

Table S1. The reports of Monte Carlo simulation and sensitivity analysis.

Statistics	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways
Trials	100000	100000	100000	100000	100000	100000	100000	100000
Base Case	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mean	8.76E-04	8.85E-03	7.10E-10	9.73E-03	1.38E+01	9.73E+01	7.80E-06	1.11E+02
Median	2.10E-04	2.12E-03	1.70E-10	2.33E-03	3.30E+00	2.33E+01	1.87E-06	2.66E+01
Mode	---	---	---	---	---	---	---	---
Standard Deviation	3.15E-03	3.18E-02	2.56E-09	3.50E-02	4.95E+01	3.50E+02	2.81E-05	3.99E+02
Variance	9.92E-06	1.01E-03	6.53E-18	1.22E-03	2.45E+03	1.22E+05	7.88E-10	1.59E+05
Skewness	23.45	23.45	23.48	23.45	23.45	23.45	23.48	23.45
Kurtosis	1,085.53	1,085.04	1,089.13	1,085.08	1,085.53	1,085.04	1,089.13	1,085.10
Coeff. of Variation	3.59	3.59	3.60	3.59	3.59	3.59	3.60	3.59
Minimum	1.32E-09	1.33E-08	1.12E-15	1.46E-08	2.07E-05	1.46E-04	1.23E-11	1.67E-04
Maximum	2.36E-01	2.38E+00	1.95E-07	2.62E+00	3.70E+03	2.62E+04	2.15E-03	2.99E+04
Range Width	2.36E-01	2.38E+00	1.95E-07	2.62E+00	3.70E+03	2.62E+04	2.15E-03	2.99E+04
Mean Std. Error	9.96E-06	1.01E-04	8.08E-12	1.11E-04	1.56E-01	1.11E+00	8.88E-08	1.26E+00

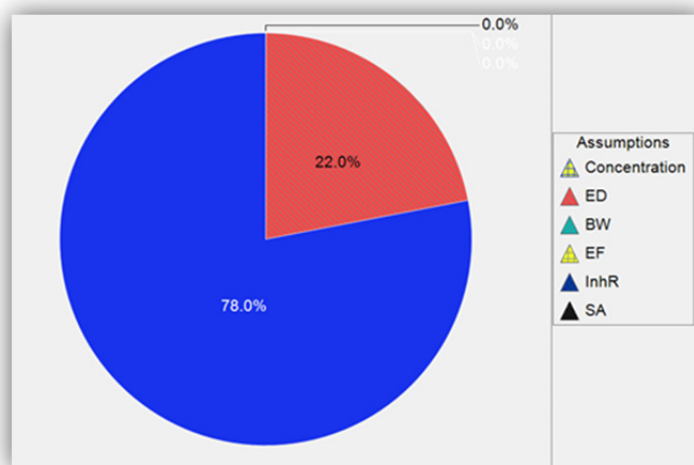
Percentiles	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation	Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways
5%	8.25E-06	8.34E-05	6.70E-12	9.17E-05	1.30E-01	9.17E-01	7.36E-08	1.05E+00
95%	3.44E-03	3.48E-02	2.79E-09	3.82E-02	5.40E+01	3.82E+02	3.07E-05	4.36E+02

Chart Bins	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact			Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion			Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation			Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways		
	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.
	1	-2.36E-05	4.70E-03	96620	-2.38E-04	4.74E-02	96619	-1.95E-11	3.89E-09	96725	-2.62E-04	5.21E-02	96619	-3.70E-01	7.37E+01	96620	-2.62E+00	5.21E+02	96619	-2.15E-07	4.27E-05	96725	-2.99E+00	5.95E+02
2	4.70E-03	9.41E-03	2182	4.74E-02	9.50E-02	2182	3.89E-09	7.79E-09	2112	5.21E-02	1.04E-01	2182	7.37E+01	1.48E+02	2182	5.21E+02	1.04E+03	2182	4.27E-05	8.56E-05	2112	5.95E+02	1.19E+03	2182
3	9.41E-03	1.41E-02	578	9.50E-02	1.43E-01	579	7.79E-09	1.17E-08	561	1.04E-01	1.57E-01	579	1.48E+02	2.22E+02	578	1.04E+03	1.57E+03	579	8.56E-05	1.29E-04	561	1.19E+03	1.79E+03	579
4	1.41E-02	1.89E-02	229	1.43E-01	1.90E-01	229	1.17E-08	1.56E-08	228	1.57E-01	2.09E-01	229	2.22E+02	2.96E+02	229	1.57E+03	2.09E+03	229	1.29E-04	1.72E-04	228	1.79E+03	2.39E+03	229
5	1.89E-02	2.36E-02	137	1.90E-01	2.38E-01	137	1.56E-08	1.95E-08	138	2.09E-01	2.62E-01	137	2.96E+02	3.70E+02	137	2.09E+03	2.61E+03	137	1.72E-04	2.14E-04	138	2.39E+03	2.98E+03	137
6	2.36E-02	2.83E-02	72	2.38E-01	2.86E-01	72	1.95E-08	2.34E-08	65	2.62E-01	3.14E-01	72	3.70E+02	4.44E+02	72	2.61E+03	3.14E+03	72	2.14E-04	2.57E-04	65	2.98E+03	3.58E+03	72
7	2.83E-02	3.30E-02	54	2.86E-01	3.33E-01	54	2.34E-08	2.73E-08	51	3.14E-01	3.66E-01	54	4.44E+02	5.18E+02	54	3.14E+03	3.66E+03	54	2.57E-04	3.00E-04	51	3.58E+03	4.18E+03	54
8	3.30E-02	3.77E-02	32	3.33E-01	3.81E-01	32	2.73E-08	3.12E-08	27	3.66E-01	4.19E-01	32	5.18E+02	5.92E+02	32	3.66E+03	4.19E+03	32	3.00E-04	3.43E-04	27	4.18E+03	4.78E+03	32
9	3.77E-02	4.24E-02	29	3.81E-01	4.28E-01	29	3.12E-08	3.51E-08	28	4.19E-01	4.71E-01	29	5.92E+02	6.66E+02	29	4.19E+03	4.71E+03	29	3.43E-04	3.86E-04	28	4.78E+03	5.37E+03	29
10	4.24E-02	4.72E-02	16	4.28E-01	4.76E-01	16	3.51E-08	3.90E-08	13	4.71E-01	5.23E-01	16	6.66E+02	7.40E+02	16	4.71E+03	5.23E+03	16	3.86E-04	4.29E-04	13	5.37E+03	5.97E+03	16
11	4.72E-02	5.19E-02	7	4.76E-01	5.24E-01	7	3.90E-08	4.30E-08	11	5.23E-01	5.76E-01	7	7.40E+02	8.14E+02	7	5.23E+03	5.76E+03	7	4.29E-04	4.72E-04	11	5.97E+03	6.57E+03	7
12	5.19E-02	5.66E-02	6	5.24E-01	5.71E-01	6	4.30E-08	4.69E-08	4	5.76E-01	6.28E-01	6	8.14E+02	8.89E+02	6	5.76E+03	6.28E+03	6	4.72E-04	5.15E-04	4	6.57E+03	7.17E+03	6
13	5.66E-02	6.13E-02	3	5.71E-01	6.19E-01	3	4.69E-08	5.08E-08	1	6.28E-01	6.80E-01	3	8.89E+02	9.63E+02	3	6.28E+03	6.80E+03	3	5.15E-04	5.58E-04	1	7.17E+03	7.77E+03	3
14	6.13E-02	6.60E-02	0	6.19E-01	6.67E-01	0	5.08E-08	5.47E-08	4	6.80E-01	7.33E-01	0	9.63E+02	1.04E+03	0	6.80E+03	7.33E+03	0	5.58E-04	6.01E-04	4	7.77E+03	8.36E+03	0
15	6.60E-02	7.08E-02	5	6.67E-01	7.14E-01	5	5.47E-08	5.86E-08	5	7.33E-01	7.85E-01	5	1.04E+03	1.11E+03	5	7.33E+03	7.85E+03	5	6.01E-04	6.44E-04	5	8.36E+03	8.96E+03	5
16	7.08E-02	7.55E-02	4	7.14E-01	7.62E-01	4	5.86E-08	6.25E-08	2	7.85E-01	8.37E-01	4	1.11E+03	1.18E+03	4	7.85E+03	8.37E+03	4	6.44E-04	6.87E-04	2	8.96E+03	9.56E+03	4
17	7.55E-02	8.02E-02	6	7.62E-01	8.10E-01	6	6.25E-08	6.64E-08	5	8.37E-01	8.90E-01	6	1.18E+03	1.26E+03	6	8.37E+03	8.90E+03	6	6.87E-04	7.30E-04	5	9.56E+03	1.02E+04	6
18	8.02E-02	8.49E-02	2	8.10E-01	8.57E-01	2	6.64E-08	7.03E-08	3	8.90E-01	9.42E-01	2	1.26E+03	1.33E+03	2	8.90E+03	9.42E+03	2	7.30E-04	7.73E-04	3	1.02E+04	1.08E+04	2
19	8.49E-02	8.96E-02	2	8.57E-01	9.05E-01	2	7.03E-08	7.42E-08	2	9.42E-01	9.94E-01	2	1.33E+03	1.41E+03	2	9.42E+03	9.94E+03	2	7.73E-04	8.15E-04	2	1.08E+04	1.14E+04	2
20	8.96E-02	9.44E-02	1	9.05E-01	9.52E-01	1	7.42E-08	7.81E-08	1	9.94E-01	1.05E+00	1	1.41E+03	1.48E+03	1	9.94E+03	1.05E+04	1	8.15E-04	8.58E-04	1	1.14E+04	1.19E+04	1
21	9.44E-02	9.91E-02	1	9.52E-01	1.00E+00	1	7.81E-08	8.20E-08	1	1.05E+00	1.10E+00	1	1.48E+03	1.56E+03	1	1.05E+04	1.10E+04	1	8.58E-04	9.01E-04	1	1.19E+04	1.25E+04	1
22	9.91E-02	1.04E-01	2	1.00E+00	1.05E+00	2	8.20E-08	8.59E-08	1	1.10E+00	1.15E+00	2	1.56E+03	1.63E+03	2	1.10E+04	1.15E+04	2	9.01E-04	9.44E-04	1	1.25E+04	1.31E+04	2

Chart Bins	Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact			Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion			Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation			Carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via dermal contact			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via ingestion			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via inhalation			Non-carcinogenic risk of PCDD/Fs in fly ash to onsite workers via three pathways		
	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.
	23	1.04E-01	1.09E-01	1	1.05E+00	1.10E+00	1	8.59E-08	8.98E-08	1	1.15E+00	1.20E+00	1	1.63E+03	1.70E+03	1	1.15E+04	1.20E+04	1	9.44E-04	9.87E-04	1	1.31E+04	1.37E+04
24	1.09E-01	1.13E-01	1	1.10E+00	1.14E+00	1	8.98E-08	9.37E-08	2	1.20E+00	1.26E+00	1	1.70E+03	1.78E+03	1	1.20E+04	1.26E+04	1	9.87E-04	1.03E-03	2	1.37E+04	1.43E+04	1
25	1.13E-01	1.18E-01	1	1.14E+00	1.19E+00	1	9.37E-08	9.76E-08	1	1.26E+00	1.31E+00	1	1.78E+03	1.85E+03	1	1.26E+04	1.31E+04	1	1.03E-03	1.07E-03	1	1.43E+04	1.49E+04	1
26	1.18E-01	1.23E-01	0	1.19E+00	1.24E+00	0	9.76E-08	1.02E-07	0	1.31E+00	1.36E+00	0	1.85E+03	1.93E+03	0	1.31E+04	1.36E+04	0	1.07E-03	1.12E-03	0	1.49E+04	1.55E+04	0
27	1.23E-01	1.27E-01	3	1.24E+00	1.29E+00	3	1.02E-07	1.05E-07	2	1.36E+00	1.41E+00	3	1.93E+03	2.00E+03	3	1.36E+04	1.41E+04	3	1.12E-03	1.16E-03	2	1.55E+04	1.61E+04	3
28	1.27E-01	1.32E-01	0	1.29E+00	1.33E+00	0	1.05E-07	1.09E-07	0	1.41E+00	1.47E+00	0	2.00E+03	2.07E+03	0	1.41E+04	1.47E+04	0	1.16E-03	1.20E-03	0	1.61E+04	1.67E+04	0
29	1.32E-01	1.37E-01	1	1.33E+00	1.38E+00	1	1.09E-07	1.13E-07	1	1.47E+00	1.52E+00	1	2.07E+03	2.15E+03	1	1.47E+04	1.52E+04	1	1.20E-03	1.24E-03	1	1.67E+04	1.73E+04	1
30	1.37E-01	1.42E-01	0	1.38E+00	1.43E+00	0	1.13E-07	1.17E-07	0	1.52E+00	1.57E+00	0	2.15E+03	2.22E+03	0	1.52E+04	1.57E+04	0	1.24E-03	1.29E-03	0	1.73E+04	1.79E+04	0
31	1.42E-01	1.46E-01	0	1.43E+00	1.48E+00	0	1.17E-07	1.21E-07	1	1.57E+00	1.62E+00	0	2.22E+03	2.30E+03	0	1.57E+04	1.62E+04	0	1.29E-03	1.33E-03	1	1.79E+04	1.85E+04	0
32	1.46E-01	1.51E-01	2	1.48E+00	1.52E+00	2	1.21E-07	1.25E-07	1	1.62E+00	1.68E+00	2	2.30E+03	2.37E+03	2	1.62E+04	1.67E+04	2	1.33E-03	1.37E-03	1	1.85E+04	1.91E+04	2
33	1.51E-01	1.56E-01	0	1.52E+00	1.57E+00	0	1.25E-07	1.29E-07	0	1.68E+00	1.73E+00	0	2.37E+03	2.44E+03	0	1.67E+04	1.73E+04	0	1.37E-03	1.42E-03	0	1.91E+04	1.97E+04	0
34	1.56E-01	1.60E-01	0	1.57E+00	1.62E+00	0	1.29E-07	1.33E-07	0	1.73E+00	1.78E+00	0	2.44E+03	2.52E+03	0	1.73E+04	1.78E+04	0	1.42E-03	1.46E-03	0	1.97E+04	2.03E+04	0
35	1.60E-01	1.65E-01	0	1.62E+00	1.67E+00	0	1.33E-07	1.37E-07	1	1.78E+00	1.83E+00	0	2.52E+03	2.59E+03	0	1.78E+04	1.83E+04	0	1.46E-03	1.50E-03	1	2.03E+04	2.09E+04	0
36	1.65E-01	1.70E-01	0	1.67E+00	1.71E+00	0	1.37E-07	1.41E-07	0	1.83E+00	1.88E+00	0	2.59E+03	2.67E+03	0	1.83E+04	1.88E+04	0	1.50E-03	1.55E-03	0	2.09E+04	2.15E+04	0
37	1.70E-01	1.75E-01	1	1.71E+00	1.76E+00	1	1.41E-07	1.45E-07	0	1.88E+00	1.94E+00	1	2.67E+03	2.74E+03	1	1.88E+04	1.94E+04	1	1.55E-03	1.59E-03	0	2.15E+04	2.21E+04	1
38	1.75E-01	1.79E-01	0	1.76E+00	1.81E+00	0	1.45E-07	1.48E-07	0	1.94E+00	1.99E+00	0	2.74E+03	2.81E+03	0	1.94E+04	1.99E+04	0	1.59E-03	1.63E-03	0	2.21E+04	2.27E+04	0
39	1.79E-01	1.84E-01	0	1.81E+00	1.86E+00	0	1.48E-07	1.52E-07	0	1.99E+00	2.04E+00	0	2.81E+03	2.89E+03	0	1.99E+04	2.04E+04	0	1.63E-03	1.67E-03	0	2.27E+04	2.33E+04	0
40	1.84E-01	1.89E-01	0	1.86E+00	1.91E+00	0	1.52E-07	1.56E-07	0	2.04E+00	2.09E+00	0	2.89E+03	2.96E+03	0	2.04E+04	2.09E+04	0	1.67E-03	1.72E-03	0	2.33E+04	2.39E+04	0
41	1.89E-01	1.93E-01	0	1.91E+00	1.95E+00	0	1.56E-07	1.60E-07	0	2.09E+00	2.15E+00	0	2.96E+03	3.04E+03	0	2.09E+04	2.15E+04	0	1.72E-03	1.76E-03	0	2.39E+04	2.45E+04	0
42	1.93E-01	1.98E-01	0	1.95E+00	2.00E+00	0	1.60E-07	1.64E-07	0	2.15E+00	2.20E+00	0	3.04E+03	3.11E+03	0	2.15E+04	2.20E+04	0	1.76E-03	1.80E-03	0	2.45E+04	2.51E+04	0
43	1.98E-01	2.03E-01	0	2.00E+00	2.05E+00	0	1.64E-07	1.68E-07	0	2.20E+00	2.25E+00	0	3.11E+03	3.18E+03	0	2.20E+04	2.25E+04	0	1.80E-03	1.85E-03	0	2.51E+04	2.57E+04	0
44	2.03E-01	2.08E-01	0	2.05E+00	2.10E+00	0	1.68E-07	1.72E-07	0	2.25E+00	2.30E+00	0	3.18E+03	3.26E+03	0	2.25E+04	2.30E+04	0	1.85E-03	1.89E-03	0	2.57E+04	2.63E+04	0

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	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.	Min.	Max.	Freq.
	45	2.08E-01	2.12E-01	0	2.10E+00	2.14E+00	0	1.72E-07	1.76E-07	0	2.30E+00	2.36E+00	0	3.26E+03	3.33E+03	0	2.30E+04	2.36E+04	0	1.89E-03	1.93E-03	0	2.63E+04	2.69E+04
46	2.12E-01	2.17E-01	0	2.14E+00	2.19E+00	0	1.76E-07	1.80E-07	0	2.36E+00	2.41E+00	0	3.33E+03	3.41E+03	0	2.36E+04	2.41E+04	0	1.93E-03	1.97E-03	0	2.69E+04	2.75E+04	0
47	2.17E-01	2.22E-01	0	2.19E+00	2.24E+00	0	1.80E-07	1.84E-07	0	2.41E+00	2.46E+00	0	3.41E+03	3.48E+03	0	2.41E+04	2.46E+04	0	1.97E-03	2.02E-03	0	2.75E+04	2.81E+04	0
48	2.22E-01	2.26E-01	0	2.24E+00	2.29E+00	0	1.84E-07	1.87E-07	0	2.46E+00	2.51E+00	0	3.48E+03	3.56E+03	0	2.46E+04	2.51E+04	0	2.02E-03	2.06E-03	0	2.81E+04	2.87E+04	0
49	2.26E-01	2.31E-01	0	2.29E+00	2.33E+00	0	1.87E-07	1.91E-07	1	2.51E+00	2.57E+00	0	3.56E+03	3.63E+03	0	2.51E+04	2.56E+04	0	2.06E-03	2.10E-03	1	2.87E+04	2.93E+04	0
50	2.31E-01	2.36E-01	2	2.33E+00	2.38E+00	2	1.91E-07	1.95E-07	1	2.57E+00	2.62E+00	2	3.63E+03	3.70E+03	2	2.56E+04	2.62E+04	2	2.10E-03	2.15E-03	1	2.93E+04	2.99E+04	2

(a)



(b)

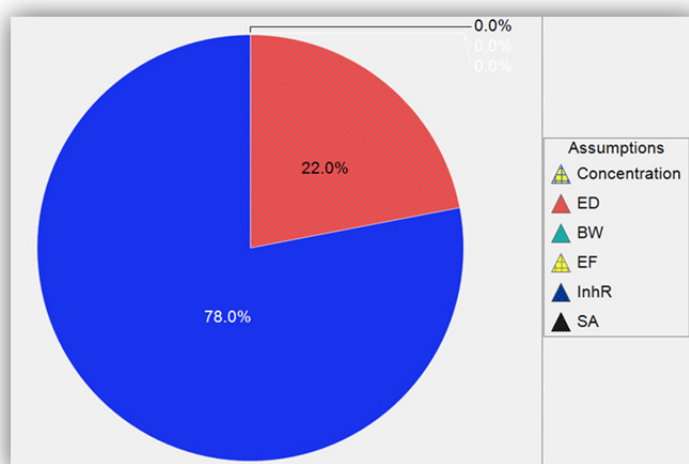


Fig.S1. Sensitivity analysis for parameters in assessment of carcinogenic and non-carcinogenic risks. Concentration is the sum of TEQ concentrations for 17 PCDD/Fs in individual sample of fly ash; The exposure frequency (day/year) and the exposure duration (year) are defined as EF and ED respectively; BW represents the bodyweight (kg); IngR is the accidental ingestion rate of fly ash for the receptor (mg/day); SA means the skin surface area available for contact (cm²/event).