Groundwater Heavy Metal Pollution Characteristics and Health Risk Assessment in Typical Industrial Parks in Southwest China

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Supplementary tables

Table S1. Descriptive statistics of heavy metals in groundwater samples from industrial parks MY

Heavy metals	Min	Max	Mean	SD	CV	Groundwater Class III criterion	Drinking water standard
Fe(mg/L)	0.057	3.45	0.8344	1.1036	132.26	0.3	0.3
Mn(mg/L)	0.0276	5.73	0.8745	1.8450	210.97	0.1	0.1
Zn(mg/L)	0.00883	0.0287	0.0143	0.0062	43.54	1	1
Pb(mg/L)	0.00308	0.0207	0.0119	0.0054	45.67	0.01	0.01
Cu(mg/L)	0.00108	0.0116	0.0042	0.0041	97.85	1	1
Cr(mg/L)	nd[1]	0.007	0.0013	0.0027	201.94	0.05	0.05
As(mg/L)	nd[1]	0.0167	0.0022	0.0055	244.33	0.01	0.01

Hg(mg/L)	nd[1]	0.0008	0.0002	0.0003	168.84	0.001	0.001
Cd(mg/L)	0.00014	0.00134	0.0005	0.0004	82.87	0.005	0.005

[1] nd indicates not detected.

Table S2. Descriptive statistics of heavy metals in groundwater samples from industrial parks HZ

Heavy metals	**Min**	**Max**	**Mean**	**SD**	**CV**	**Groundwater Class III criterion**	**Drinking water standard**
Fe(mg/L)	0.34	3.43	1.1090	0.9455	85.26	0.3	0.3
Mn(mg/L)	0.012	4.59	0.7108	1.3991	196.84	0.1	0.1
Zn(mg/L)	0.00818	0.0626	0.0193	0.0163	84.71	1	1
Pb(mg/L)	0.00205	0.0287	0.0106	0.0086	81.47	0.01	0.01
Cu(mg/L)	0.00124	0.00515	0.0033	0.0016	47.09	1	1
Cr(mg/L)	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	0.05	0.05

As(mg/L)	0.00039	0.00528	0.0017	0.0016	94.85	0.01	0.01
Hg(mg/L)	0.00007	0.00111	0.0004	0.0005	120.92	0.001	0.001
Cd(mg/L)	0.00014	0.0005	0.0003	0.0001	43.42	0.005	0.005

[1] nd indicates not detected.

Table S3. Descriptive statistics of heavy metals in groundwater samples from industrial parks LG

Heavy metals	**Min**	**Max**	**Mean**	**SD**	**CV**	**Groundwater Class III criterion**	**Drinking water standard**
Fe(mg/L)	0.1	1.39	0.3371	0.3379	100.22	0.3	0.3
Mn(mg/L)	nd[1]	2.53	0.5342	0.7542	141.17	0.1	0.1
Zn(mg/L)	0.0022	0.128	0.0260	0.0365	140.03	1	1
Pb(mg/L)	0.00042	0.00665	0.0021	0.0019	88.59	0.01	0.01
Cu(mg/L)	0.00042	0.0095	0.0018	0.0023	128.13	1	1

Cr(mg/L)	0.00153	0.00539	0.0025	0.0010	38.56	0.05	0.05
As(mg/L)	0.00019	0.00122	0.0007	0.0004	55.69	0.01	0.01
Hg(mg/L)	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	0.001	0.001
Cd(mg/L)	nd[1]	0.00068	0.0002	0.0002	93.77	0.005	0.005

[1] nd indicates not detected.

Table S4. Original data on heavy metals in industrial park MY

	GW1	**GW2**	**GW3**	**GW4**	**GW5**	**GW6**	**GW7**	**GW8**	**GW9**
Fe（mg/L）	3.45	0.173	0.09	1.67	0.057	0.188	0.428	0.694	0.76
Mn（mg/L）	0.0578	0.114	0.127	5.73	0.288	0.46	0.0276	0.972	0.0943
Cu（mg/L）	0.00312	0.00314	0.00155	0.00262	0.00157	0.00108	0.0116	0.0113	0.00218
Zn（mg/L）	0.00974	0.0148	0.0101	0.0177	0.0287	0.00883	0.0101	0.0159	0.0128
Hg（mg/L）	0.00006	nd[1]	0.0001	nd[1]	0.0005	nd[1]	nd[1]	0.00006	0.0008

As（mg/L）	nd[1]	nd[1]	nd[1]	0.0016	nd[1]	0.001	nd[1]	0.0167	0.0008
Cd（mg/L）	0.00018	0.00028	0.00063	0.00046	0.00097	0.00022	0.00014	0.00134	0.00026
Cr（mg/L）	0.005	nd[1]	nd[1]	nd[1]	0.007	nd[1]	nd[1]	nd[1]	nd[1]
Pb（mg/L）	0.014	0.0111	0.00885	0.0182	0.0127	0.0068	0.00308	0.0207	0.0116

[1] nd indicates not detected.

Table S5. Original data on heavy metals in industrial park HZ

	GW10	GW11	GW12	GW13	GW14	GW15	GW16	GW17	GW18	GW19
Fe（mg/L）	0.5	0.36	0.95	0.74	0.91	0.34	1.77	0.55	1.54	3.43
Mn（mg/L）	0.012	0.11	0.431	0.048	0.25	0.068	0.241	0.258	1.1	4.59
Cu（mg/L）	0.00458	0.00335	0.00502	0.00515	0.00345	0.00129	0.0026	0.00487	0.00165	0.00124
Zn（mg/L）	0.0122	0.0123	0.013	0.0626	0.0183	0.015	0.00988	0.0292	0.00818	0.012

Hg（mg/L）	nd[1]	nd[1]	0.00016	nd[1]	nd[1]	nd[1]	0.00025	nd[1]	0.00111	0.00007
As（mg/L）	0.00039	0.00062	0.00105	0.00359	0.00181	0.00051	0.00091	0.00205	0.00064	0.00528
Cd（mg/L）	0.0002	0.00048	0.0004	0.0002	0.00037	0.00042	0.00023	0.0005	0.00018	0.00014
Cr（mg/L）	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]
Pb（mg/L）	0.00524	0.0176	0.0186	0.00572	0.0287	0.00464	0.00409	0.0125	0.0064	0.00205

[1] nd indicates not detected.

Table S6. Original data on heavy metals in industrial park LG

	GW20	GW21	GW22	GW23	GW24	GW25	GW26	GW27	GW28	GW29	GW30	GW31	GW32	GW33
Fe（mg/L）	0.59	0.14	0.16	0.16	0.34	0.19	0.23	0.1	0.44	1.39	0.42	0.34	0.12	0.1
Mn（mg/L）	0.37	0.08	nd[1]	0.547	2.53	0.005	0.052	0.007	0.091	0.52	1.86	0.634	0.611	0.172
Cu（mg/L）	0.00215	0.0095	0.00077	0.00076	0.00312	0.00164	0.00107	0.00042	0.00123	0.00083	0.00155	0.00116	0.00048	0.00074
Zn（mg/L）	0.0292	0.0263	0.00344	0.00401	0.00451	0.0076	0.0158	0.00425	0.0059	0.00366	0.0675	0.0622	0.128	0.0022
Hg（mg/L）	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]	nd[1]
As（mg/L）	0.00122	0.00056	0.00046	0.00115	0.00053	0.00024	0.00032	nd[1]	0.00115	0.0011	0.0006	0.00081	0.00019	0.00038
Cd（mg/L）	0.00068	0.0004	0.00007	0.00007	0.00006	0.00023	0.00038	0.0001	0.00012	0.00024	0.00054	0.00009	0.00009	nd[1]
Cr（mg/L）	0.00237	0.00132	0.00103	0.00105	0.00082	0.00464	0.00468	0.00209	0.00098	0.00145	0.00665	0.0015	0.00058	0.00042
Pb（mg/L）	0.00539	0.00306	0.00267	0.00197	0.00194	0.0018	0.00178	0.00153	0.0027	0.00258	0.00278	0.00177	0.00227	0.00257

[1] nd indicates not detected.

Table S7. HPI and HEI for groundwater samples from industrial parks MY, HZ and LG

	Sample ID	HPI	HEI
Industrial park MY	GW-1	17.63	13.69
	GW-2	9.43	2.90
	GW-3	15.83	2.69
	GW-4	56.24	64.96
	GW-5	48.59	5.20
	GW-6	9.39	6.06
	GW-7	3.06	2.06
	GW-8	41.24	16.13
	GW-9	66.28	5.58
Industrial park HZ	GW-10	4.95	2.41
	GW-11	15.06	4.23
	GW-12	29.66	9.70
	GW-13	7.95	3.99
	GW-14	24.71	8.68
	GW-15	5.49	2.43
	GW-16	24.57	9.12
	GW-17	13.74	6.00
	GW-18	91.51	17.99

	GW-19	44.96	58.18
Industrial park LG	GW20	7.58	6.30
	GW21	3.17	1.63
	GW22	1.43	0.75
	GW23	5.71	6.28
	GW24	19.03	26.63
	GW25	4.27	1.26
	GW26	5.13	1.92
	GW27	1.90	0.67
	GW28	2.87	2.67
	GW29	7.21	10.19
	GW30	19.90	20.96
	GW31	6.59	7.82
	GW32	5.20	6.78
	GW33	1.90	2.19