

APPENDIX 2

WDS composition of REE-bearing uraninites [wt.%] and their calculated ages (sample W-5, Fig. 8A-I)

	SO ₃	P ₂ O ₅	SiO ₂	TiO ₂	Ce ₂ O ₃	Pr ₂ O ₃	Nd ₂ O ₃	Sm ₂ O ₃	Eu ₂ O ₃	Gd ₂ O ₃	Tb ₂ O ₃	Dy ₂ O ₃	Ho ₂ O ₃
young uraninites													
1-p4	0.016	0.017	0.027	0.019	0.216	0.110	0.086	0.091	n.d.	0.066	n.d.	0.173	0.031
2-p2	0.045	0.009	0.025	n.d.	0.029	0.080	0.014	0.078	0.071	0.222	n.d.	0.052	n.d.
3-p1	0.029	n.d.	0.011	0.025	0.018	n.d.	n.d.	0.020	0.150	0.027	n.d.	0.017	0.060
3-p3	n.d.	n.d.	0.014	0.075	n.d.	n.d.	n.d.	n.d.	0.071	n.d.	n.d.	0.102	0.111
6-p2	0.029	n.d.	0.011	0.068	0.051	n.d.	n.d.	0.033	0.063	0.044	n.d.	0.081	n.d.
6-p3	0.021	0.022	n.d.	0.076	0.180	n.d.	0.017	0.100	n.d.	n.d.	n.d.	0.073	0.057
Min	0.016	0.009	0.011	0.019	0.018	0.080	0.014	0.02	0.063	0.027	n.d.	0.017	0.031
Max	0.045	0.022	0.027	0.076	0.216	0.110	0.086	0.100	0.150	0.222	n.d.	0.173	0.111
Av.	0.028	0.016	0.0176	0.0526	0.0988	0.095	0.039	0.0644	0.0887	0.0897	n.d.	0.083	0.065
s.d.	0.0110	0.0066	0.0078	0.0282	0.0922	0.0212	0.0407	0.0358	0.0410	0.0896	n.d.	0.053	0.0335
old uraninites													
1-p1	n.d.	0.025	n.d.	0.068	1.050	0.269	1.105	0.312	0.167	0.033	n.d.	0.108	0.073
1-p2	0.077	0.002	0.034	n.d.	0.325	0.128	0.378	0.180	0.174	0.184	n.d.	0.166	n.d.
1-p3	0.039	n.d.	n.d.	0.004	0.871	0.207	0.948	0.320	0.169	0.128	n.d.	0.319	0.048
1-p5	0.011	n.d.	n.d.	0.039	0.890	0.187	1.137	0.382	0.336	0.216	n.d.	0.299	0.106
2-p1	0.086	0.005	n.d.	n.d.	0.538	0.245	0.826	0.285	0.045	0.060	n.d.	0.255	0.123
3-p2	0.033	n.d.	0.007	n.d.	1.005	0.032	0.997	0.250	0.255	0.028	n.d.	0.055	0.084
3-p4	0.053	n.d.	0.420	n.d.	0.542	0.085	0.558	0.153	0.128	n.d.	n.d.	0.025	n.d.
4-p1	0.016	0.011	0.01	n.d.	0.908	n.d.	0.834	0.327	0.137	0.287	0.073	0.267	0.090
4-p2	0.034	0.008	0.034	n.d.	0.652	0.144	0.997	0.391	0.091	0.387	0.001	0.375	n.d.
4-p3	0.060	0.038	n.d.	0.120	0.805	0.059	0.739	0.184	0.234	0.017	n.d.	0.323	0.216
4-p4	0.072	0.023	0.06	0.027	1.326	0.119	1.507	0.352	0.263	0.203	0.004	0.529	0.117
4-p5	0.061	0.041	n.d.	0.033	0.728	0.208	0.931	0.362	n.d.	0.320	0.068	0.335	n.d.
4-p6	0.230	n.d.	n.d.	0.094	0.634	0.090	1.083	0.311	0.220	0.075	0.008	0.412	n.d.
5-p1	n.d.	0.015	0.010	0.054	0.828	0.005	0.905	0.332	0.166	0.330	0.003	0.427	n.d.
5-p2	0.006	n.d.	n.d.	n.d.	0.741	0.144	0.759	0.231	0.033	0.438	n.d.	0.363	n.d.
5-p3	0.032	0.006	0.008	0.089	0.914	0.166	1.332	0.412	0.301	0.406	n.d.	0.562	n.d.

5-p4	0.004	0.006	0.005	n.d.	0.771	0.123	0.922	0.266	0.111	0.176	n.d.	0.351	0.095
5-p5	0.071	0.009	0.009	0.113	0.857	0.069	0.997	0.263	0.200	0.246	n.d.	0.320	0.092
5-p6	0.038	0.016	0.010	0.034	0.469	0.063	0.651	0.328	0.244	0.267	0.001	0.322	n.d.
6-p1	0.012	n.d.	n.d.	n.d.	0.819	n.d.	0.831	0.276	0.131	0.314	0.075	0.443	n.d.
6-p4	0.113	0.010	n.d.	0.072	0.812	0.335	1.267	0.400	0.188	0.431	n.d.	0.463	0.093
7-p1	n.d.	0.002	0.009	0.015	0.866	0.099	0.857	0.205	0.115	0.238	0.049	0.293	n.d.
7-p2	0.122	0.001	0.010	0.073	0.343	n.d.	0.491	0.132	0.014	n.d.	0.009	0.149	0.049
7-p3	0.022	n.d.	0.010	n.d.	1.314	0.122	1.242	0.316	0.166	0.453	n.d.	0.370	n.d.
7-p4	n.d.	0.024	0.016	0.070	0.938	0.098	1.087	0.127	0.165	0.362	n.d.	0.257	0.036
8-p1	0.005	n.d.	n.d.	0.042	0.600	0.098	0.869	0.234	0.072	0.245	0.031	0.185	n.d.
8-p2	0.023	n.d.	0.019	n.d.	1.041	0.241	1.654	0.585	0.145	0.505	n.d.	0.577	0.028
8-p3	0.031	n.d.	n.d.	n.d.	0.279	0.055	0.299	0.239	0.150	0.337	n.d.	0.413	0.122
9-p1	0.186	n.d.	n.d.	n.d.	0.407	0.123	0.48	0.237	0.213	0.186	n.d.	0.187	n.d.
9-p2	0.007	0.022	n.d.	0.021	1.160	0.379	1.594	0.496	0.326	0.445	n.d.	0.623	n.d.
9-p3	0.013	0.001	0.001	0.043	0.723	0.093	0.918	0.289	0.062	n.d.	0.084	0.277	0.182
9-p4	0.043	0.033	n.d.	0.060	0.796	0.057	1.001	0.364	n.d.	0.052	n.d.	0.144	0.069
9-p5	0.053	n.d.	n.d.	0.052	0.473	0.071	0.628	0.117	0.288	0.064	n.d.	0.286	n.d.
Min	0.004	0.001	0.001	0.004	0.279	0.005	0.299	0.117	0.014	0.017	0.001	0.025	0.028
Max	0.230	0.041	0.42	0.12	1.326	0.379	1.654	0.585	0.336	0.505	0.084	0.623	0.216
Average	0.054	0.015	0.040	0.056	0.770	0.137	0.934	0.293	0.171	0.248	0.034	0.318	0.095
s.d.	0.053	0.012	0.099	0.032	0.261	0.088	0.322	0.103	0.084	0.146	0.034	0.145	0.049

	Er ₂ O ₃	Yb ₂ O ₃	Lu ₂ O ₃	La ₂ O ₃	Sc ₂ O ₃	ThO ₂	UO ₂	PbO	Y ₂ O ₃	CaO	Total	Σ REEO	Age (Ma)
young uraninites (II)													
1-p4	0.236	0.218	0.001	0.243	n.d.	0.0	96.784	0.913	1.222	n.d.	100.469	2.692	71
2-p2	n.d.	0.092	n.d.	0.266	0.006	0.0	97.125	0.538	0.792	0.171	99.615	1.607	42
3-p1	n.d.	0.185	0.065	n.d.	0.103	0.0	95.872	1.057	1.068	0.184	99.044	1.720	83
3-p3	0.062	0.139	n.d.	n.d.	n.d.	0.0	96.899	0.909	0.919	0.182	99.483	1.404	70
6-p2	0.125	0.076	0.065	n.d.	0.029	0.238	96.341	1.059	0.918	0.223	99.456	1.456	82

6-p3	0.041	0.063	n.d.	n.d.	n.d.	0.171	96.152	1.004	0.938	0.239	99.154	1.311	78
Min	0.041	0.063	0.001	0.243	0.006	0.0	95.872	0.538	0.792	0.171	99.044	1.311	42
Max	0.236	0.218	0.065	0.266	0.103	0.238	97.125	1.059	1.222	0.239	100.469	2.692	83
Average	0.116	0.129	0.044	0.255	0.046	0.068	96.529	0.913	0.976	0.200	99.537	1.698	71
s.d.	0.088	0.063	0.037	0.016	0.051	0.108	0.483	0.195	0.149	0.029	0.505	0.508	15
old uraninites (I)													
1-p1	0.175	0.196	0.060	n.d.	n.d.	0.463	83.798	6.167	1.447	0.544	96.060	4.987	526
1-p2	n.d.	0.096	n.d.	0.181	0.053	0.018	89.045	5.895	0.732	0.352	98.019	2.454	477
1-p3	0.098	0.049	n.d.	0.110	0.036	0.318	84.667	6.243	1.220	0.748	96.547	4.491	528
1-p5	0.209	0.118	0.001	0.118	0.015	0.050	82.788	6.130	2.003	0.864	95.899	6.055	530
2-p1	n.d.	n.d.	0.187	0.074	0.023	0.330	86.565	5.757	1.000	0.504	96.908	3.621	478
3-p2	n.d.	0.100	0.026	0.208	0.024	0.210	86.633	6.211	0.949	0.988	98.095	3.981	514
3-p4	n.d.	n.d.	n.d.	n.d.	n.d.	0.150	88.273	5.418	0.455	0.546	96.437	1.938	443
4-p1	n.d.	0.106	n.d.	0.006	0.011	0.195	84.705	5.491	1.776	1.000	96.250	4.399	467
4-p2	0.244	0.197	n.d.	0.076	n.d.	0.107	84.200	5.005	1.566	1.154	95.663	5.120	430
4-p3	0.225	0.233	0.076	0.155	0.003	0.203	86.212	5.364	1.668	0.740	97.674	4.858	449
4-p4	0.210	0.161	n.d.	0.369	n.d.	0.0	82.749	5.332	1.915	1.034	96.372	7.062	465
4-p5	0.071	0.059	0.023	n.d.	n.d.	0.613	84.036	5.768	1.355	1.246	96.258	4.460	492
4-p6	0.100	0.148	n.d.	0.026	0.029	0.195	83.739	6.759	1.344	0.945	96.442	4.443	575
5-p1	0.172	0.243	n.d.	0.178	0.017	0.0	83.655	5.813	1.933	1.024	96.110	5.506	499
												4.573	
5-p2	0.254	0.138	0.021	0.121	0.026	0.088	85.085	6.128	1.33	0.724	96.630		516
5-p3	0.302	0.217	n.d.	0.077	n.d.	0.157	82.561	5.988	1.756	1.016	96.302	6.445	520
5-p4	0.166	0.118	n.d.	0.301	0.071	0.070	85.312	5.657	1.387	0.725	96.637	4.787	477
5-p5	0.157	0.159	n.d.	0.058	n.d.	0.208	83.658	6.399	1.501	0.952	96.338	4.937	547
5-p6	n.d.	0.160	n.d.	0.122	n.d.	0.341	86.293	6.097	1.162	0.536	97.154	3.788	507
6-p1	0.326	0.174	n.d.	0.064	0.023	0.495	85.229	5.420	1.649	0.463	96.744	4.563	458
6-p4	0.115	0.177	0.091	0.033	0.017	0.078	81.939	5.971	1.827	0.803	95.235	4.165	522
7-p1	0.136	0.110	0.015	0.085	n.d.	0.242	84.230	6.114	1.112	0.928	95.720	4.193	520
7-p2	n.d.	n.d.	n.d.	0.045	n.d.	0.079	89.050	5.643	0.789	0.672	97.671	1.999	457
7-p3	0.092	0.091	n.d.	n.d.	0.023	0.595	83.208	5.945	1.357	0.905	96.231	6.342	512
7-p4	0.070	0.064	n.d.	0.104	0.026	0.751	84.172	5.681	1.353	1.001	96.402	4.591	484

8-p1	n.d.	0.044	0.035	n.d.	0.077	0.112	85.244	6.672	1.102	1.020	96.687	3.445	559
8-p2	0.288	0.398	0.044	0.135	0.074	0.159	80.865	5.839	2.319	1.086	96.025	7.908	518
8-p3	0.243	0.336	0.014	0.124	n.d.	0.018	85.251	6.128	2.231	0.503	96.773	4.228	515
9-p1	n.d.	0.092	0.126	0.127	n.d.	0.063	87.838	6.043	0.942	0.659	97.909	2.994	494
9-p2	0.277	0.276	n.d.	0.292	n.d.	0.219	80.797	5.841	2.368	1.009	96.152	7.959	518
9-p3	0.187	0.155	0.045	0.094	0.010	0.330	84.985	5.958	1.456	0.946	96.852	4.458	503
9-p4	n.d.	0.112	0.019	0.025	n.d.	0.224	86.568	6.235	0.854	0.982	97.638	3.474	516
9-p5	n.d.	0.129	n.d.	n.d.	n.d.	0.131	86.728	5.772	0.933	0.607	96.332	2.989	479
Min	0.07	0.044	0.001	0.006	0.003	0.018	80.797	5.005	0.455	0.352	95.235	1.938	430
Max	0.326	0.398	0.187	0.369	0.077	0.751	89.05	6.759	2.368	1.246	98.095	7.959	575
Av.	0.187	0.155	0.052	0.123	0.031	0.233	84.851	5.906	1.418	0.825	96.611	4.582	500
s.d	0.077	0.082	0.050	0.088	0.023	0.184	2.075	0.377	0.470	0.227	0.700	1.448	33