

Supplementary Data

This supplementary data is a part of a paper entitled “Assessment of Heavy Metal Concentrations in Roadside Soils from Mafraq, Jordan”.

Table S1. Statistical summary of heavy metal concentrations (mg/kg) in roadside soils of Mafraq in all sampling sites

Sample number	Latitude	Longitude	Fe	Cu	Zn	Mn	Pb	Cd	Cr	Co	Ni
S1	32.35350	36.22478	18531	36	87	453	99	4	74	13	37
S2	32.35356	36.22435	23656	46	121	659	95	1	113	13	43
S3	32.35261	36.22372	21894	47	108	564	78	5	96	18	36
S4	32.35239	36.22407	20257	33	73	451	39	2	75	14	31
S5	32.35134	36.22144	20816	43	87	491	61	3	95	17	26
S6	32.34888	36.21868	18971	39	89	430	77	3	95	13	28
S7	32.34732	36.21728	22846	47	94	517	61	3	103	11	31
S8	32.33861	36.21152	8735	34	81	277	46	3	43	5	24
S9	32.33634	36.21369	23920	37	82	570	76	---	115	14	44
S10	32.33496	36.21401	22454	50	128	722	86	3	91	16	56
S11	32.33278	36.21324	22697	42	79	529	42	3	78	13	33
S12	32.33234	36.21200	10804	35	114	265	6	1	39	8	28
S13	32.31635	36.22953	24121	42	79	623	22	1	104	12	39
S14	32.31824	36.22893	18146	38	69	537	19	3	58	10	42
S15	32.31746	36.22744	19838	37	65	491	52	1	72	19	44
S16	32.32165	36.22519	27914	51	93	558	26	2	62	14	51
S17	32.32258	36.22770	26256	412	270	440	472	3	63	12	28
S18	32.32123	36.22836	26998	44	80	623	29	2	70	20	52
S19	32.32610	36.22533	16741	47	142	382	60	2	61	7	41
S20	32.32397	36.22936	35410	127	101	887	105	4	132	29	96
S21	32.33031	36.22751	24978	42	68	701	27	5	95	20	52
S22	32.33233	36.22369	30446	45	67	732	3	2	110	20	53
S23	32.33192	36.21947	20005	32	116	475	100	3	80	10	45
S24	32.33363	36.22173	28492	40	64	679	84	3	105	15	43
S25	32.33382	36.21613	23037	37	81	506	78	6	84	11	41
S26	32.37297	36.21361	26568	37	63	638	44	4	88	13	41
S27	32.36981	36.21600	24656	37	64	709	55	2	74	16	54
S28	32.36811	36.21573	22863	34	80	601	11	2	81	13	44
S29	32.36218	36.21310	19928	30	51	540	44	---	82	10	42
S30	32.35909	36.21224	14905	28	74	325	71	3	58	12	37
S31	32.36167	32.36167	20060	32	74	606	16	3	57	15	36
S32	32.36386	36.20090	21046	37	79	607	17	2	83	13	54
S33	32.36000	36.21004	22506	26	69	457	20	4	67	13	27
S34	32.35618	36.21049	19659	36	92	406	---	4	73	12	42
S35	32.35185	36.20987	19630	39	94	494	19	3	59	7	42
S36	32.34609	36.20626	25153	36	96	646	39	2	72	17	66
S37	32.34644	36.20310	18939	35	119	446	65	2	64	9	38
S38	32.34529	36.20212	24654	36	107	657	46	1	65	17	61
S39	32.34168	36.20049	16837	45	119	421	51	3	51	10	30

Sample number	Latitude	Longitude	Fe	Cu	Zn	Mn	Pb	Cd	Cr	Co	Ni
S40	32.34253	36.19781	27026	42	97	612	50	3	85	16	45
S41	32.34302	36.19705	27661	34	87	665	118	3	85	22	55
S42	32.34462	36.19785	24113	33	87	700	66	3	102	20	56
S43	32.34383	36.19522	22514	33	86	544	140	4	88	22	61
S44	32.34552	36.19514	24288	42	86	574	101	3	79	19	58
S45	32.35143	36.18025	22046	29	73	671	39	3	77	23	58
S46	32.34312	36.19153	22607	33	74	529	49	2	77	24	64
S47	32.34236	36.19392	22809	34	86	539	268	2	84	24	63
S48	32.34275	36.18864	22611	33	88	552	48	2	75	19	61
S49	32.34279	36.20332	24493	37	98	492	62	3	69	14	54
S50	32.34245	36.20396	26864	46	110	635	6	3	63	19	59
S51	32.34369	36.20427	20803	35	83	494	138	2	54	16	49
S52	32.34582	36.20993	14059	25	76	324	85	3	36	15	39
S53	32.34486	36.20930	10572	27	78	272	53	---	36	10	25
S54	32.34463	36.20938	9358	43	169	240	27	---	25	12	38
S55	32.34448	36.21069	6763	40	125	206	19	---	21	7	34
S56	32.34364	36.20976	6123	17	96	147	25	---	38	6	19
S57	32.34167	36.20484	22644	45	139	513	61	1	71	19	45
S58	32.34076	36.20396	2863	14	89	105	---	1	36	6	26
S59	32.33998	36.20394	2615	20	113	125	19	---	28	6	30
S60	32.33947	36.20487	2108	12	58	112	80	---	20	3	29
S61	32.33812	36.20833	8712	37	181	233	97	---	40	11	32
S62	32.33721	36.20940	3849	20	413	621	9	---	26	5	24
S63	32.33690	36.21003	25604	34	82	634	87	3	103	22	54
S64	32.33598	36.21075	9051	36	122	252	144	3	52	8	27
S65	32.33591	36.21134	23660	34	76	496	6	1	116	16	66
S66	32.32872	36.21493	19606	26	62	463	12	2	92	13	39
S67	32.32856	36.21609	26132	37	84	524	94	---	87	24	58
S68	32.33060	36.21377	22131	36	102	459	---	2	80	14	43
S69	32.33180	36.21238	2166	27	85	100	68	---	28	4	21
S70	32.35274	36.22519	18164	28	82	383	4	2	83	12	42
S71	32.35440	36.22409	22571	37	105	558	158	3	84	17	38
S72	32.35484	36.22337	22796	35	85	615	65	5	101	18	58
S73	32.35573	36.22354	18834	26	65	408	101	5	65	12	29
S74	32.35620	36.22263	19862	33	107	363	39	5	50	10	47
S75	32.35986	36.22159	21294	32	101	380	42	3	67	17	48
S76	32.36039	36.21994	25111	40	123	505	1	2	80	23	44
S77	32.36357	36.21919	26505	40	98	631	64	2	75	24	55
S78	32.36429	36.21812	25016	64	132	537	74	---	79	20	64
S79	32.35039	36.21421	21856	34	179	482	23	3	62	17	72
S80	32.34778	36.21523	21989	53	98	394	26	1	67	15	44
S81	32.34728	36.21172	1616	25	65	302	---	4	75	12	40
S82	32.34836	36.21179	1613	35	94	369	17	1	77	8	43
S83	32.34919	36.20861	2109	31	95	489	31	2	84	14	55
S84	32.35572	36.20765	1966	31	98	450	---	---	81	14	56

Sample number	Latitude	Longitude	Fe	Cu	Zn	Mn	Pb	Cd	Cr	Co	Ni
S85	32.34006	36.20121	2256	31	88	605	---	3	110	16	57
S86	32.33330	36.19941	1426	26	87	396	1	1	54	11	44
S87	32.33411	36.20258	1815	29	101	480	35	---	68	13	52
S88	32.33813	36.20426	2182	30	99	477	8	1	58	18	55
S89	32.33756	36.20831	1317	24	75	331	36	---	57	11	34
S90	32.33777	36.21060	1809	38	108	390	40	1	69	13	48
S91	32.34094	36.21556	899	43	151	314	---	---	69	7	46
S92	32.34114	36.21473	1044	22	82	278	---	---	71	9	30
S93	32.33788	36.21474	1620	31	127	454	---	---	71	10	36
S94	32.33778	36.21858	1858	31	92	453	13	2	80	14	39
S95	32.33909	36.22602	1216	37	115	333	---	---	89	10	52
S96	32.33883	36.22503	1442	28	79	435	---	3	88	9	55
S97	32.34023	36.23464	2114	35	93	603	---	1	101	21	58
Average			16840.4	40.0	99.4	478	59.8	2.40	72.9	14.0	44.6
Standard deviation			9478.9	40.1	44.2	155	62.4	1.30	22.8	5.20	13.0
Median			20256.8	35.1	88.9	491	48.1	2.50	74.5	13.4	43.5
Coefficient of variation (%)			0.56	1.00	0.44	0.32	1.04	0.51	0.31	0.37	0.29
Minimum			898.8	11.7	51.2	99.5	0.80	0.10	20.2	2.60	18.8
Maximum			35410.3	412	413	887	472	5.60	132	28.8	95.5

--- Below detection limit

Table S2. Statistical summary of heavy metal concentrations (mg/kg) in roadside soils collected from the commercial sampling sites

Metal	Average	SD	Median	C.V (%)	Minimum	Maximum	Number of samples
Cd	2.00	1.00	2.10	51.1	0.20	4.30	49
Co	13.2	5.50	13.1	41.7	2.60	24.1	49
Cr	64.9	25.3	68.8	39.0	20.2	116	49
Cu	32.8	8.30	33.8	25.3	11.7	49.8	49
Fe	13880	9815	15448	70.7	899	27661	49
Mn	432	173	461	40.1	100	722	49
Ni	43.3	13.5	43.4	31.3	19	65.7	49
Pb	57.8	50.9	48.3	88.0	0.80	268	49
Zn	105	51.8	90.5	49.1	58.3	413	49

Table S3. Statistical summary of heavy metal concentrations (mg/kg) in roadside soils collected from the industrial sampling sites.

Metal	Average	SD	Median	C.V (%)	Minimum	Maximum	Number of samples
Cd	2.40	1.50	1.80	0.60	0.70	5.00	10
Co	16.7	6.80	16.4	0.40	6.80	28.8	10
Cr	80.3	24.1	70.8	0.30	57.9	132	10
Cu	87.5	117	43.1	1.30	36.6	412	10
Fe	24654	5428	25555	0.20	16741	35410	10
Mn	577	143	547	0.20	382	887	10
Ni	50.2	18.0	47.3	0.40	28.3	95.5	10
Pb	90.7	138	40.7	1.50	19.4	472	10
Zn	105	62.0	81.5	0.60	65.4	270	10

Table S4. Statistical summary of heavy metal concentrations (mg/kg) in roadside soils collected from the residential sampling sites

Metal	Average	SD	Median	C.V (%)	Minimum	Maximum	Number of samples
Cd	2.60	1.20	2.80	0.50	0.10	4.50	18
Co	13.3	3.70	13.2	0.30	6.80	23.1	18
Cr	78.0	13.5	77.3	0.20	56.9	103	18
Cu	35.6	7.80	33.9	0.20	25.4	53.0	18
Fe	16325	8166	19994	0.50	1613	22846	18
Mn	476	98.8	473	0.20	302	671	18
Ni	40.3	10.1	40.7	0.30	26.0	57.7	18
Pb	41.1	23.1	38.8	0.60	15.5	77.5	18
Zn	83.7	14.7	88.0	0.20	51.2	108	18

Table S5. Statistical summary of heavy metal concentrations (mg/kg) in roadside soils collected from Irbid-Mafraq highway

Metal	Average	SD	Median	C.V (%)	Minimum	Maximum	Number of samples
Cd	3.00	1.30	2.60	0.40	0.90	5.40	20
Co	15.5	4.40	15.4	0.30	9.40	24.3	20
Cr	83.1	16.5	80.4	0.20	49.7	113	20
Cu	37.4	7.90	36.2	0.20	25.8	64.3	20
Fe	20192	8586	22683	0.40	1216	30446	20
Mn	540	120	547	0.20	333	732	20
Ni	48.9	10.1	47.1	0.20	28.5	72.0	20
Pb	62.1	41.7	63.7	0.70	0.90	158	20
Zn	97.1	29.1	95.5	0.30	62.6	179	20

Table S6. Enrichment factors (EFs) of Cd, Cr, Cu, Mn, Pb, Co, Fe, Ni and Zn in all sampling sites

Sample site	Fe	Cu	Zn	Mn	Pb	Cd	Cr	Co	Ni
S1	1	2.7	2.3	1.4	9.3	78.9	4.0	2.5	3.5
S2	1	2.7	2.5	1.6	7.0	20.7	4.8	1.9	3.2
S3	1	3.0	2.4	1.5	6.2	72.8	4.4	2.8	2.8
S4	1	2.3	1.8	1.3	3.4	33.9	3.7	2.3	2.7
S5	1	2.9	2.1	1.4	5.1	57.1	4.5	2.9	2.2
S6	1	2.9	2.3	1.3	7.1	53.3	5.0	2.3	2.6
S7	1	2.9	2.0	1.3	4.7	38.7	4.5	1.7	2.3
S8	1	5.4	4.6	1.9	9.2	109	4.9	2.1	4.7
S9	1	2.2	1.7	1.4	5.5	5.3	4.8	2.1	3.2
S10	1	3.1	2.8	1.9	6.7	44.3	4.1	2.6	4.4
S11	1	2.6	1.7	1.4	3.2	41.7	3.4	2.0	2.6
S12	1	4.5	5.2	1.4	0.9	34.8	3.6	2.5	4.5
S13	1	2.4	1.6	1.5	1.6	17.6	4.3	1.7	2.9
S14	1	2.9	1.9	1.7	1.9	49.7	3.2	1.9	4.0
S15	1	2.6	1.6	1.4	4.6	11.8	3.6	3.3	3.8
S16	1	2.5	1.6	1.2	1.6	19.6	2.2	1.8	3.2
S17	1	22	5.1	1.0	31.5	45.7	2.4	1.7	1.9
S18	1	2.3	1.5	1.3	1.9	20.1	2.6	2.6	3.3
S19	1	3.9	4.2	1.3	6.3	37.5	3.6	1.4	4.3
S20	1	5.0	1.4	1.5	5.2	43.0	3.7	2.8	4.7
S21	1	2.3	1.3	1.6	1.9	70.8	3.8	2.8	3.6
S22	1	2.1	1.1	1.4	0.2	20.8	3.6	2.3	3.0
S23	1	2.3	2.9	1.4	8.8	51.8	4.0	1.7	4.0
S24	1	1.9	1.1	1.4	5.2	40.1	3.7	1.8	2.6
S25	1	2.2	1.7	1.3	5.9	86.1	3.6	1.7	3.1
S26	1	2.0	1.2	1.4	2.9	48.0	3.3	1.7	2.7
S27	1	2.1	1.3	1.7	3.9	32.8	3.0	2.2	3.8
S28	1	2.1	1.7	1.5	0.8	37.8	3.5	2.0	3.4
S29	1	2.1	1.3	1.6	3.9	----	4.1	1.7	3.7
S30	1	2.6	2.4	1.3	8.4	82.6	3.9	2.8	4.3
S31	1	2.2	1.8	1.8	1.3	54.0	2.8	2.6	3.1
S32	1	2.4	1.9	1.7	1.4	33.0	3.9	2.2	4.5
S33	1	1.6	1.5	1.2	1.5	66.2	3.0	2.1	2.1
S34	1	2.5	2.3	1.2	0.7	66.9	3.7	2.2	3.7
S35	1	2.8	2.4	1.5	---	55.3	3.0	1.2	3.7
S36	1	2.0	1.9	1.5	2.7	32.0	2.9	2.3	4.6
S37	1	2.6	3.1	1.4	6.0	40.2	3.4	1.7	3.5
S38	1	2.1	2.1	1.6	3.3	13.7	2.6	2.4	4.3
S39	1	3.7	3.5	1.5	5.3	72.8	3.1	2.0	3.1
S40	1	2.2	1.8	1.3	3.2	44.7	3.2	2.1	2.9
S41	1	1.7	1.6	1.4	7.5	37.3	3.1	2.7	3.5
S42	1	1.9	1.8	1.7	4.8	45.0	4.2	2.9	4.0
S43	1	2.1	1.9	1.4	10.9	67.9	3.9	3.4	4.7
S44	1	2.4	1.7	1.4	7.2	47.9	3.2	2.8	4.1

Sample site	Fe	Cu	Zn	Mn	Pb	Cd	Cr	Co	Ni
S45	1	1.9	1.6	1.8	3.1	42.7	3.5	3.7	4.6
S46	1	2.0	1.6	1.4	3.8	36.7	3.4	3.7	4.9
S47	1	2.1	1.9	1.4	20.6	25.3	3.7	3.7	4.8
S48	1	2.0	1.9	1.4	---	25.8	3.3	2.9	4.7
S49	1	2.1	2.0	1.2	4.4	37.7	2.8	2.0	3.9
S50	1	2.4	2.0	1.4	0.4	43.5	2.3	2.5	3.8
S51	1	2.3	2.0	1.4	11.6	33.5	2.6	2.6	4.1
S52	1	2.5	2.7	1.3	10.5	80.9	2.5	3.7	4.8
S53	1	3.5	3.6	1.5	8.8	---	3.4	3.3	4.2
S54	1	6.4	8.9	1.5	5.0	---	2.7	4.4	7.2
S55	1	8.3	9.1	1.8	---	---	3.1	3.7	8.8
S56	1	3.8	7.8	1.4	7.1	23.3	6.3	3.6	5.4
S57	1	2.8	3.0	1.3	4.7	17.5	3.1	2.9	3.5
S58	1	7.0	15.3	2.1	0.5	136.1	12.4	7.0	15.7
S59	1	10.8	21.2	2.8	12.6	---	10.8	8.0	19.8
S60	1	7.8	13.6	3.1	66.2	69.5	9.6	4.4	24.2
S61	1	5.9	10.2	1.6	19.5	53.3	4.6	4.4	6.4
S62	1	7.1	52.8	9.4	4.0	---	6.9	4.6	11.0
S63	1	1.8	1.6	1.4	6.0	41.7	4.0	3.0	3.7
S64	1	5.6	6.6	1.6	27.8	116.0	5.7	3.3	5.3
S65	1	2.0	1.6	1.2	0.5	10.1	4.9	2.3	4.9
S66	1	1.9	1.6	1.4	1.0	37.2	4.7	2.3	3.5
S67	1	2.0	1.6	1.2	6.3	---	3.3	3.2	3.9
S68	1	2.3	2.3	1.2	2.7	26.6	3.6	2.2	3.4
S69	1	17.4	19.4	2.7	55.0	27.5	12.9	5.7	16.6
S70	1	2.2	2.2	1.2	---	47.0	4.6	2.4	4.1
S71	1	2.3	2.3	1.4	12.2	40.0	3.7	2.6	3.0
S72	1	2.2	1.8	1.6	5.0	71.1	4.4	2.7	4.4
S73	1	1.9	1.7	1.3	9.4	101.8	3.4	2.2	2.6
S74	1	2.3	2.7	1.1	3.4	97.4	2.5	1.8	4.1
S75	1	2.1	2.3	1.0	3.5	46.8	3.1	2.7	3.9
S76	1	2.2	2.4	1.2	0.1	27.8	3.2	3.1	3.1
S77	1	2.1	1.8	1.4	4.2	32.4	2.8	3.2	3.7
S78	1	3.6	2.6	1.3	5.1	---	3.1	2.8	4.5
S79	1	2.2	4.0	1.3	1.8	52.8	2.8	2.7	5.8
S80	1	3.4	2.2	1.0	---	---	3.0	2.4	3.5
S81	1	22.0	19.7	10.9	18.9	798.8	46.6	25.2	43.3
S82	1	30.2	28.9	13.3	33.3	220.4	47.9	16.6	46.7
S83	1	20.8	22.2	13.5	10.4	15.4	39.9	23.1	45.2
S84	1	21.7	24.5	13.4	35.7	82.3	41.3	25.6	50.0
S85	1	19.5	19.2	15.6	28.0	69.5	48.8	25.3	43.9
S86	1	25.9	30.2	16.2	3.2	59.6	38.1	25.9	53.3
S87	1	22.7	27.3	15.4	1.7	151.4	37.5	25.0	50.1
S88	1	19.1	22.3	12.8	3.7	246.2	26.6	29.0	44.2
S89	1	26.0	28.1	14.7	0.3	---	43.6	30.4	45.5

Sample site	Fe	Cu	Zn	Mn	Pb	Cd	Cr	Co	Ni
S90	1	29.1	29.4	12.6	4.9	1.2	38.0	24.1	46.1
S91	1	67.6	82.5	20.4	---	---	77.0	28.6	88.8
S92	1	29.5	38.9	15.5	---	24.5	67.6	28.8	50.8
S93	1	26.5	38.7	16.3	---	---	43.7	22.6	39.2
S94	1	23.6	24.4	14.2	2.1	---	43.2	26.1	37.0
S95	1	42.4	46.4	16.0	---	---	72.8	29.6	75.1
S96	1	27.2	27.0	17.6	---	---	60.9	22.8	66.5
S97	1	23.1	21.7	16.6	---	---	47.7	34.1	47.9
Average	1	7.8	8.8	3.9	8.1	61.8	11.8	6.8	12.9
SD	0	10.9	13.6	5.3	11.1	91.7	17.9	9.1	18.9