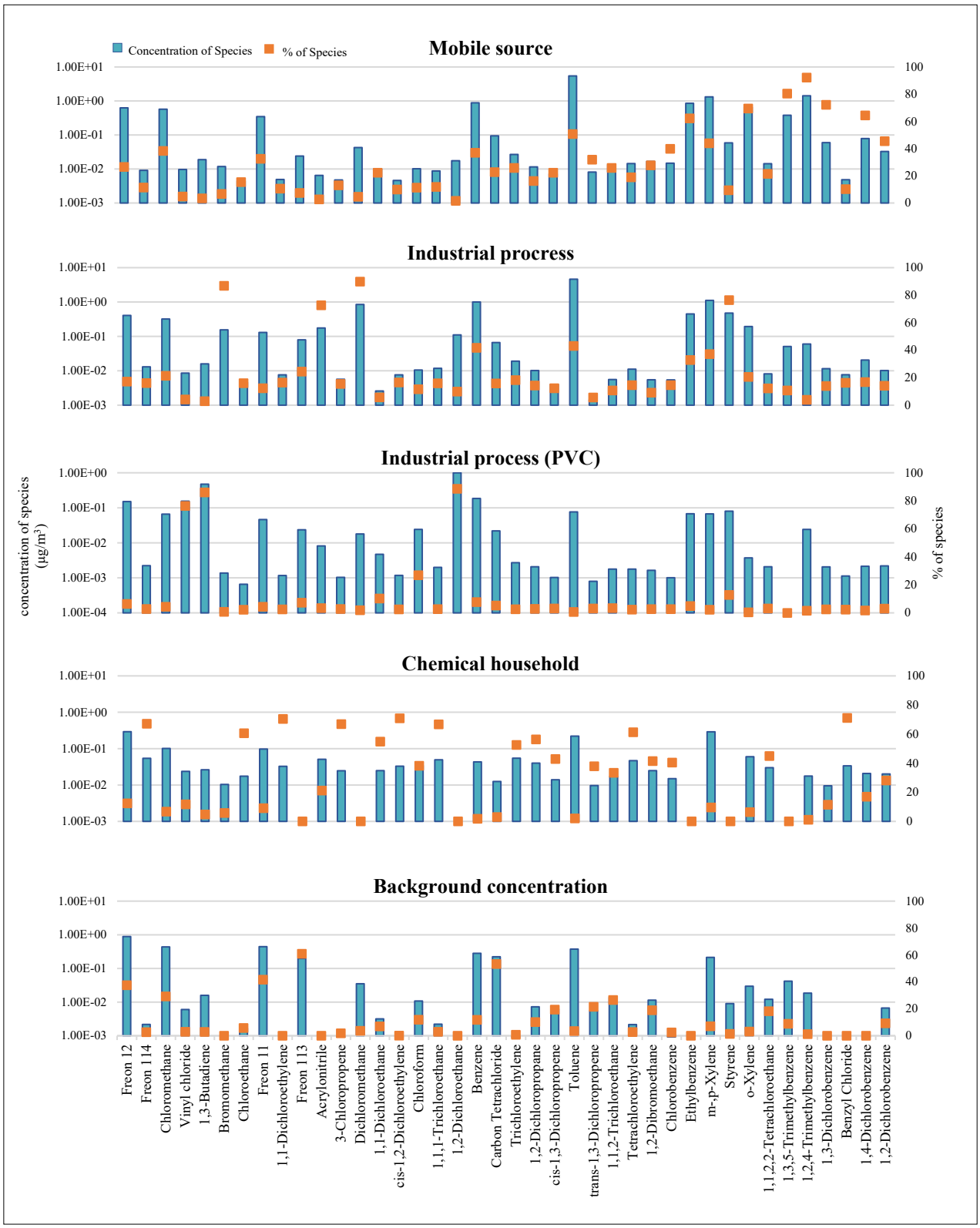

Fig. S5. Source profiles resolved from PMF at HMTP monitoring station in 2012-2016.

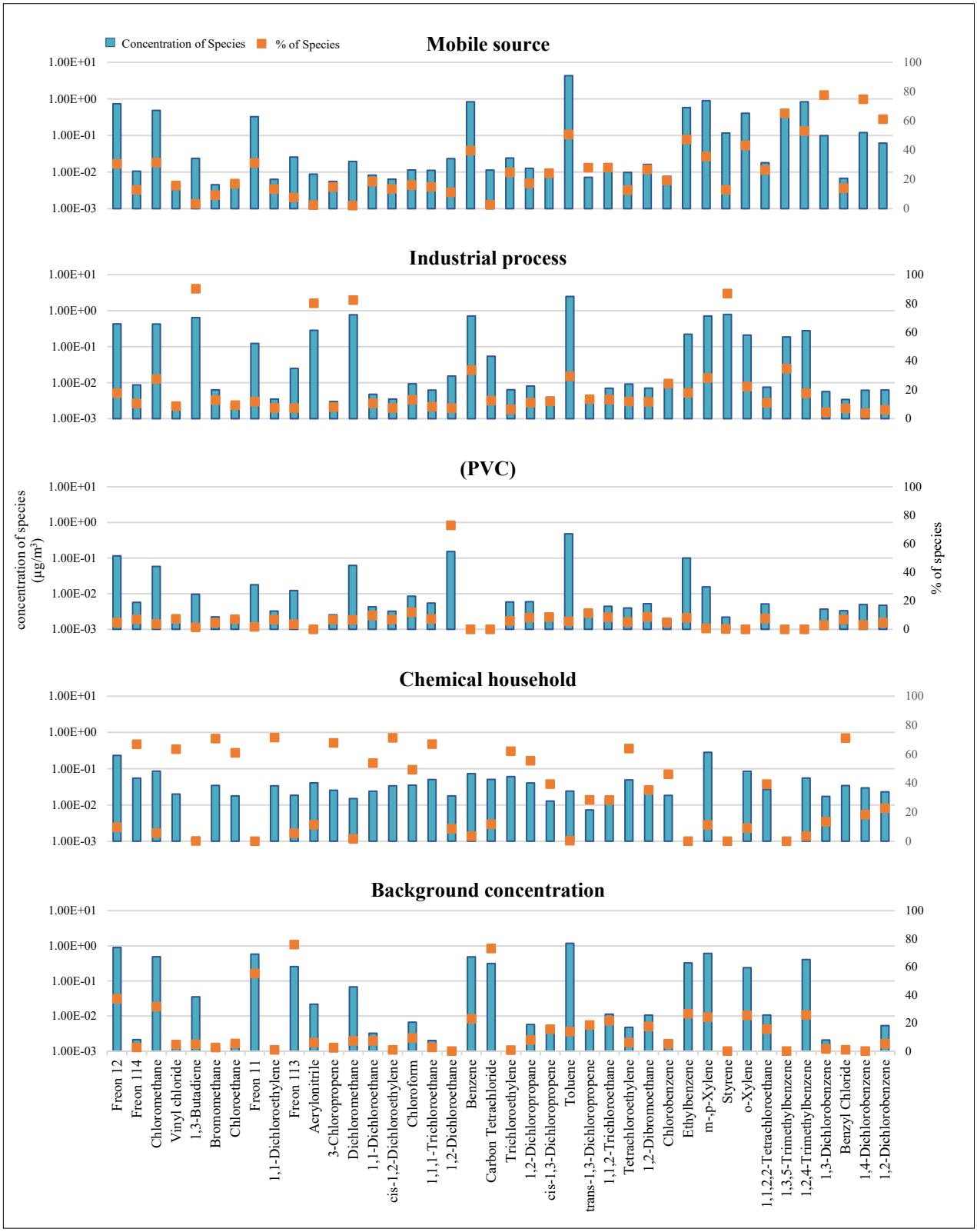

Fig. S6. Source profiles resolved from PMF at BTKH monitoring station in 2012-2016.

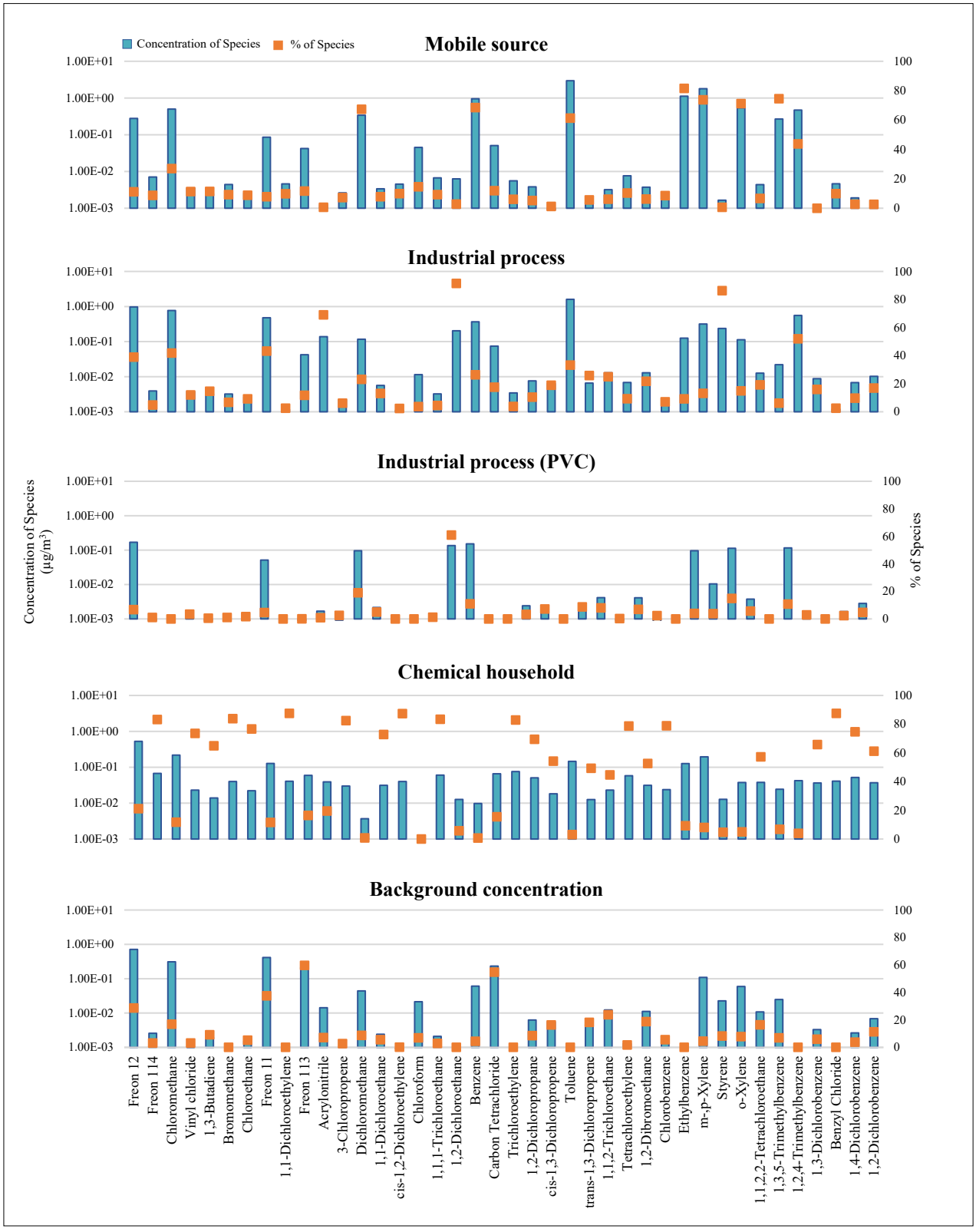

Fig. S7. Source profiles resolved from PMF at WNFS monitoring station in 2012-2016.

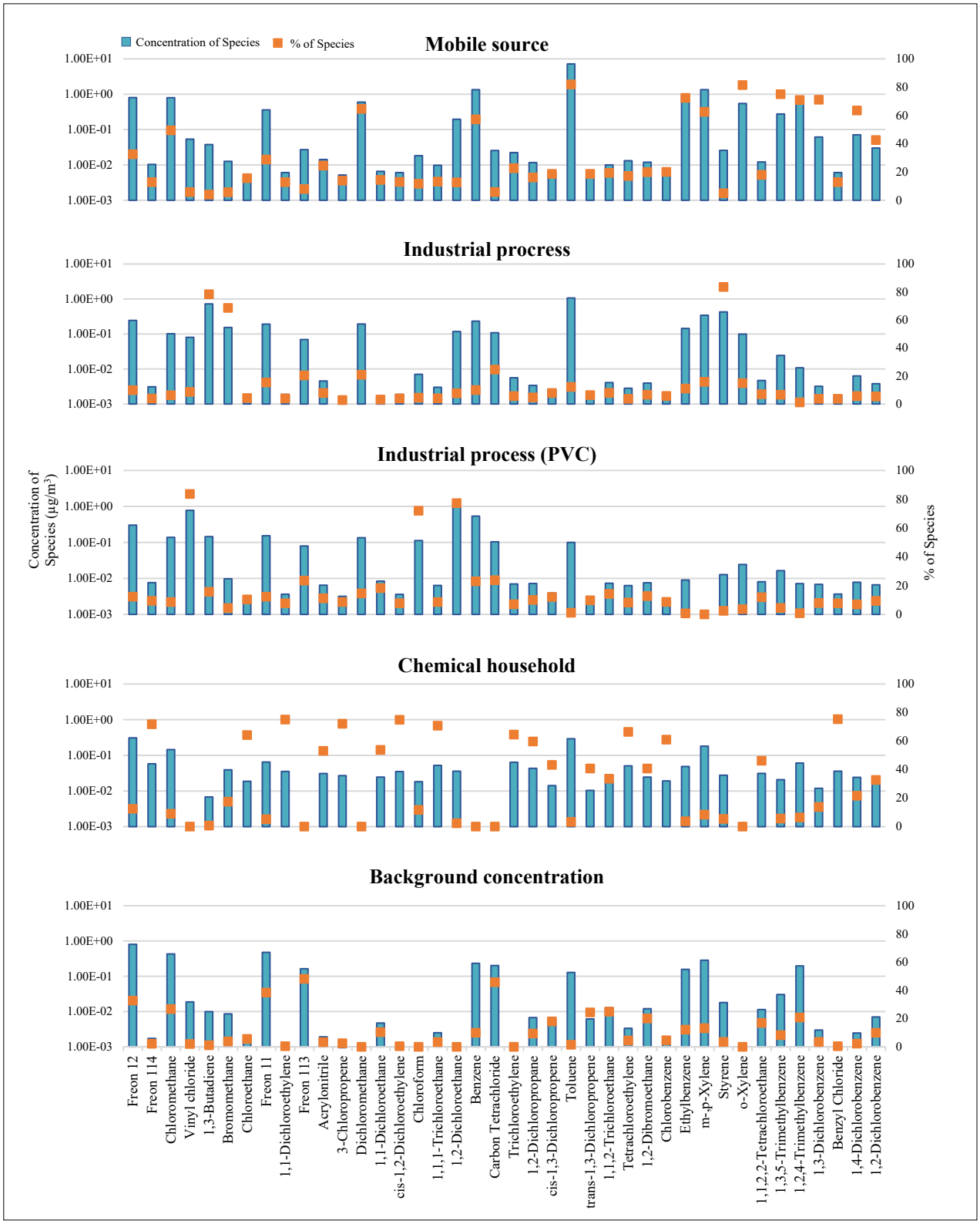

Fig. S8. Source profiles resolved from PMF at MMTP monitoring station in 2012-2016.

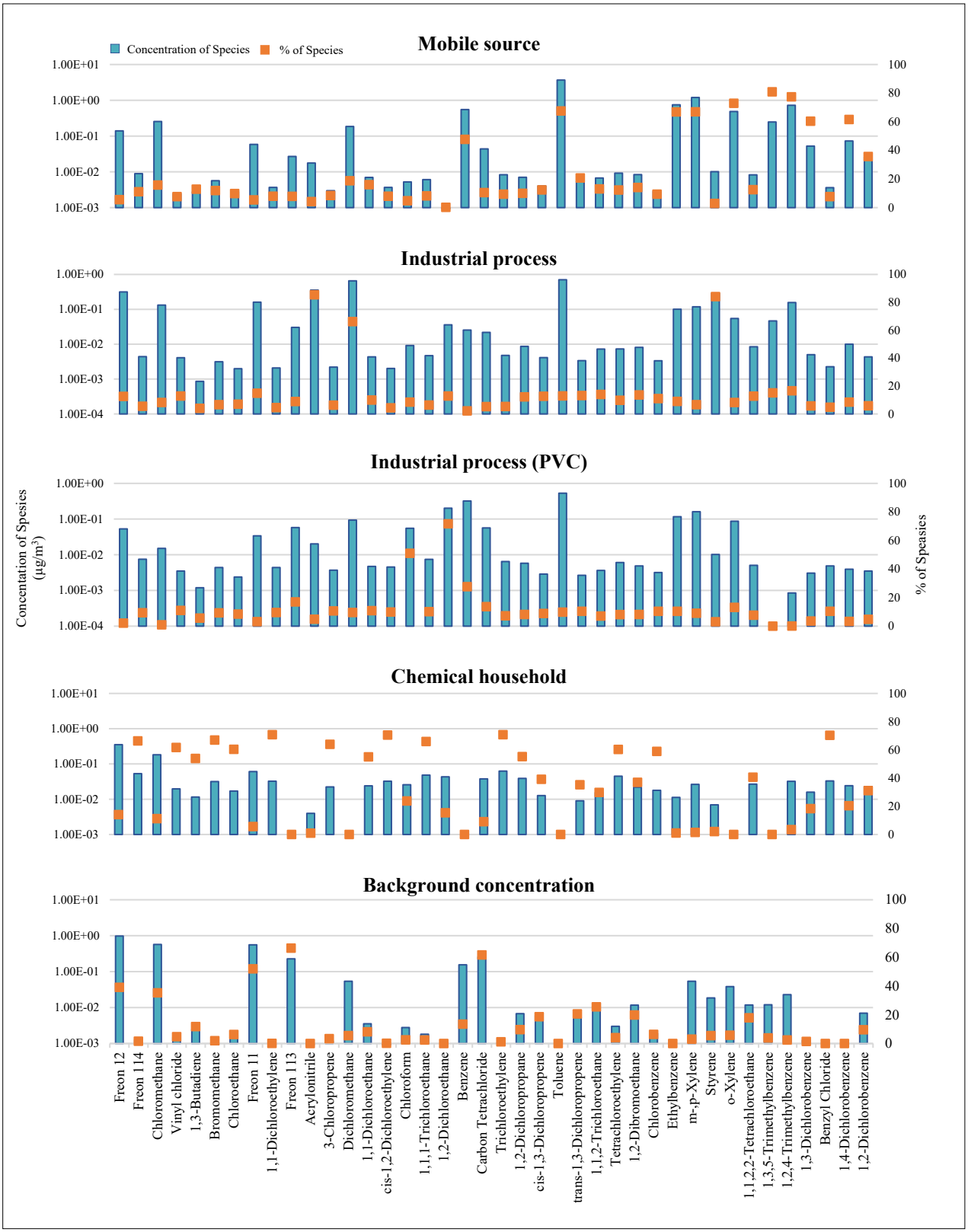

Fig. S9. Source profiles resolved from PMF at MCLT monitoring station in 2012-2016.

Fig. S10. Source profiles resolved from PMF at BPLC monitoring station in 2012-2016.

Fig. S11. Source profiles resolved from PMF at NPKV monitoring station in 2012-2016.

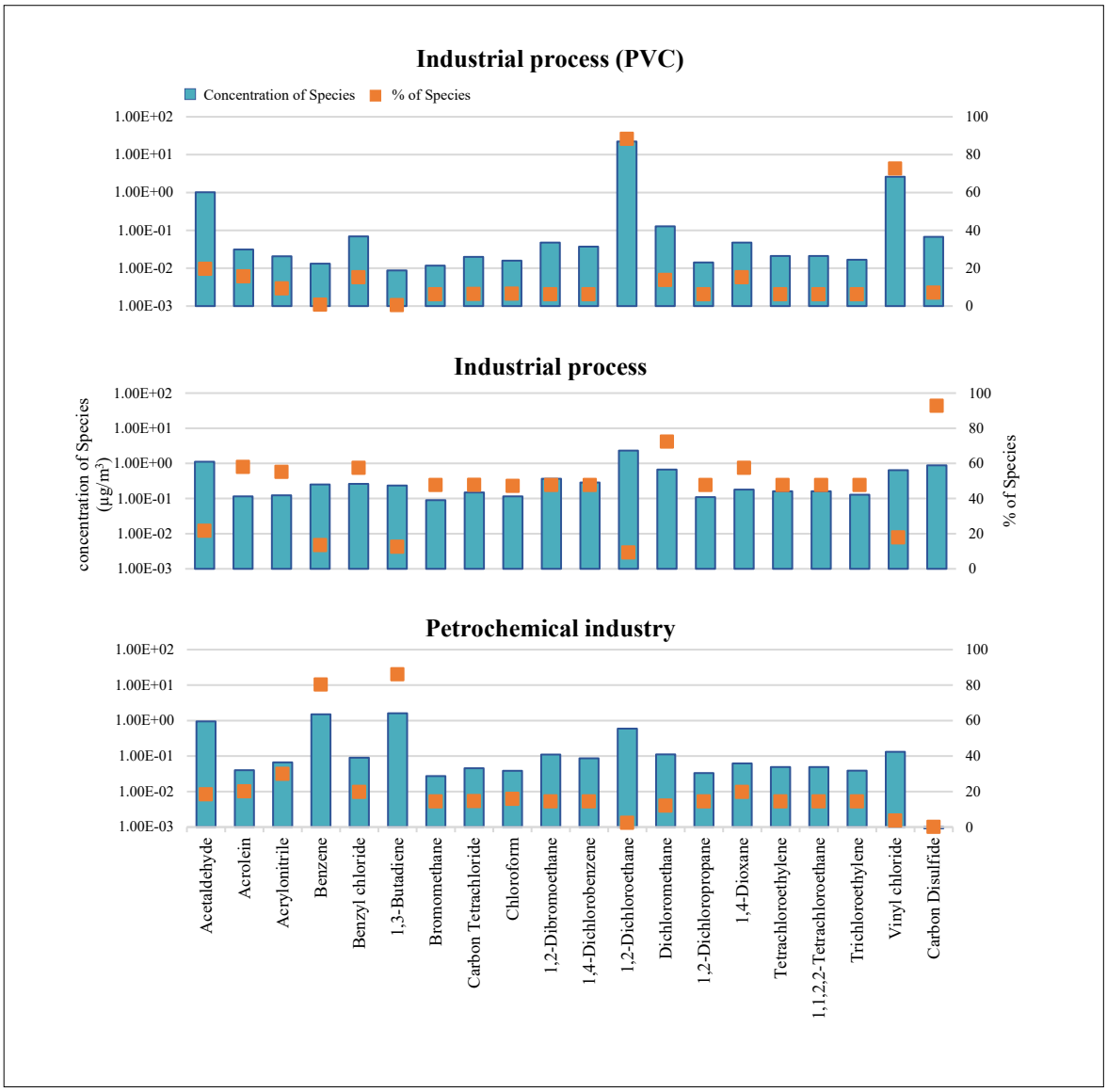

Fig. S12. Source profiles resolved from PMF at MIEO monitoring station in 2012-2016.

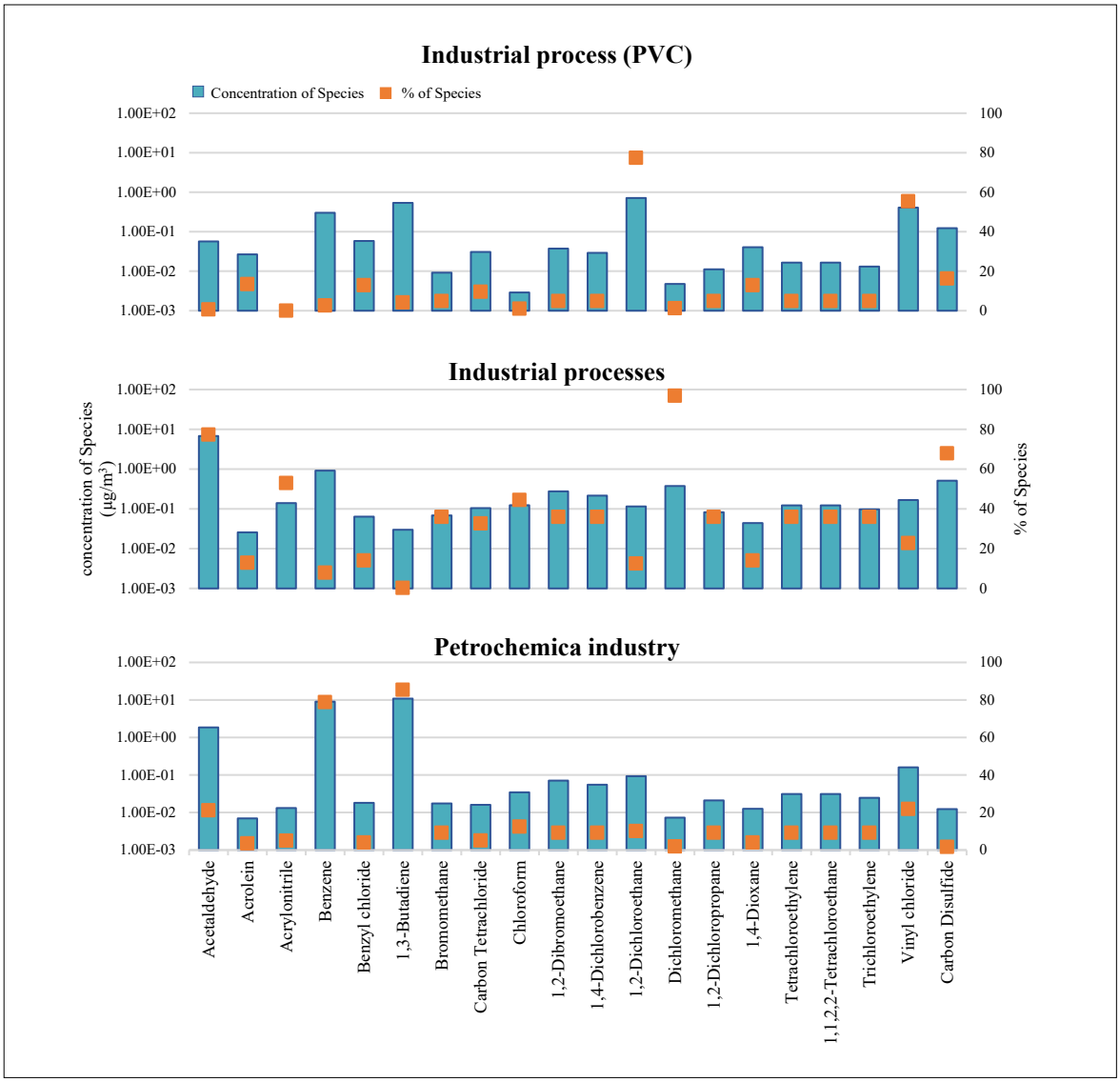

Fig. S13. Source profiles resolved from PMF at I-4 monitoring station in 2012-2016.

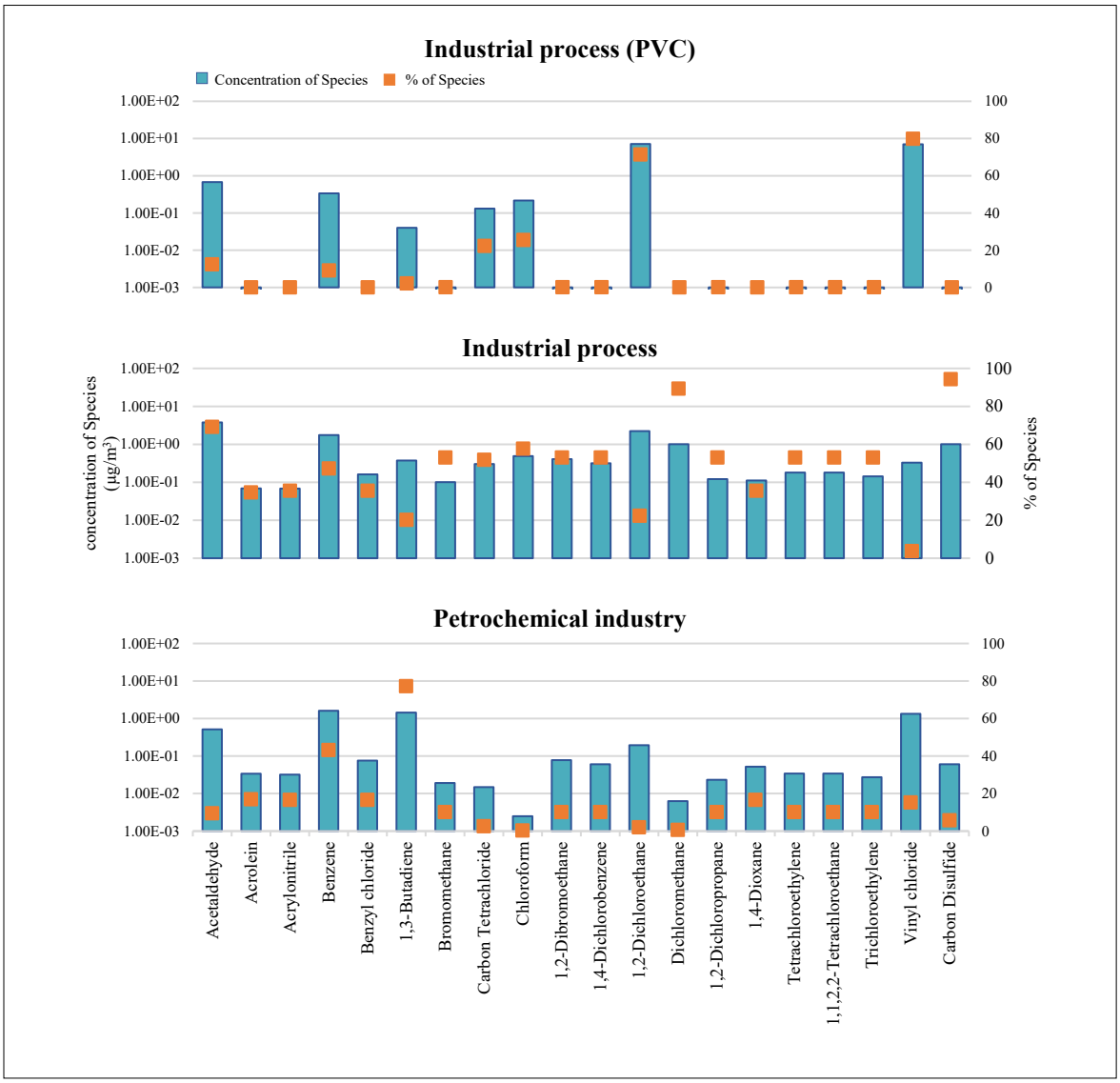

Fig. S14. Source profiles resolved from PMF at I-3 monitoring station in 2012-2016.

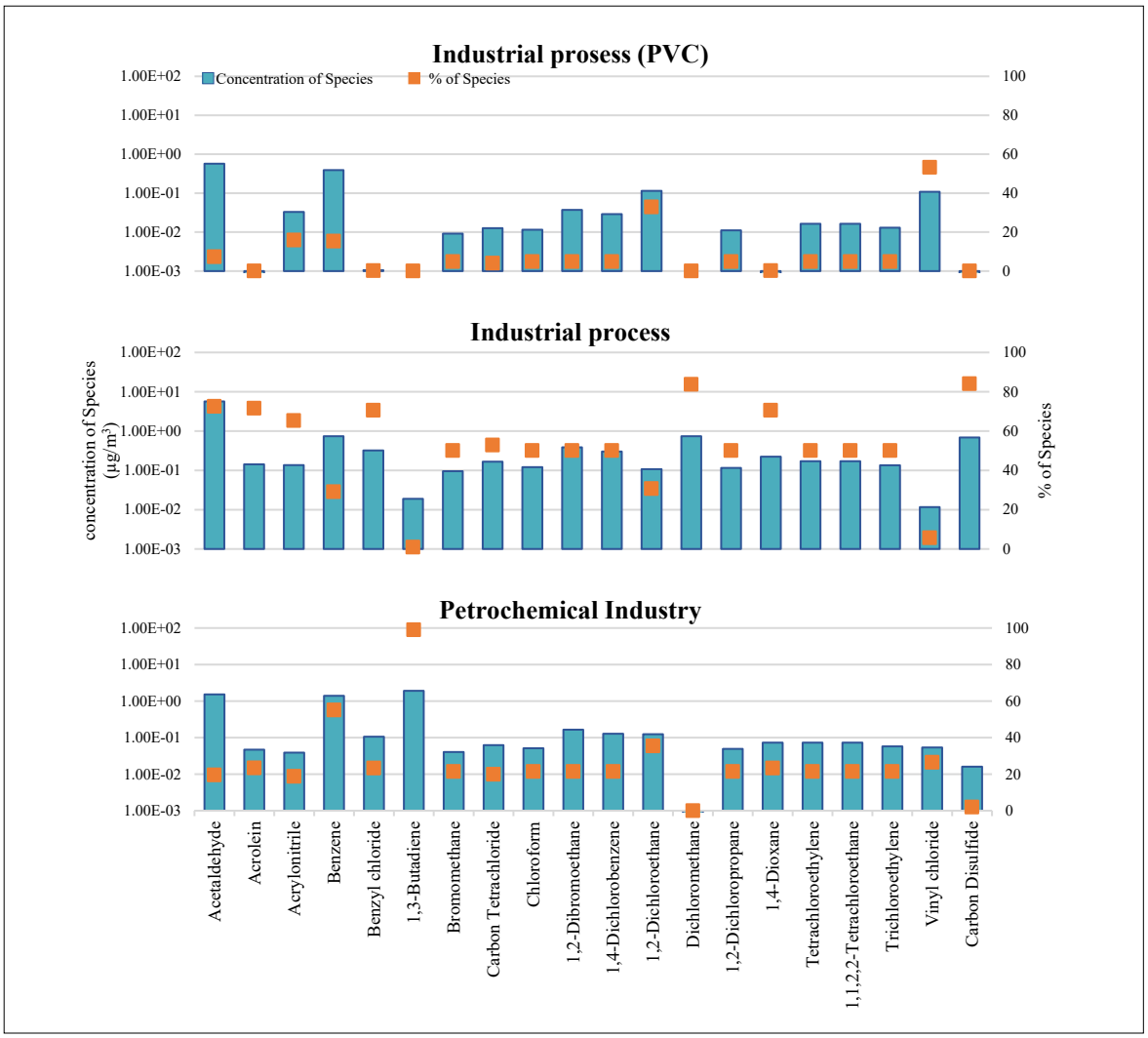

Fig. S15. Source profiles resolved from PMF at E-IE monitoring station in 2012-2016.

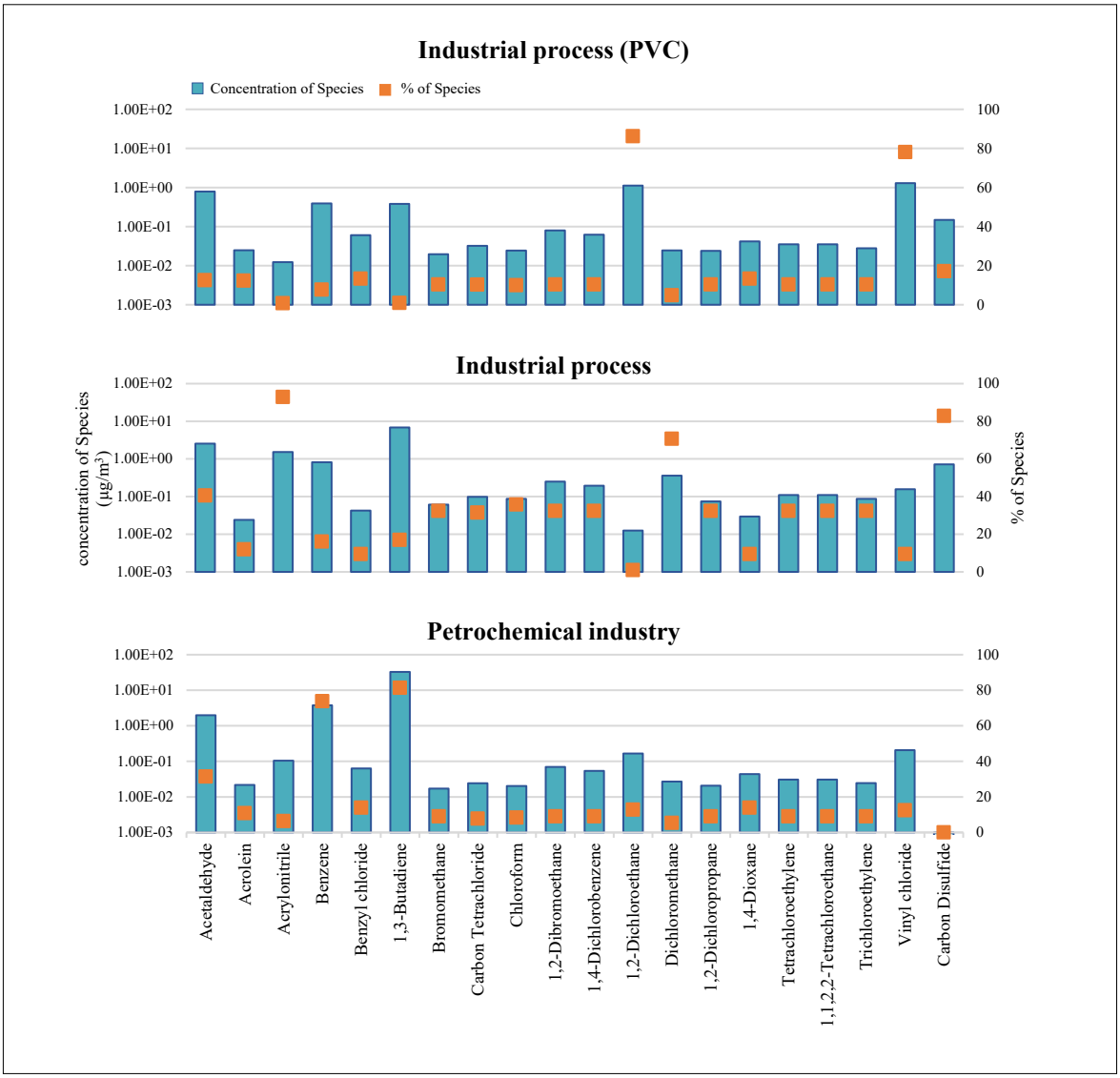

Fig. S16. Source profiles resolved from PMF at I-2 monitoring station in 2012-2016.

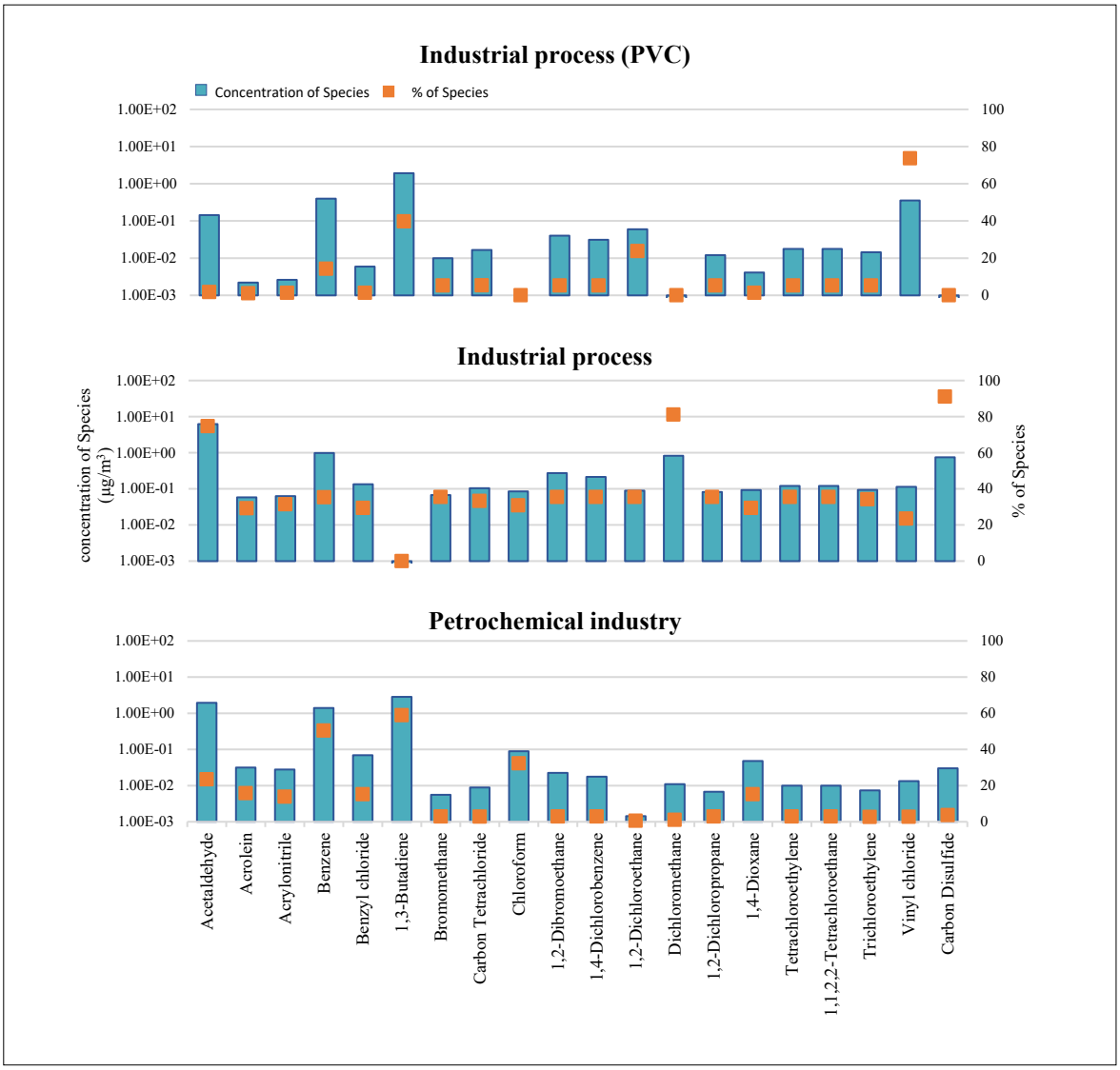

Fig. S17. Source profiles resolved from PMF at I-7 monitoring station in 2012-2016.

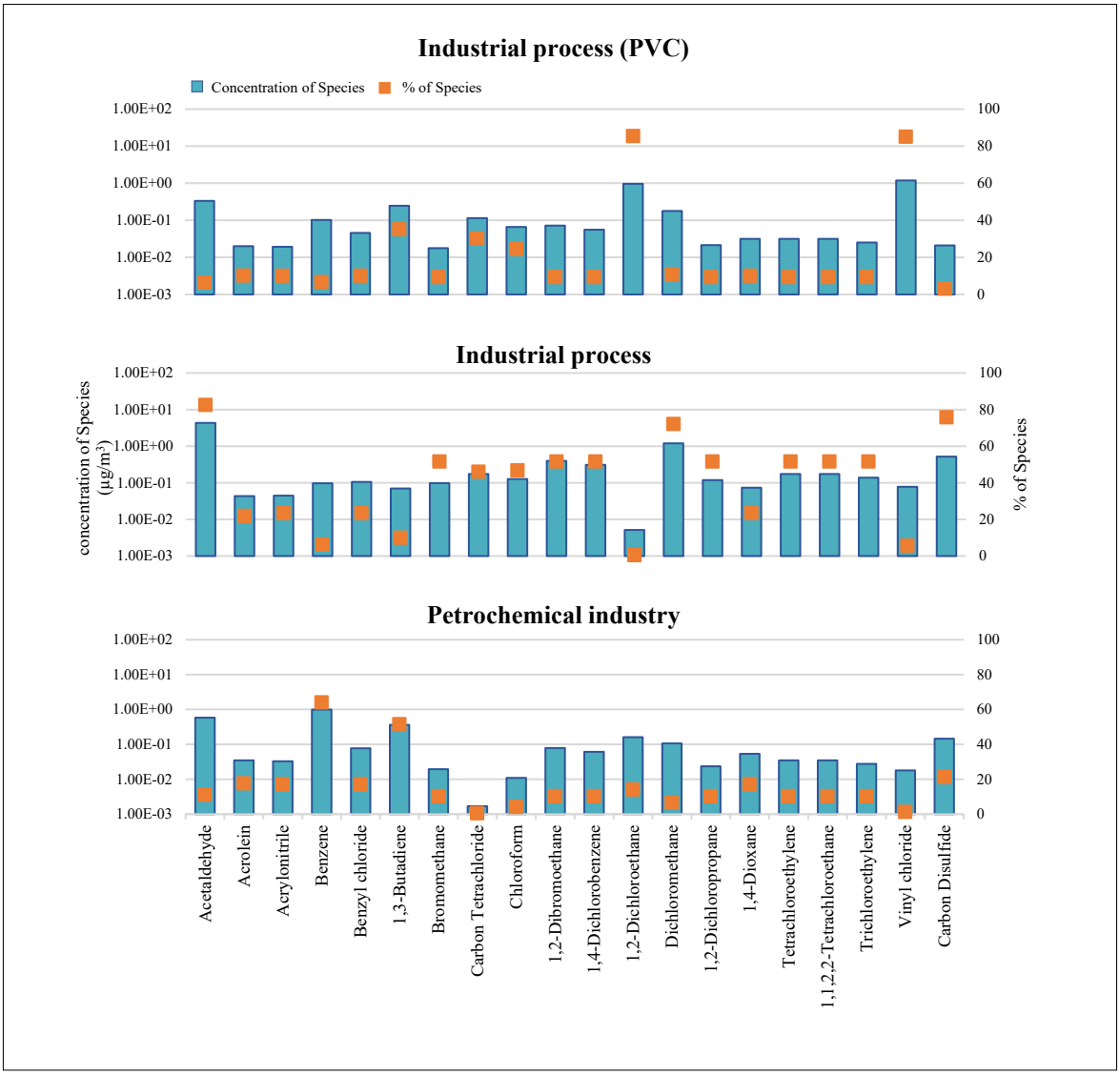

Fig. S18. Source profiles resolved from PMF at I-1 monitoring station in 2012-2016.

Table S3. Percentage of source contribution to measured VOCs concentration at each monitoring station under different seasons.

Station	Mobile source		Industrial process		Industrial process (PVC)		Background concentration		Chemical used in households		Petrochemical industry	
	Dry season	Wet season	Dry season	Wet season	Dry season	Wet season	Dry season	Wet season	Dry season	Wet season	Dry season	Wet season
In the community area												
HMTP	47.4	38.8	36.9	31.3	3.2	4.6	5.2	19.0	7.47	6.2	-	-
BTKH	41.4	40.6	31.9	27.8	5.5	3.8	17.7	20.6	4.1	7.3	-	-
WNFS	44.2	49.2	32.8	18.5	3.5	8.5	15.2	15.3	4.4	8.5	-	-
MMTP	48.8	51.7	28.6	23.3	6.2	12.6	10.3	6.3	6.1	6.1	-	-
MCLT	45.0	39.5	17.2	19.5	8.5	5.2	20.5	21.1	8.9	14.7	-	-
BPLC	42.2	46.4	40.7	25.6	3.6	18.4	10.3	4.4	3.2	5.2	-	-
NPKV	41.7	46.43	37.1	31.2	4.2	7.2	8.3	9.8	8.8	5.3	-	-
Within industrial area												
MIEO	-	-	23.3	26.6	55.0	63.5	-	-	-	-	21.6	9.9
I-4	-	-	49.3	33.7	5.7	13.0	-	-	-	-	45.0	53.3
I-3	-	-	32.2	18.7	42.5	61.3	-	-	-	-	25.3	19.9
E-IE	-	-	63.9	56.1	8.8	12.9	-	-	-	-	27.3	31.0
I-2	-	-	51.1	30.5	2.7	6.1	-	-	-	-	46.2	63.5
I-7	-	-	52.7	61.0	5.3	12.0	-	-	-	-	42.0	27.0
I-1	-	-	51.7	48.2	13.3	16.9	-	-	-	-	35.0	34.9