

Table S1. Sample information, Major ion content and isotope composition of samples in the study area.

No	Type	pH	Temp. (°C)	TDS (mg/L)	Na	K	Ca	Mg	Cl	SO ₄	HCO ₃	SiO ₂	B	F	δD	δ ¹⁸ O
					mg/L										‰	‰
TH16*	Surface water	8.00	15.5	206.00	9.60	2.20	46.70	9.60	6.70	38.10	160.00	7.00	-	-	-89.90	-12.80
XG5*	Surface water	7.90	9.0	153.00	0.00	1.20	37.90	8.60	2.80	32.30	118.00	4.80	-	-	-102.00	-13.90
PT8	Surface water	8.55	13.3	140.00	5.47	1.40	32.81	11.21	4.03	78.04	106.79	48.81	0.00	0.38	-80.58	-12.80
PT1	Thermal spring	8.98	63.3	345.00	117.07	3.37	9.64	0.03	37.60	201.62	121.46	98.07	0.08	17.55	-90.29	-13.05
PT2	Thermal spring	9.10	37.0	328.00	102.89	2.51	14.00	0.08	65.66	217.59	26.49	70.09	0.32	8.07	-71.84	-10.84
PT3	Thermal spring	7.44	63.1	1762.00	420.02	42.99	230.45	12.23	186.96	1791.96	362.76	161.85	0.46	4.27	-73.12	-11.26
PT4	Thermal spring	9.70	30.3	549.00	178.66	4.75	19.94	1.11	107.85	415.58	3.67	81.42	0.12	1.04	-67.32	-10.60
PT5	Thermal spring	9.92	71.9	223.00	76.69	1.69	2.42	0.02	35.16	75.73	7.13	118.32	0.08	18.97	-63.62	-10.55
PT6	Thermal spring	8.77	70.0	291.00	88.38	4.51	8.28	0.47	52.04	131.62	87.63	116.76	0.19	4.51	-74.10	-11.19
PT7	Thermal spring	7.58	62.0	1402.00	438.91	50.58	56.41	10.00	230.91	403.73	1010.83	146.85	1.91	7.82	-73.49	-10.61
PT9	Thermal spring	6.86	38.9	556.00	98.11	11.57	91.66	15.50	48.52	170.89	528.04	88.07	2.75	3.27	-77.89	-11.94
K1*	Thermal well	7.20	27.0	564.00	96.00	10.90	61.50	15.20	62.80	100.00	314.00	56.20	-	-	-93.90	-13.00
K2*	Thermal well	8.40	91.0	2676.00	852.00	117.00	13.10	14.40	425.00	632.00	781.00	92.10	-	-	-80.80	-10.80
K3*	Thermal well	8.60	103.0	2664.00	895.00	114.00	6.90	13.00	410.00	616.00	904.00	88.90	-	-	-	-
K4*	Thermal well	6.40	155.0	3664.00	1021.00	136.00	4.10	2.20	624.00	805.00	214.00	273.00	-	-	-	-
KH6**	Thermal well	6.85	141.0	2995.12	1007.34	141.48	12.06	3.66	639.58	809.76	744.59	-	8.90	8.33	-74.53	-8.72
KH10**	Thermal well	6.81	100.0	2382.87	778.70	103.07	24.12	4.39	494.06	600.19	743.37	-	5.20	6.44	-79.98	-9.90
ZK7**	Thermal well	6.35	144.0	3313.77	1021.02	135.82	4.07	2.22	623.49	805.34	213.57	-	13.10	11.41	-73.10	-8.30

* Samples from [25];

** Samples from [27]; [37]

Table S2. Test results of radioactive elements in Kuzgan granitic pluton and calculation of radioactive heat generation

NO	K ₂ O/ %	Th/ (μg/g)	U/ (μg/g)	Heat generation rate (μW/m ³) / (μJ/g•a)	
017E	7.97	96.56	17.04	11.78	141.97
019H	6.71	57.09	3.03	5.37	64.30
019J	7.98	54.84	7.09	6.39	76.40
019A2	7.17	101.77	10.06	10.28	123.81
019I	6.87	98.72	14.40	11.14	134.38
zb02-1	10.39	17.00	1.90	2.72	31.45
zb02-13	8.32	82.70	15.30	10.42	125.42
19002#	11.22	50.90	15.10	8.49	101.49
QSH-4##	6.33	115.38	5.38	9.93	119.72
017Eb	4.72	58.91	7.78	6.51	78.35
018E	4.92	49.42	11.93	6.93	83.52
018M	3.74	30.22	11.54	5.40	65.03
018O	5.57	110.05	27.20	15.05	182.05
018U	5.58	82.50	7.51	8.14	98.11
zb19-1	5.55	10.80	8.50	3.48	41.42
zb29-7	6.57	29.50	5.10	4.00	47.58
QSH-1###	5.13	63.60	11.84	7.90	95.29
QSH-2##	4.92	60.22	13.89	8.17	98.59
QSH-3##	4.97	95.05	15.25	10.91	131.88

Unmarked, [53]; #, Pan Yusheng (2000); ##, This study.

Table S3. Test results of radioactive elements in Karibasheng granitic pluton and calculation of radioactive heat generation

No	K ₂ O /%	Th/ (μg/g)	U/ (μg/g)	Heat generation rate (μW/m ³) / (μJ/g•a)	
019M	5.07	61.80	7.05	6.55	78.88
9002#	4.89	125.00	12.80	12.33	149.14
9003#	4.63	53.20	7.00	5.91	71.08
14008#	4.80	49.80	9.80	6.40	77.11
QSH-3###	5.20	80.69	14.10	9.66	116.61

Labels are same as above Table S2

References

- Ke, S., 2006. Petrogenesis of Taxkorgan Alkaline Complex Belt and Its Tectonic Significance. China University of Geosciences, Beijing.
- Li, Y.M., Pang, Z.H., Yang, F.T., Yuan, L.J., Tang, P.H., 2017. Hydrogeochemical characteristics and genesis of the high-temperature geothermal system in the Tashkorgan basin of the Pamir syntax, western China. *J Asian Earth Sci* 149, 134-144.
- Shi, J., Lu, C., Li, Q., Chang, Z., 2018. Progress in research on the geothermal resources in Taxkorgan Valley, Xinjiang. *Geological Survey of China (in Chinese)* 5, 8-10.
- Shi, J., Wang, M., Ma, X., Zhang, W., Zhu, L., 2022. Isotope and Hydrogeochemical Characteristics of the Quman High Temperature Geothermal Field in Taxkorgan, Xinjiang. *Acta Geoscientica Sinica (in Chinese with English abstract)* 43.