



وَنَازَرَةُ الطَّاقَةِ وَالثَّرَوَةِ الْمَعْدِنِيَّةِ

النحاس + العناصر
الأرضية النادرة

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Ministry of Energy and Mineral Resources
The Hashemite Kingdom Of Jordan

WADI IMRAN

“PROPOSED AREA FOR INVESTMENT OPPORTUNITY”

“Base Metals & REEs”

“Brief”

Geology and Mining Directorate

Geological and Geochemical Surveys Division

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1. OVERVIEW

1.1. Objective

The aim is to open the area for private sector investment for exploration as it has been identified through a previous regional geochemical survey as containing significant anomalies indicating the presence of zinc and lead, along with elevated values of copper, tin, niobium, and REEs.

1.2. Area of Interest

The proposed area is located in the Aqaba Governorate region, about 7 km east of the city of Aqaba, and encompassing approximately 85.7 km² (Table-1) (Fig. 1).

Its proximity to infrastructures such as tarmac roads, power lines, and the Aqaba port, enhances the project's development potential.

High mountains with rugged surfaces form the prominent terrain element with wide, deeply incised valleys. Elevations range from 450m to 1300m a.m.s.l (Fig. 2).

Table 1: Wadi Imran proposed investment area coordinates.

P	X (WGS 84 / UTM 36N)	Y (WGS 84 / UTM 36N)
1	707484	3258819
2	703452	3257773
3	697487	3262873
4	703546	3268671
5	705929	3269034
6	709169	3265532
7	710361	3264559

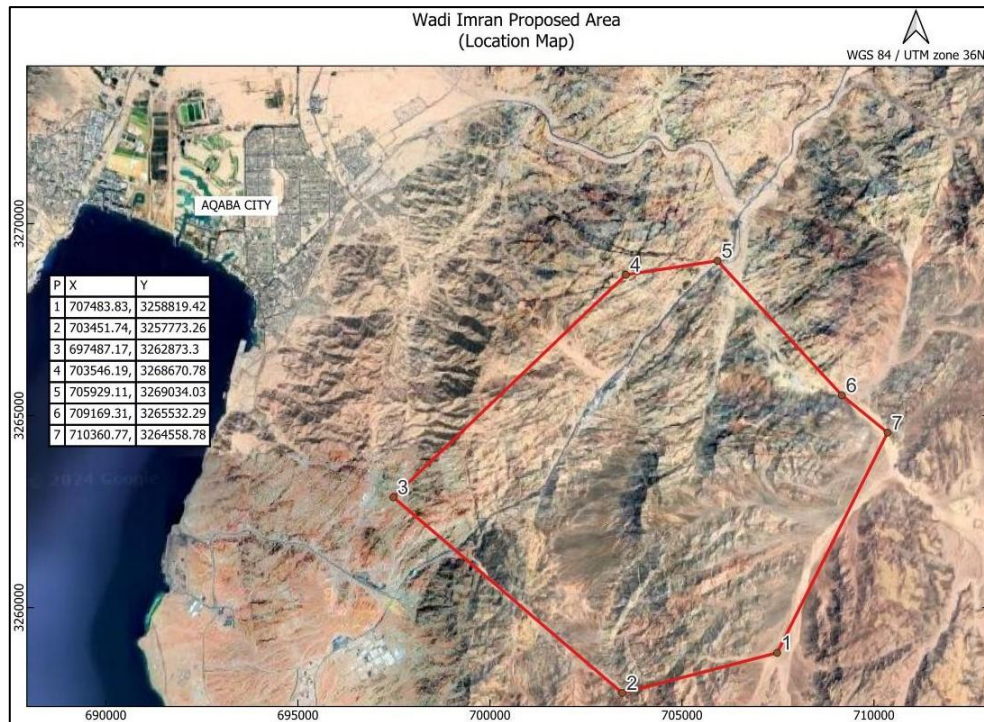


Figure 1: Location map of Wadi Imran proposed area.

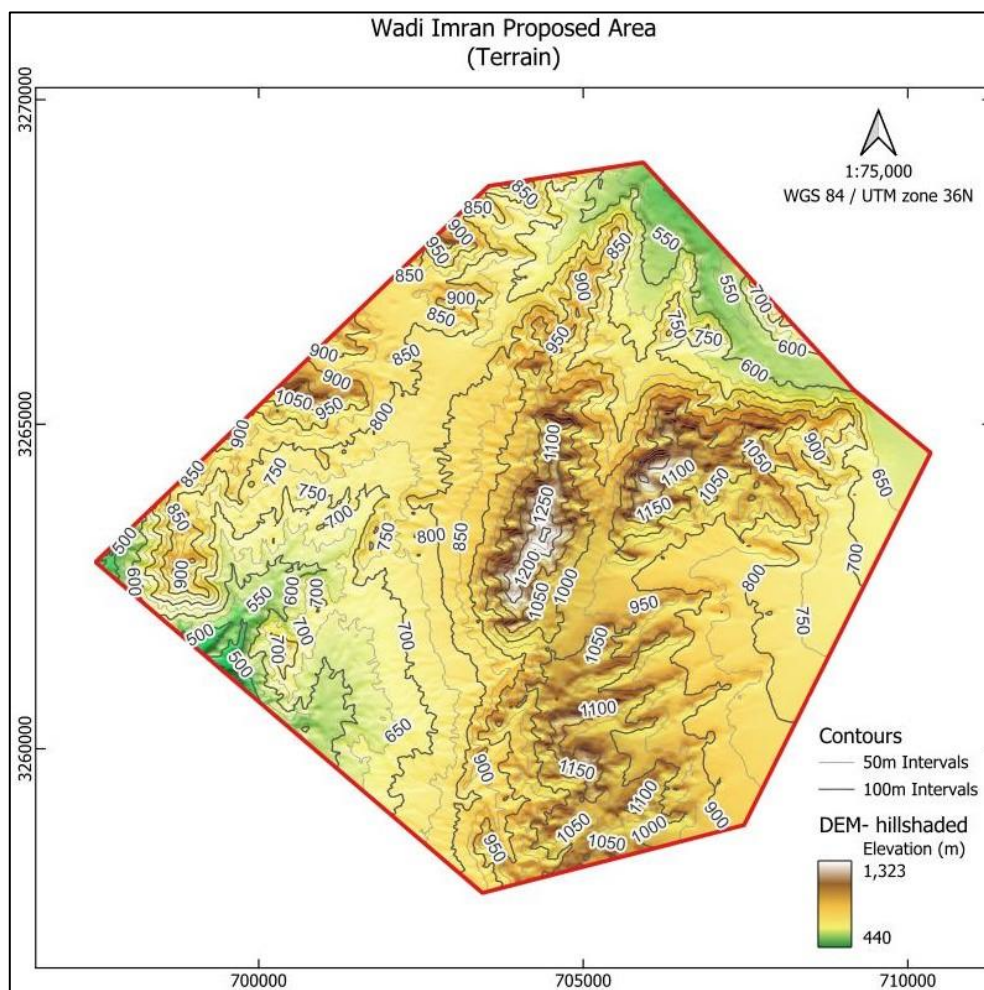


Figure 2: DEM and elevations of Wadi Imran proposed area.

1.3. Previous Work

A regional geochemical survey was conducted on the basement igneous rocks in the southern part of the Kingdom by the Geochemical Survey Division (formerly part of the Natural Resources Authority), in cooperation with the French Geological Survey (BRGM). The survey involved collecting samples of stream sediments and heavy minerals.

This survey, reported in 1994, identified several areas in the Aqaba and Wadi Araba regions that contained elements at above-normal concentrations, known as geochemical anomalies.

These elements included zinc, lead, copper, and other elements, which suggest the presence of mineralized zones.

The study recommended continued exploration in these anomaly areas in detail, including the proposed Wadi Imran area.

2. REGIONAL BACKGROUND

2.1. Geological Setting

The proposed area is underlain by basement igneous rocks, which are considered the northernmost extension of the Arabian-Nubian Shield, with a limited sedimentary cover from the Salib Arkoses Sandstone Formation in the far south of the area (Fig. 3).

The igneous rocks are primarily represented by the Yutum Granite suite and the Ruman Granodiorite suite, which has a geochemical profile rich in iron group elements with a more potassic fringe of an alkaline tendency (BRGM, 1994).

The Yutum suite contains outcrops of the Imran monzogranite and the Abu Jeddah granite units, which overlap with the Humrat granite unit in the far south of the area, while the Ruman suite consists of the Sabil granodiorite unit, which shows Ba enrichment.

The area is interspersed with acidic and basic dykes in two main directions: N-S and E-W, with other secondary directions, especially NE-SW.

The area is strongly influenced by structures associated with the Dead Sea Transform Fault System (DSTFS), which formed in the Miocene, as well as by Precambrian faults that contributed to the opening of the Red Sea and the submergence of the Aqaba Gulf by water near the end of the Miocene.

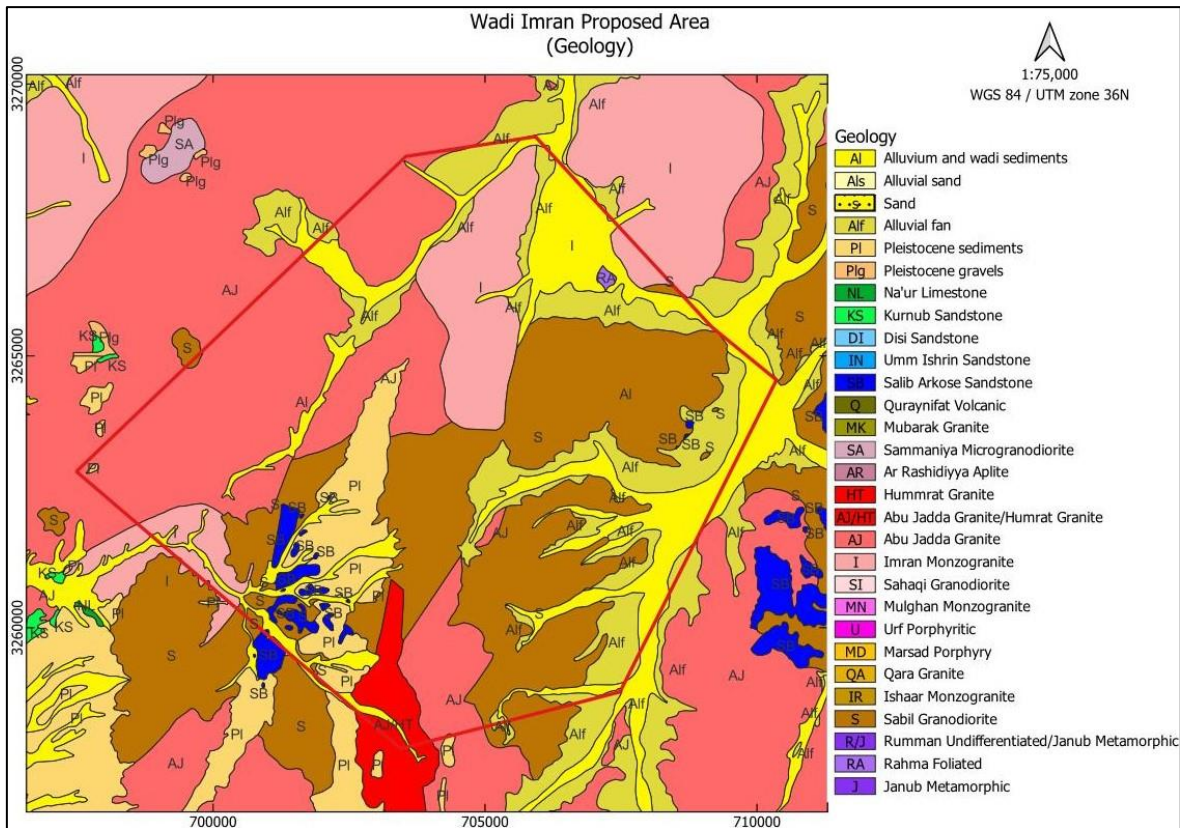


Figure 3: Geology of Wadi Imran proposed area. *Legend includes units other than those within the area's boundaries.*

2.2. Geochemical Survey Results

2.2.1. Survey Results

The Wadi Imran proposed area was surveyed by collecting stream sediment (SS) samples ([Appendix 1](#)).

The results from the BRGM regional geochemical survey provide valuable insights into the mineral potential of the proposed investment area ([Table 2](#)).

The survey identified significant geochemical anomalies that highlight prospective zones for mineral exploration ([Fig. 4](#)).

- **Zinc and Lead**

Zinc values up to 643 ppm were observed in stream sediment samples. Most of the highest values fell within the Abu Jeddah granite unit in the western part of the area.

Lead values up to 137 ppm were observed in stream sediment samples. Most of the highest values fell within the Sabil granodiorite and Abu Jeddah granite units in the southeastern and western parts of the area.

- **Copper**

High background copper values were detected in stream sediment samples, with values ranging from 35 ppm and 53 ppm particularly in the northeastern part of the area, primarily within the Sabil granodiorite unit. An exceptional anomalous copper value of 620 ppm (Sample 1219) was detected in the western part of the area within the Abu Jeddah granite unit.

Table 2: Summary statistics of BRGM Zn, Pb, and Cu results.

	SS (ppm)		
	Zn	Pb	Cu
Min.	25.00	1.00	3.00
Max.	643.00	137.00	620.00
Range	618.00	136.00	617.00
Mean	146.75	29.02	22.49
St. Dev.	93.23	20.05	47.55
Qr1	106.75	21.00	17.00
Qr2	134.50	32.00	23.00
Qr3	213.25	43.00	29.00
Skew.	1.75	1.96	12.00
kurt.	4.28	6.65	150.24
CI_{95%}	132.6-161	25.9-32.1	15.3-29.7

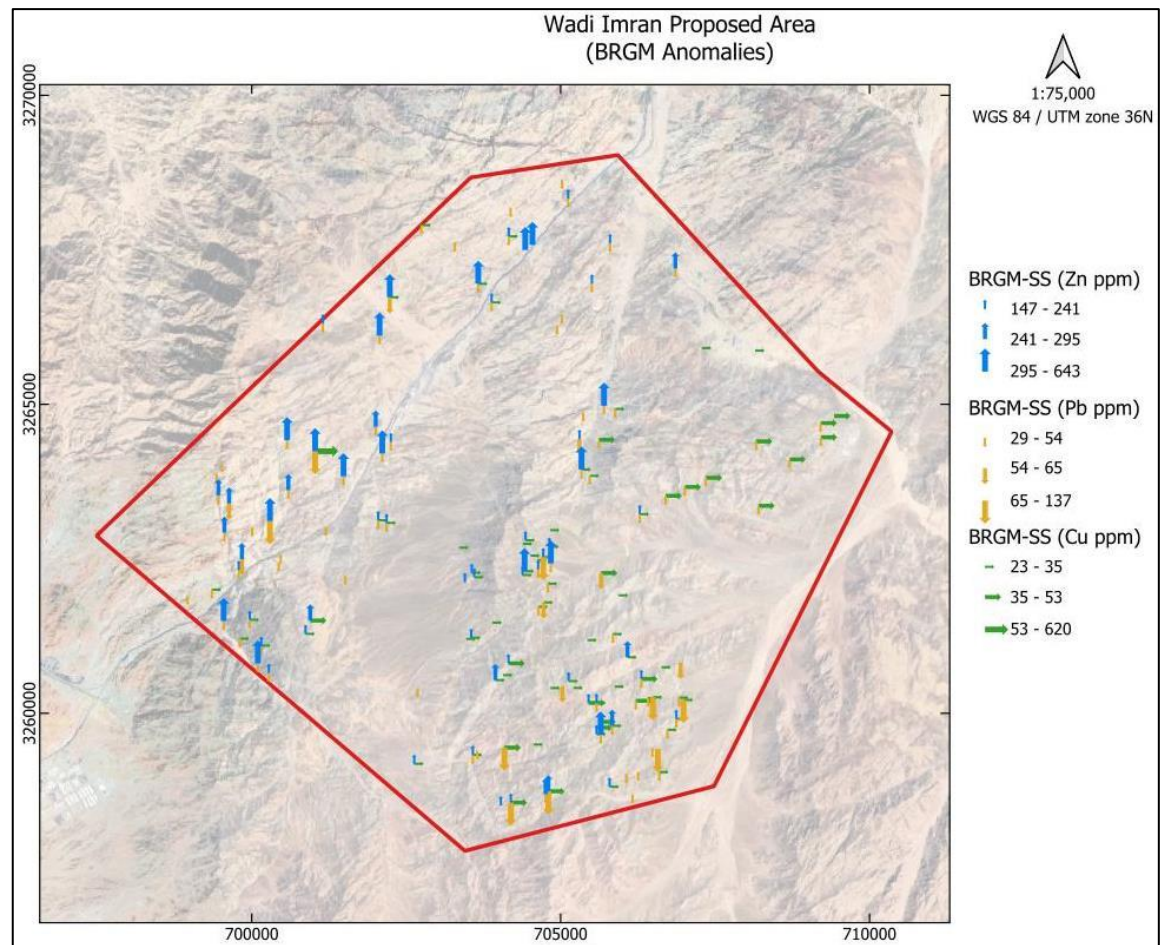


Figure 4: BRGM Zn, Pb, & Cu concentrations in SS samples.

2.2.2. Anomaly Areas

The survey results were mapped to identify three anomalous areas (Fig. 5), which are outlined as follows:

- **Anomaly-1 (western part)**

Classified by BRGM as secondary priority, which has a slightly higher Zn and Pb background than the surrounding environment, and within the Abu Jeddah granite unit.

- **Anomaly-2 (central and southern parts)**

This area exhibits elevated Zn and Pb concentrations within the Abu Jeddah granite and Sabil granodiorite units.

In addition to these two elements; Cu, Ce, Sn, Nb, and P were found at high background values.

- **Anomaly-3 (northeastern part)**

This area exhibits high background Cu concentrations within the Sabil granodiorite unit, and without the association of other elements.

The identified anomaly areas were found to be almost identical to those identified by BRGM, with slight amendments (**Fig. 6**)

These anomalous areas represent the primary targets for further prospecting and exploration works.

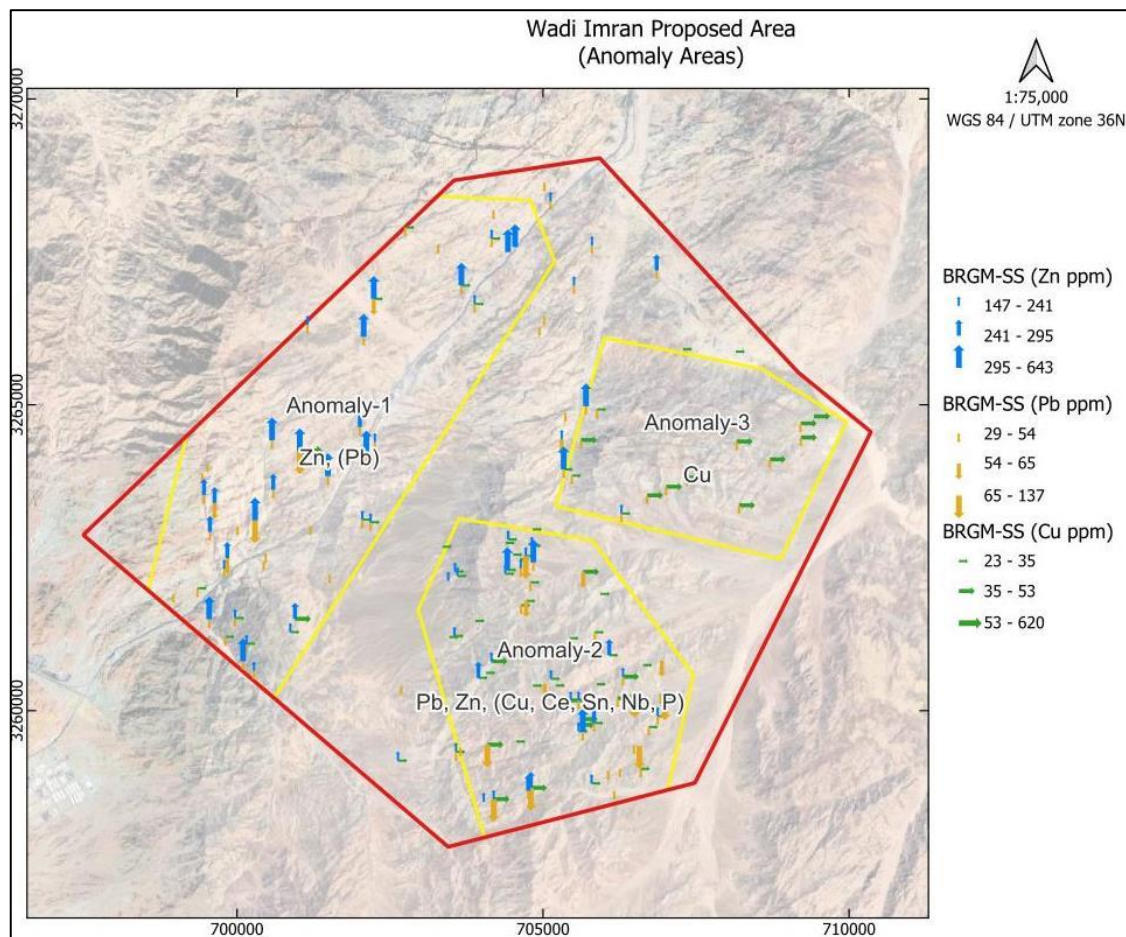


Figure 5: Anomaly areas identified in Wadi Imran proposed area.

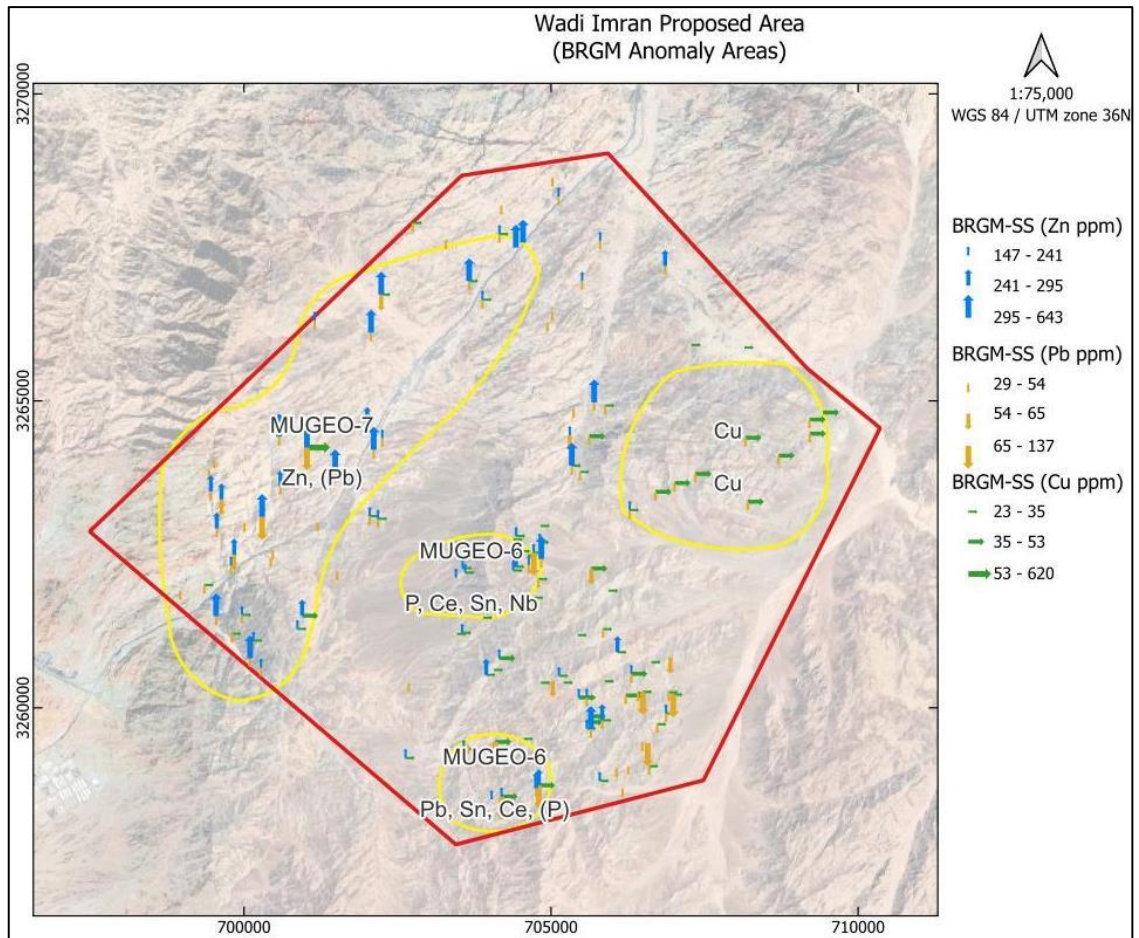


Figure 6: Anomaly areas identified by the BRGM in Wadi Imran proposed area.

3. REFERENCES

BRGM. (1994). Geochemical and Mineral Exploration of Aqaba-Araba Complex, *Ministry of Energy & Mineral Resources, Amman, Jordan. Internal Report.*

4. APPENDICES

Appendix 1: Analysis results of BRGM's stream sediment (SS) samples.

SS	X	Y	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	MnO	TiO2	Cu	Zn	Pb	P	Li	Be	B
Sample	WGS84/UTM36N	WGS84/UTM36N	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
281	703327	3261036	68.4	8.4	9	4.6	1.6	1.4	0.1	1.29			22				
326	709430	3264812	55.5	11.1	9.6	8.2	3.9	1.8	0.2	1.66	50	101	26	3065	29	2	
327	709211	3264697	54.4	11.1	13.1	9.3	4.3	1.6	0.2	2.37	53	119	29	3721	25	2	
328	709215	3264467	45.7	9.1	22.8	8.7	3.9	1.3	0.2	2.83	51	137	32	4143	26	2	
329	708706	3264109	51.3	10.2	10.2	7.8	3.8	1.7	0.1	1.35	49	104	35	3098	29	2	
330	708166	3264400	55.9	10.2	10.7	8.3	4.1	1.6	0.2	1.74	45	108	34	3561	26	2	
331	708206	3263358	56.8	10.4	11.4	9	3.7	1.6	0.2	2.39	47	113	36	3054	24	2	
332	707353	3263811	55.5	10.4	10.6	9	4	1.5	0.2	1.69	46	104	36	2744	23	2	
333	707012	3263662	54	9.7	14.5	9.3	4.1	1.5	0.2	2.53	48	112	33	3675	24	2	
334	706701	3263520	51.1	10.7	14.9	9.1	3.3	1.5	0.2	3.04	36	142	31	3962	23	2	
924	705704	3264977	40.9	8.4	35.7	4.6	2.3	1.3	0.4	7.87	21	346	34	3481	18	2	2
925	705883	3264925	56.1	13	12.9	6.7	3.4	1.6	0.2	2.7	35	135	39	4479	26	2	
926	705367	3264866	61.3	10.4	19.8	4	1.4	2	0.2	1.95	16	104	50	3159	19	2	4
927	705621	3264425	56.8	12.8	11.8	7.8	4	1.7	0.2	2.15	43	118	43	4540	32	2	
928	705307	3264441	64.9	11.7	15.5	5.8	2.3	2	0.2	2.82	20	147	63	3776	19	3	3
929	705339	3263945	42.3	9.8	27.3	6.7	4.2	1.1	0.3	7.11	28	315	40	4458	19	1	
930	705474	3263842	58.5	12.1	13.3	5.2	3	1.9	0.2	3.6	27	136	45	3390	24	2	
931	706283	3263223	50	10.7	21.6	8.8	4.9	1.2	0.3	5.74	31	206	46	5111	23	2	
932	705656	3262270	66.7	12.3	8.4	6.2	2.8	2.1	0.1	1.26	36	107	58	2980	25	3	1
933	704728	3261794	65	13	11	7.7	3.2	1.8	0.2	2.07	29	117	62	3374	25	3	
934	704843	3262425	23.5	4.3	64.6	6.5	2.3	0.4	1.1	28.3	7	643	42	15192	14		1
935	704720	3262528	63.6	11.7	16.8	9.1	3.8	1.3	0.3	3.58	23	209	93	7682	20	2	2
936	705942	3261909	61.7	12.8	8.8	5.5	3.1	2.2	0.1	1.63	34	104	22	3331	27	2	
937	706668	3262123	59.4	11.3	15.2	4.9	2.8	2	0.2	1.86	19	122	27	2939	32	2	
938	705847	3261282	61.9	12	10.1	5.9	3.3	1.7	0.2	1.73	23	107	32	2295	23	2	
939	706303	3260913		12				2.2		2.31			7	3757	27		
940	707363	3261334	53.5	11.1	11.5	5.2	3.4	1.9	0.2	2.11	20	116	23	3669	33	2	
1077	705024	3268635	68.8	12.3	5.8	4	1.9	2.4	0.1	0.95	11	106	34	2617	41	4	
1079	705124	3268331	45.2	10	20.3	5.4	4.2	1.2	0.3	4.74	18	213	31	3742	21	2	1
1081	704191	3268180	56.3	11.1	11	4.9	2.4	1.7	0.2	2.64	17	142	32	4278	31	4	

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1083	704545	3267580	37.6	9	28.2	5.8	4.7	0.8	0.3	6.77	21	308	24	3636	16	1	2
1084	704429	3267497	30.9	7	34.8	5.1	4.4	0.6	0.4	8.8	18	391	27	3363	13		3
1085	704161	3267719	56.7	10.7	10.8	5.9	3	1.6	0.2	2.88	23	147	30	3816	25	4	
1086	703288	3267617	63	12.2	7.1	5	2.4	1.9	0.1	1.51	21	105	31	3649	26	4	
1087	702749	3267900	57.7	11.1	9.3	5.8	2.9	1.6	0.2	2.35	23	127	32	3940	26	4	
1088	703667	3266951	34.3	6.9	36.3	4.7	2.6	0.9	0.5	10	33	461	43	3443	20	2	3
1089	703884	3266649	45.4	9.3	20.8	6.6	5.1	1	0.3	5.57	23	232	30	5018	15	2	1
1090	702236	3266733	20.9	4.5	54.5	3.3	1.8	0.6	0.5	7.94	24	453	61	2519	15		7
1094	702070	3266114	38.5	8	34.8	4.5	2.5	1.1	0.4	7.03	16	365	35	3146	25	1	3
1095	701153	3266311	53.2	11.2	16.3	4.4	2.4	1.7	0.2	3.07	15	190	37	3147	30	4	1
1096	705801	3267611	50.8	10.3	19.6	5.4	2.7	1.4	0.2	3.38	15	170	34	3934	21	2	
1097	705507	3266956	53.6	11	14.5	6.2	3.2	1.5	0.2	4.2	22	160	33	5123	21	2	
1098	705019	3266454	65.5	11.9	5.3	4.3	1.8	2.3	0.1	0.92	10	95	36	2687	29	4	
1099	704945	3266275	57	11.5	13.5	4.4	1.9	1.8	0.1	2.1	13	124	37	3839	21	3	
1100	706396	3267866	50	11.3	17.2	5.5	2.2	1.7	0.2	2.41	15	145	27	4759	19	2	
1103	706859	3267198	43.4	9.7	26.7	6	3.3	1	0.3	5.36	21	277	35	4797	15	1	1
1110	707842	3266693	57.4	11.9	12.2	5.4	2.7	1.7	0.2	2.83	16	110	8	4514	18	2	
1112	707291	3265912	58.3	11	13	7.7	3.8	1.3	0.2	2.85	28	120	17	4266	18	2	
1113	708151	3265869	61.6	10	8.8	8.6	3.5	1.6	0.1	1.5	35	94	23	2889	21	3	
1206	699790	3262321	61.1	10.1	20.8	5.4	2.5	1.6	0.3	3.55	16	181	44	4388	20	3	3
1207	699842	3262495	56.7	9.2	26.9	5.8	2.6	1.4	0.4	4.92	17	255	57	4899	20	3	3
1208	699558	3262922	48.9	10.5	23.5	5.3	3	1.5	0.3	5.14	21	252	42	4874	22	3	
1209	699634	3263395	48.4	9.5	26	5.1	2.6	1.5	0.4	5.79	16	251	55	5456	26	2	2
1210	699462	3263527	49.8	10.5	21.5	4.6	2.6	1.8	0.3	5.13	18	260	48	6832	21	2	
1211	699432	3263881	45.4	9.8	24.7	5.1	2.4	1.4	0.2	3.27	13	142	47	3921	24	2	2
1212	699521	3264043	55.8	10.8	12.2	3.7	2.1	2	0.2	1.78	10	99	47	2721	24	2	1
1213	700470	3262565	72	13.8	6.1	4.3	1.9	2.7	0.1	1	11	83	46	2294	28	3	3
1214	700438	3262437	97.9	17.2	4.2	3	1.2	4.2	0.1	0.69	7	49	43	1544	19	4	1
1215	700007	3263011	67.6	13.1	13.1	4.7	2.7	2.2	0.3	3.14	17	135	50	5047	27	4	3
1216	700295	3263110	36.8	7.4	38.5	4.1	2.5	1.2	0.5	8.48	16	428	71	3137	19	2	
1217	700593	3263610	51.9	9.1	23.3	4.8	2.5	1.6	0.3	5.09	15	278	48	4579	35	3	
1218	700573	3264420	39.8	7.2	39.3	4.2	2	1.3	0.4	6.4	12	371	52	4527	27	2	4
1219	701026	3264241	46.2	8.1	35.4	4.6	2.1	1.4	0.4	6.54	620	328	72	71	14	4	
1220	701201	3263014	62	12.1	8.7	6.3	2.7	1.8	0.1	1.54	20	100	37	3601	23	3	
1221	702048	3263124	50.9	11.6	20.3	5.7	2.9	1.6	0.2	2.8	24	178	54	3832	27	2	
1222	702184	3263081	42.4	10.9	16.1	9.5	4.2	1.2	0.3	4.03	29	157	45	5550	27	1	
1223	701486	3263835	42.8	8	38.5	3.9	1.9	1.4	0.4	5.56	14	312	38	3366	23	2	4
1224	701519	3264496	66	11.4	8.4	4.5	2.4	2.1	0.2	1.92	14	97	27	2946	30	4	

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1225	702114	3264205	45.1	9.6	31.9	5.6	2.8	1.2	0.4	6.23	21	322	33	4464	20	1	1
1226	702253	3264390	54.1	10.5	20	4.8	2.5	1.6	0.3	3.92	17	194	33	3138	21	2	2
1227	702008	3264638	49.6	9.5	25.4	4.9	2.5	1.5	0.3	6.24	14	268	31	3302	29	3	3
1228	699546	3261493	38.8	7.9	34.1	6.3	3	1.1	0.4	10	19	306	29	6552	25	1	3
1230	699969	3261514	52.9	11.8	16.2	8.1	4.1	1.3	0.2	3.3	32	156	33	5340	26	2	
1231	699808	3261207	61.9	11.9	10.1	6.5	3.1	1.9	0.2	1.93	32	95	31	3735	26	2	2
1232	700155	3261095	53.2	12.3	15.7	8.3	4.3	1.2	0.2	3.14	29	154	29	5244	26	2	
1233	700100	3260807	36.1	7	37	9.1	4.5	0.8	0.6	12.9	17	350	33	18093	18	2	2
1234	700278	3260655	58.8	11.2	16.1	7	3.5	1.6	0.2	3.34	21	154	35	5455	22	2	3
1237	700871	3261286	48.7	11.1	24.1	7.4	3.3	1.3	0.3	4.59	34	235	28	5395	25	1	1
1238	700947	3261501	41.9	10.4	26.3	7.2	5.1	0.9	0.3	10	40	247	22	5648	22	1	
1239	701199	3262199	82.5	4.4	16.5	2.7	1.4	0.6	0.2	3.44	14	145	17	5620	11	1	1
1240	701516	3262224	66.1	11.4	12	5.4	2.9	1.9	0.2	2.64	21	115	32	5640	20	3	
1241	703206	3262696	55.6	12.4	9.6	5.6	3.1	1.7	0.1	2.16	18	95	20	5098	18	2	
1242	703135	3262248	57.7	13.1	8.2	5.4	2.9	1.7	0.1	1.55	18	82	21	3416	21	2	
1243	703452	3262125	41	8.9	25.3	5.1	2.7	1.2	0.4	8.93	15	236	25	8749	16	2	
1244	703373	3261688	52.2	11.4	14	5.3	2.7	1.7	0.2	3.49	22	138	27	3722	20	2	
1245	703472	3261204	57.1	11	12	5.4	3.3	1.6	0.2	3.24	26	119	28	4120	22	2	2
1247	703016	3260704	74.7	7.8	7.4	3.2	1.7	1.4	0.1	1.33	17	71	26	2265	24	2	8
1248	702684	3260400	69.7	9.3	7.7	3.6	2.1	1.9	0.1	1.28	20	80	29	2372	30	2	6
1249	702848	3260204	70.1	9.9	7.4	2.7	2	2	0.1	1.41	18	88	27	2412	26	2	6
1250	702737	3260082	63.9	9.9	11.9	3	1.8	2	0.2	2.41	15	118	26	2602	27	2	4
1251	703652	3259399	58.6	11.3	10.3	5.2	2.8		0.2	2.22	22	103	29	3758	30	2	2
1252	704007	3259421	75.8	11.7	4	2.9	1.2	3.1	0.1	0.74	11	50	15	2054	21	3	
1253	704562	3259495	64.6	12.4	9.1	5.7	3.1	2.2	0.1	1.76	30	92	16	4233	32	3	5
1254	703832	3258944	70.8	12.8	8.1	4.3	2.2	2.7	0.1	1.75	13	95	21	2799	28	3	7
1255	704033	3258510	61.3	11.8	14.7	5.9	3.3	1.8	0.2	3.68	22	159	26	4369	33	2	3
1256	704758	3258690	47.4	9.6	29.1	5.5	2.8	1.3	0.3	8.1	22	289	34	4060	25	2	1
1259	703944	3260537	54	10.4	22.6	4.7	2.7	1.8	0.3	6.19	25	254	24	3420	20	2	5
1260	702631	3259183	55	9.5	21.1	5.5	3.1	1.7	0.3	5.38	26	216	23	3827	33	2	5
1263	703245	3258526	64.6	12.4	5.3	4.7	1.8	2.5	0.1	0.9	21	60	25	2345	20	3	
1309	706165	3258688	64.9	13.5	13.5	6	3.3	2.1	0.2	2.57	21	128	35	3657	30	3	
1310	705795	3258812	53.8	23.4	23.4	8.1	4.8	1.3	0.3	5.37	26	211	27	5383	26	1	
1567	698963	3261906	65.3	11.9	8	5.4	2.7	1.9	0.1	1.74	14	94	49	2976	20	3	
1568	699355	3262001	62.4	12.2	8	5.8	3.8	2	0.1	1.29	23	93	54	2832	24	2	
1579	706944	3260819	68.3	12.2	11	6.2	3.1	2	0.2	1.94	22	134	62	4217	32	2	
1580	705032	3260438	68.6	12	11.5	5.5	3	2.3	0.2	2.13	19	124	59	3994	23	3	
1581	705583	3260168	43.1	10.3	21	6.8	4.2	1.2	0.3	5.55	27	219	53	4709	26	2	

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1582	705651	3259653	34.4	7.3	40.4	6.2	3.1	0.9	0.5	10.5	20	326	51	5323	22	1	
1583	706496	3260260	60.3	11.4	13.4	5.6	3.3	1.8	0.2	2.46	24	136	70	4129	27	3	
1584	706992	3260216	62.5	11.4	10.7	6	2.9	1.9	0.2	1.79	26	111	70	3851	24	3	
1585	706575	3259422	59	11	14.1	6.4	3.1	1.7	0.2	2.46	19	144	76	3849	27	3	
3172	704644	3261723	57.5	11.3	13.9	6.2	3.5	1.79	0.2	2.66	32	133	41	2465	29	2	
3173	704796	3262098	61.3	12.1	10.9	6	3.1	2.05	0.2	2.35	25	128	49	2916	33	3	
3174	704637	3262327	43.8	8.8	15.4	8.3	4.7	1.01	0.27	3.67	15	157	36	14665	22	3	
3175	704385	3262238	45.7	8.7	28.5	11.1	5.4	0.84	0.48	9.42	27	238	20	30499	23	2	1
3176	704417	3262299	30	5.8	49	8.3	3.8	0.49	0.8	19.4	24	360	12	28491	24		3
3177	704628	3262479	54.4	11.7	10.2	6.8	3.6	1.45	0.15	1.98	24	105	16	5082	22	2	
3178	704513	3262551	46.6	10.3	11.4	7.9	3.3	1.22	0.18	2.51	29	111	22	5553	23	2	
3179	704391	3262743	52.7	12.1	10.9	8.5	3.6	0.95	0.16	2.2	27	109		4473	26	2	
3180	704433	3262800	55.7	12.4	15.2	6.4	4	1.68	0.21	2.88	25	153		5921	25	1	1
3181	704818	3262696	49.2	10.8	22.2	6.5	4	1.32	0.27	4.37	27	229		5712	25	1	3
3182	704831	3262964	53.5	11.9	13.2	6.4	4	1.44	0.19	2.39	25	141	10	5906	26	2	
3183	705434	3261185	63.9	11.7	9.9	5.5	3.3	1.98	0.14	1.56	24	102	7	3636	27	2	2
3184	706083	3260907	47.9	8.7	30.1	5.1	3.3	1.43	0.36	6.36	27	275	12	4073	27		2
3185	707148	3260974	58.8	10.7	14.4	6	3.2	1.61	0.17	2.17	22	121	15	3018	27	2	1
3186	706824	3260854	61.5	11.3	10.6	6.5	3.2	1.76	0.15	1.67	21	105	19	3142	30	2	
3187	706636	3260745	62.8	11.5	11.1	5.9	3.2	1.73	0.16	2.1	23	115	14	4579	31	2	
3188	706308	3260556	54.4	12.8	19	9.6	4.7	1.26	0.28	4.7	36	197	36	15603	36	2	
3189	705878	3260432	51.8	11.4	15	7.2	4.5	1.32	0.2	3.05	28	139	14	4813	30	1	
3190	705131	3260521	57.5	12.6	15.4	6.6	3.8	1.96	0.23	3.45	27	159	15	7117	30	2	
3191	704876	3260498	61.8	12.5	10.4	5	3.2	2.14	0.16	1.9	18	115	4	5458	24	2	3
3192	704837	3260409	62.7	12.1	11.2	5.5	3.4	2.05	0.17	2.17	23	112	12	4660	26	3	2
3193	705208	3260411	53.3	11.7	11.9	8.1	4	1.63	0.17	2.21	28	118	18	4747	35	2	
3194	705453	3260168	49.7	11.5	21.6	7.6	5	1.13	0.3	5.71	37	206	13	6001	32	2	
3195	705631	3259862	46.7	10.4	25.1	6.9	4.2	1.3	0.32	6.89	47	223	9	7062	31	2	
3196	705577	3259768	61.2	12.9	13.7	6.2	4	1.92	0.18	2.7	36	134	21	5161	33	2	
3197	705582	3259663	53.7	11.8	16.1	6.5	4	1.52	0.22	3.68	32	148	20	6104	32	2	
3198	705835	3259797	42.5	9	33	6.4	3.6	1.23	0.41	8.96	33	252	30	7343	28	1	
3199	706218	3260203	64.6	13.6	10.7	6.2	3.3	2.01	0.15	2.23	39	120	31	4370	28	3	
3200	706417	3260247	54.8	11.5	14.2	5.4	3.5	2.01	0.18	2.7	35	133	40	3999	35	2	
3201	706920	3260252	51.6	10.5	14.3	6.2	3.5	1.6	0.18	2.79	33	123	42	3658	30	2	
3202	706875	3259910	45.2	8.8	22.7	5.8	3.4	1.41	0.26	4.27	27	172	49	3845	28	2	
3203	706730	3259732	55.8	10.9	9	5.4	3.1	1.85	0.14	1.43	23	99	46	3008	31	2	
3204	706487	3259436	57.9	12.3	8.3	5.5	2.9	2.17	0.13	1.36	20	96	39	3085	30	2	
3205	706599	3259048	46.8	10.2	13.4	6.5	3.5	1.61	0.18	2.67	24	130	29	3984	30	2	

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3206	706258	3259053	53.8	11.1	8.6	6.3	2.9	2.18	0.12	1.39	21	99	44	2863	31	2	
3207	706069	3259017	52.3	11	9.9	5.2	2.7	1.97	0.13	1.46	22	118	33	3087	25	2	
3208	705646	3259041	52	11.4	6.2	4.9	2.2	1.99	0.09	1	13	77		2319	27	2	
3209	703579	3259327	42.7	7.9	22.8	4.4	2.9	1.5	0.29	4.96	23	214	32	3721	27	1	
3210	703684	3258938	43.4	9.1	12.3	4.1	2.7	1.5	0.17	3.14	13	126	4	3478	26	1	7
3211	704195	3258554	58.9	11.1	19	8	4.4	1.64	0.28	4.3	38	173	113	5500	40	2	
3212	704802	3258738	52.4	9.7	30.1	8.3	4.5	1.5	0.4	7.4	40.0	245.0	121.0	7690.0	41.0	1.0	
3213	704092	3259444	65.1	11.9	13.0	7.7	3.9	2.1	0.2	2.5	45.0	129.0	137.0	5144.0	39.0	3.0	
3214	704540	3259470	24.4	5.7	4.3	2.6	1.5	1.0	0.1	0.9	13.0	45.0		2958.0	14.0	1.0	
3215	703594	3259555	27.3	5.2	1.7	1.3	0.6	1.3	0.0	0.3	3.0	25.0	1.0	1415.0	7.0	1.0	
3216	703675	3259762	28.4	5.7	4.6	2.6	1.2	1.2	0.1	0.9	9.0	54.0	15.0	2370.0	9.0	2.0	
3217	703964	3260275	29.1	5.9	4.1	2.7	1.3	1.1	0.1	0.8	13.0	49.0	13.0	2570.0	10.0	2.0	
3218	704113	3259890	25.3	5.4	7.4	4.1	2.0	0.7	0.1	1.8	16.0	73.0	15.0	4869.0	14.0	1.0	
3219	704068	3260618	63.8	12.4	6.3	4.6	2.2	2.7	0.1	1.0	29.0	75.0	12.0	2893.0	24.0	3.0	
3220	704158	3260808	50.9	10.8	21.7	5.8	3.6	1.8	0.3	6.0	38.0	217.0	12.0	8390.0	26.0	3.0	
3221	703554	3261222	51.6	10.0	21.0	6.2	4.0	1.6	0.3	7.4	34.0	201.0	17.0	7759.0	27.0	3.0	
3222	703897	3261468	64.0	11.6	10.0	5.4	2.7	1.9	0.2	2.3	25.0	108.0	19.0	5317.0	27.0	2.0	
3223	704214	3261746	71.5	9.4	9.1			1.4	0.2		6.0	92.0	18.0	5615.0	22.0	2.0	
3224	703604	3262202	39.0	9.8	26.0	9.8	4.5	1.3	0.4	8.6	24.0	237.0	19.0	40509.0	26.0	3.0	
3225	703562	3262275	46.6	12.1	18.2	9.0	5.0	1.5	0.3	4.3	23.0	168.0	21.0	27934.0	27.0	3.0	
3226	703126	3262284	56.9	12.8	11.9	6.3	3.1	1.9	0.2	2.3	22.0	132.0	19.0	7536.0	26.0	3.0	
3227	703358	3262680	57.2	13.7	12.1	8.1	3.5	1.8	0.2	2.2	25.0	127.0	21.0	5786.0	25.0	3.0	
SS	V	Cr	Co	Ni	As	Sr	Y	Nb	Mo	Ag	Sn	Ba	La	Ce	W	Bi	Zr
Sample	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
281										0.1	1		2	2407	2		181
326	197	93	30	87	14	437	19	20	1		22	432	52	109	30		199
327	283	133	39	100	23	405	28	32	1		21	417	70	159	32		250
328	489	317	41	112	35	340	34	38	3	0.1	2	309	82	190	37		428
329	205	109	30	88	28	339	16	17	3		19	379	46	95	36		84
330	226	113	32	93	46	345	23	24	3		22	370	62	134	36		157
331	243	111	33	81	49	363	35	38	4		24	404	87	206	44		234
332	225	124	32	90	44	337	21	25	2		25	386	57	126	39		246
333	292	272	34	95	36	368	26	34	4		14	422	73	167	46		296
334	329	163	35	77	58	402	21	32	3		19	472	55	122	42		233
924	809	226	40	79	8	284	45	59	20		15	381	79	169	24	19	472
925	223	99	39	79	48	481	27	25	21	0.3	35	565	42	81	29	19	247
926	224	53	29	43	25	260	78	50	23		34	510	150	344	24	20	492
927	184	96	49	100	58	587	25	25	26	1	46	571	44	90	39	30	234

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928	236	77	43	59	56	338	77	56	31	0.7	51	574	158	347	37	37	467
929	684	190	51	88	6	366	30	50	16	0.2	28	359	42	74	22	38	248
930	285	84	44	78	2	473	23	35	16		34	629	44	82	22	41	442
931	513	168	59	108	5	490	39	51	21	0.6	43	383	63	130	31	46	283
932	113	60	40	56	19	371	24	24	21	1.2	50	595	45	90	24	44	211
933	182	52	49	72	40	471	29	31	26	1.5	57	587	49	100	44	54	248
934	1294	30	54	42	14	150	41	185	37		50	266	50	120	67	20	533
935	286	112	74	105	102	387	32	43	33	2.9	107	608	51	122	88	58	349
936	161	53	24	46	57	409	23	18	2		19	558	36	67	39	25	168
937	273	114	15	37	44	311	31	29	3	0.2	13	510	49	90	39	31	416
938	197	71	20	47	70	354	24	20	3		17	512	34	67	53	31	211
939	12	3	20	47	63	341	22	6	11	10	8	478	52	70	91	71	
940	224	81	20	37	38	309	29	21		0.3	13	465	56	68	34	24	243
1077	112	32	19	38	65	277	21	20	5	0.6	24	406	44	87	45	2	323
1079	525	293	47	105	57	333	45	53	3	0.2		378	66	147	46	2	297
1081	242	56	17	42	49	315	49	46	1	0.2	11	398	77	170	53	10	294
1083	836	634	62	127	63	283	29	54	7	0.5	1	285	34	71	54		328
1084	1071	713	71	136	60	213	30	67	10	0.6	43	241	42	89	45		372
1085	260	66	27	49	87	309	46	48	3	0.4	15	405	80	173	57	7	286
1086	171	35	17	39	79	334	23	24		0.2	21	465	44	89	62	15	230
1087	217	54	22	47	80	313	36	37	2	0.4	21	420	63	135	58	17	267
1088	1012	324	58	85	37	167	81	102	16	0.5	7	249	113	266	57	15	519
1089	535	295	57	107	78	278	32	54	6	0.6	1	296	44	97	55	9	277
1090	1233	396	43	98	23	70	93	91	23	1.3	1	169	97	267	40	31	740
1094	863	312	44	79	51	174	89	86	11	0.6	1	262	98	237	45	13	595
1095	367	131	24	54	87	259	41	42	4	0.3		360	61	128	60	14	429
1096	357	112	25	54	80	309	68	57	6	0.4	3	437	101	243	59	16	447
1097	345	106	84	61	76	353	75	60	5	0.4	8	621	129	309	56	12	414
1098	122	26	13	30	86	274	20	16	1	0.1	19	544	41	75	67	12	236
1099	238	63	16	38	73	262	50	39	4	0.2	11	892	92	213	59	10	505
1100	311	54	20	39	88	341	27	30	3	0.4	15	767	61	123	59	11	670
1103	632	214	32	69	82	354	34	47	9	0.7	5	412	52	108	57	6	595
1110	235	43	15	31		397	55	38			5	560	107	237	16	2	751
1112	273	92	38	75	1	442	34	33	15	1.3	10	515	46	113	22	3	650
1113	185	104	31	80	26	376	32	27	14	1.1	20	445	56	132	28	4	575
1206	358	103	34	56	71	224	56	63	11		30	423	122	256	64	32	344
1207	481	133	40	65	87	201	72	83	15		37	399	148	313	76	27	495
1208	424	67	34	53		299	64	56	12	0.1	18	406	114	250	24	26	402

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1209	488	130	32	48	8	251	90	78	15		20	403	173	371	25	27	424
1210	376	47	30	39	6	306	50	57	11		22	605	87	186	22	17	370
1211	368	103	23	47	5	288	99	57	12	0.3	21	404	151	350	22	14	767
1212	177	70	7	26	5	253	47	28	1	0.8	10	485	103	207	32	15	337
1213	15	23	9	27	1	367	22	18	4	0.1	16	484	45	71	19	26	199
1214	195	61	1	13	8	353	15	12	2		11	733	38	63	14	26	150
1215	195	61	21	45	1	318	45	53	8	0.2	19	373	103	196	20	31	336
1216	907	332	45	69	44	104	72	92	7	0.5		277	116	234	45		469
1217	483	153	37	57	48	207	104	87	7		29	316	107	251	50	11	423
1218	753	270	27	49	38	139	88	86	8	0.5	5	258	91	227	49	1	580
1219				4	9	120	47	188	12	383	109	31	190	55	18	20	
1220	176	49	25	49	115	398	25	24	5		35	550	41	77	69	20	203
1221	365	128	38	60	59	423	27	30	9		23	490	44	79	35	1	300
1222	317	123	52	82	99	436	27	40	8	0.1	24	425	42	70	36	1	214
1223	721	279	41	60	44	192	74	63	12		16	318	101	235	36	13	639
1224	117	64	30	51	59	295	45	39	11		33	446	81	169	38	10	219
1225	684	218	43	65	69	278	35	47	13		23	375	53	103	45	3	557
1226	394	122	19	35	6	304	50	42	3	0.5	14	444	86	172	29		456
1227	596	202	22	45	19	217	91	79	6	0.4	11	318	112	249	35	3	355
1228	737	142	25	44	30	266	37	77	8		13	359	48	91	46	9	369
1230	322	96	30	58	38	429	32	32	5		30	484	44	83	38		258
1231	189	54	21	51	44	343	21	19	8		29	494	38	62	39	6	175
1232	303	112	32	64	50	456	29	28	6	0.4	32	487	40	74	42		241
1233	746	44	35	25	67	257	55	99	11		39	369	55	117	53	4	438
1234	321	106	27	53	64	354	32	36	8		34	490	43	89	45	13	270
1237	513	149	46	74	1	436	36	40	14		25	475	51	94	36	25	354
1238	645	142	74	121	1	548	28	64	15		27	354	44	74	40	27	334
1239	342	120	30	40		162	24	34	13	0.3	25	178	39	78	32	31	492
1240	194	61	37	59	1	327	27	32	14		37	507	44	76	41	23	272
1241	174	34	20	40	77	495	22	17	5		15	542	37	57	29	1	163
1242	140	43	18	50	53	487	20	15	5		18	528	34	53	25	5	156
1243	525	66	29	41	75	336	33	69	11		9	417	42	74	37		296
1244	306	93	23	52	80	429	22	28	7		14	519	39	63	38	2	209
1245	250	64	29	67	105	428	25	28	8		21	506	41	70	42		197
1247	133	40	16	28	59	275	20	18	7		18	344	31	60	35	4	225
1248	137	54	17	42	72	292	18	18	6		18	414	32	59	30		197
1249	136	52	16	39	67	277	16	18	6		19	427	30	56	34		174
1250	248	100	19	44	64	241	19	27	7		14	407	38	69	40	2	270

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1251	195	62	24	54	107	382	23	23	9		27	484	40	67	44		197
1252	66	14	4	26	7	216	16	12	1		11	420	28	51	9		120
1253	166	41	17	53		422	24	19	3		24	507	36	60	22		199
1254	168	61	9	37	5	416	18	18	1		15	579	34	63	18	2	189
1255	319	110	17	47	6	377	26	29	2		14	544	38	65	24	5	240
1256	777	282	26	60	10	269	27	45	7	0.8		506	40	66	31	6	391
1259	569	159	26	59	58	333	25	40	1	0.9	4	419	39	68	55	27	299
1260	509	165	29	50	40	283	33	43		0.9	5	444	40	77	53	34	331
1263	86	20	8	30	49	352	16	16			17	497	36	55	44	6	172
1309	253	100	23	45	57	431	28	27			21	560	47	79	56	27	284
1310	522	190	41	70	75	472	33	34		0.3	14	458	45	71	59	29	291
1567	209	37	19	39	121	339	31	28			26	576	81	134	102	9	228
1568	247	103	27	59	112	326	23	15			24	593	47	85	89	4	167
1579	220	69	20	38	162	329	25	30		0.2	28	575	42	69	132	12	263
1580	234	73	19	45	160	336	23	30		0.1	26	582	40	65	130	9	234
1581	538	204	49	87	102	436	29	40	4		16	385	44	77	82	4	287
1582	1012	343	43	73	78	212	31	65	8		3	383	46	84	74	1	553
1583	254	102	34	62	142	319	30	34	7		36	479	51	99	92	7	249
1584	182	57	35	58	167	347	25	30	7	0.3	39	487	46	95	98	4	274
1585	280	123	32	56	155	325	27	34	8	0.6	36	543	49	99	97	4	308
3172	265	71	42	73	15	409	29	31	21	1.3	22	497	44	38	18	40	209
3173	203	58	37	53	10	417	29	26	19	1.1	30	677	42	37	13	41	191
3174	215	21	40	33	27	404	50	32	16	0.8	28	456	49	45	18	46	89
3175	453	26	104	126	24	422	81	99	126	6.8	101	467	87	188	5	13	407
3176	958	16	77	89		278	70	169	105	5.7	67	311	86	183	11	29	500
3177	135	53	51	74	36	411	24	34	61	2.7	58	567	44	88	3	35	222
3178	184	69	61	85	37	348	25	39	76	3.4	58	443	47	97	6	42	205
3179	161	63	28	56	4	440	24	30	32	0.8	45	468	41	72			214
3180	245	96	30	56	9	461	27	37	18	0.7	37	577	42	77		14	238
3181	426	156	39	65	3	388	31	49	28	1.5	36	482	42	81		23	283
3182	186	78	49	73	6	445	26	39	51	2.6	56	561	42	85		56	202
3183	136	66	45	62		394	22	27	44	1.7	41	525	39	78		24	179
3184	782	274	71	107		242	32	74	68	4.4	34	326	51	102	2	69	323
3185	243	115	41	65	10	282	32	41	61	2.5	56	464	48	102		25	353
3186	164	79	43	66	14	306	30	36	63	2.6	61	490	46	100		28	281
3187	170	70	46	70	39	315	27	35	58	2.6	59	505	45	90	2	38	231
3188	321	85	67	101	61	491	49	56	68	4.2	93	501	56	108		20	340
3189	266	142	53	85	26	361	27	40	63	2.5	66	458	41	80	1	58	220

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3190	252	50	36	71	30	447	30	40	58	1.5	56	567	47	77	2		292
3191	149	53	4	2		396	23	19	2	0.8	12	522	30	38	2	1	218
3192	160	53	38	75	8	386	29	35	50	2.1	66	553	48	86		16	216
3193	177	73	43	79	26	403	28	31	70	2.3	63	507	45	74		12	239
3194	494	177	63	133	26	501	36	59	64	3.1	75	408	51	95		41	295
3195	603	200	76	125	16	420	41	76	70	3.9	79	378	58	112		60	863
3196	233	108	54	82	31	474	32	43	56	2.4	69	541	49	93		31	287
3197	298	94	48	77		428	30	47	48	3.2	76	526	47	81	3	40	297
3198	838	268	79	112	39	308	36	85	75	5	79	385	54	107	9	72	515
3199	170	55	71	107	11	443	31	45	84	4.4	78	547	62	126		61	295
3200	258	115	71	102	23	408	36	48	80	3.9	58	462	62	133	11	151	657
3201	261	100	74	118	38	357	38	54	88	5.1	79	393	59	126	2	179	376
3202	503	209	76	113	57	296	38	66	90	5.5	96	365	54	123	20	203	553
3203	131	76	63	95	72	349	30	36	77	3.8	78	469	52	116	20	200	277
3204	114	54	15	36	32	373	24	23	31	0.8	32	569	40	65	8	253	242
3205	243	94	33	64	18	382	27	35	37	0.9	40	459	37	65	9	262	289
3206	123	59	46	67	21	332	25	32	57	3.2	68	520	47	85	8	326	275
3207	159	77		13	39	315	23	21		0.1	12	502	31	45		188	615
3208	83	30	4	6	4	329	18	9	5	0.9	1	522	25	28	3	75	263
3209	557	195	13	38	6	279	21	54			43	292	24	26	26	13	369
3210	271	78	2	4	10	278	19	14	2	0.9	5	379	16		7	29	312
3211	368	164	165	241	91	467	40	78	183	9.9	151	538	77	182	56	196	572
3212	691.0	262.0	182.0	235.0	99.0	436.0	46.0	109.0	210.0	12.1	206.0	456.0	87.0	219.0	65.0	246.0	622.0
3213	189.0	67.0	182.0	237.0	100.0	527.0	37.0	71.0	204.0	11.6	183.0	516.0	82.0	200.0	73.0	242.0	412.0
3214	65.0	17.0	7.0		25.0	204.0	11.0	4.0	3.0	0.2	5.0	233.0	11.0	9.0		2.0	284.0
3215	26.0	3.0	1.0		14.0	81.0	6.0		3.0	0.6	4.0	176.0	2.0	6.0		5.0	169.0
3216	83.0	34.0	17.0	34.0	49.0	175.0	11.0	13.0	14.0	0.8	17.0	218.0	20.0	49.0	2.0	17.0	344.0
3217	64.0	19.0	17.0	32.0	64.0	217.0	11.0	11.0	13.0	0.9	20.0	236.0	21.0	50.0	2.0	26.0	351.0
3218	152.0	30.0	35.0	49.0	61.0	220.0	16.0	22.0	25.0	1.8	29.0	201.0	25.0	67.0	5.0	74.0	392.0
3219	70.0	39.0	17.0	43.0	27.0	378.0	17.0	18.0	26.0	0.3	30.0	518.0	33.0	52.0	1.0	29.0	607.0
3220	496.0	135.0	39.0	67.0	15.0	396.0	29.0	54.0	37.0	1.3	34.0	411.0	38.0	72.0		52.0	913.0
3221	490.0	127.0	50.0	77.0	15.0	446.0	34.0	62.0	40.0	1.4	42.0	528.0	46.0	85.0		68.0	906.0
3222	157.0	63.0	28.0	49.0	32.0	441.0	28.0	34.0	34.0	1.0	37.0	587.0	40.0	77.0	1.0	46.0	760.0
3223	7.0	22.0	42.0	79.0	19.0	369.0		6.0	89.0	6.9	30.0	655.0	52.0	55.0	5.0	38.0	842.0
3224	446.0	27.0	50.0	54.0	35.0	455.0	64.0	72.0	51.0	1.6	55.0	490.0	62.0	203.0		39.0	265.0
3225	209.0	23.0	48.0	50.0	30.0	538.0	47.0	44.0	48.0	1.4	66.0	625.0	50.0	141.0		39.0	765.0
3226	171.0	69.0	33.0	47.0	32.0	468.0	31.0	32.0	40.0	1.2	39.0	612.0	44.0	90.0		25.0	878.0
3227	173.0	84.0	35.0	53.0	11.0	530.0	29.0	33.0	43.0	1.3	47.0	628.0	42.0	84.0		35.0	788.0

Note: *The sample locations are inaccurate as the shift can be up to a hundred meters from the actual location due to the methods adopted for conducting the regional survey in the 1990s.*