

Supplemental File S-1.

Sample CVE-1

Field Data

Location: Cheever Mine, exposed quarry excavation

Rock type: Sodic-rich granite

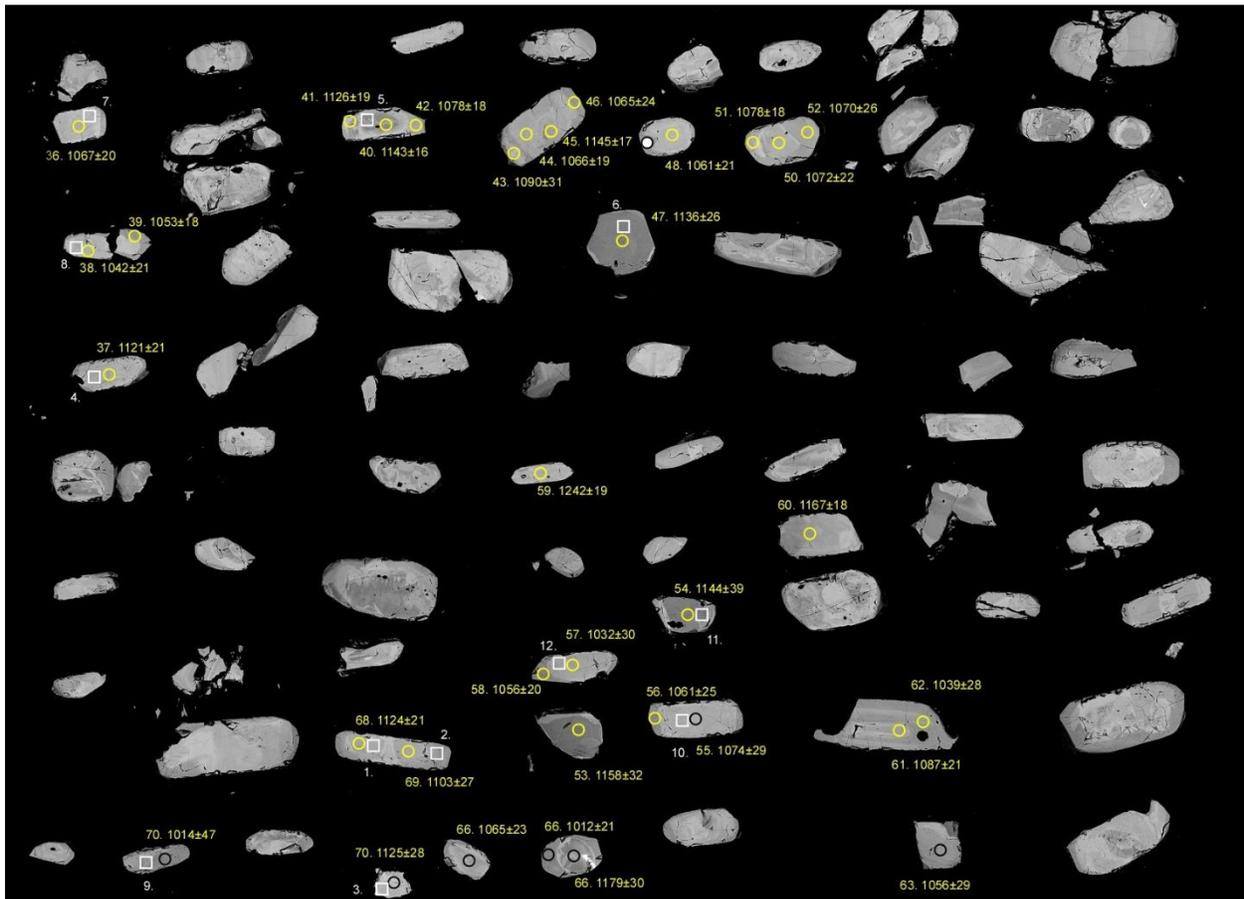
Mineralogy: Plagioclase-quartz-magnetite

Other: monazite-zircon

Field relations: Large granitic sheet making up bulk of face of quarry

Sample	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	LOI
CVE-1	70.59	0.39	10.99	10.68	0.01	0.05	0.36	5.77	0.64	0.05	0.00
CVE-2	80.28	0.33	10.35	1.41	0.01	0.11	0.57	4.80	1.40	0.01	0.23
CVE-3	67.94	0.26	11.20	12.21	0.02	0.24	0.76	6.38	0.07	0.09	0.00
CV-4	4.95	0.70	0.49	86.97	0.07	0.23	2.65	0.29	0.07	2.90	0.00
CV-7	65.93	0.47	14.40	8.68	0.02	0.08	0.56	9.03	0.20	0.09	0.00

Zircon Physical Properties



Zircon yield: Good

Size: 100-700 μm (avg. length 300 μm)

Shape: Two populations: 1) elongate (4:1) dipyrramids and fragments; 2) equant

Internal Features:

- A few distinct darker grains (BSE)
- Metamict cores
- Cores in lighter (BSE) grains
- inclusions
- fractures
- zoning apparent in many spots, sometimes truncated

Zircon Chemical and Isotopic Properties

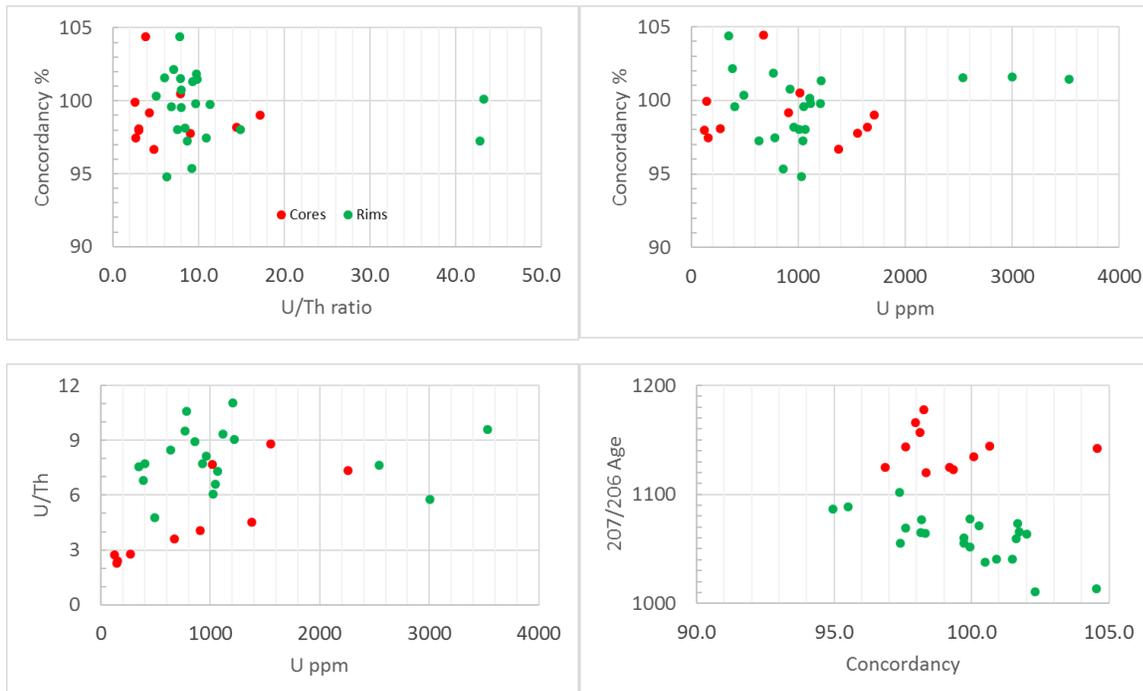
Analyses: 35 (34 passed quality control screening)

Concordant Analyses: 28/34 (97-103%)

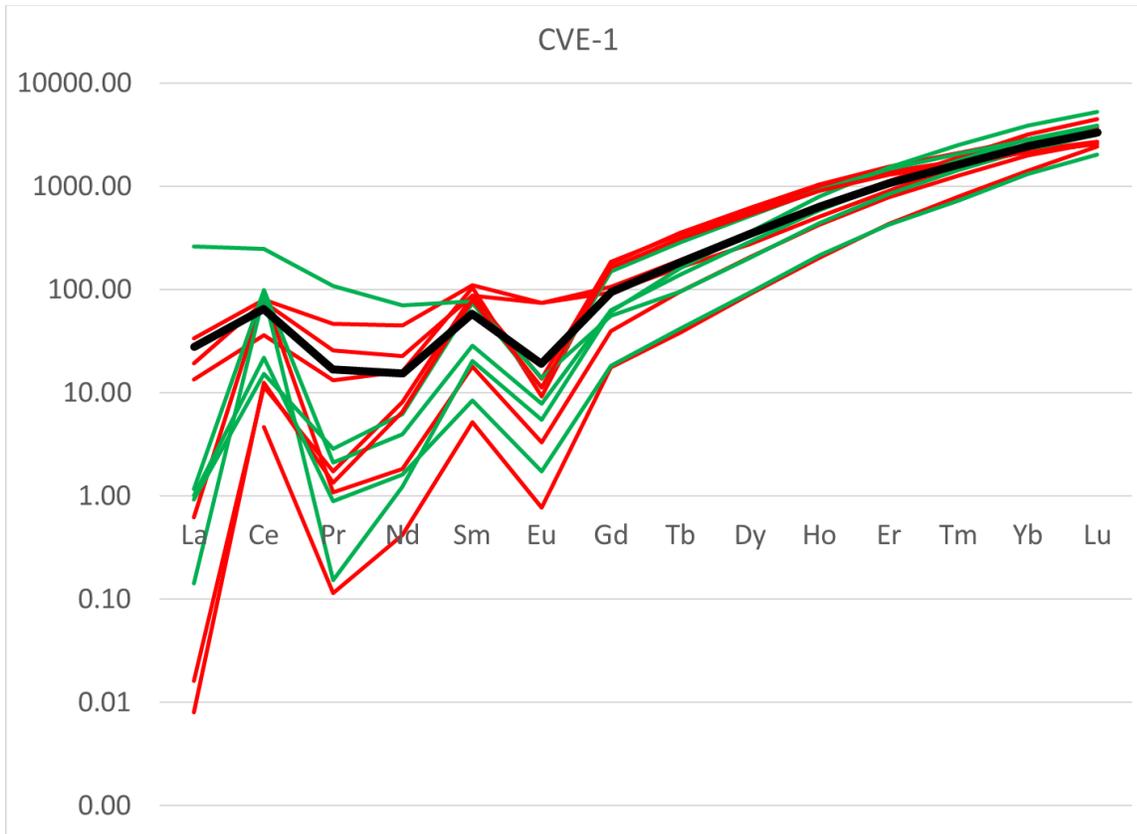
U content: cores - 976 ± 696 ; rims - 1149 ± 837

U/Th ratio: cores - 9.3 ± 11.0 ; rims - 10.1 ± 7.9

$^{206}\text{Pb}/^{204}\text{Pb}$: cores - 770042; rims - 1228585



Zircon REE Analysis: 12

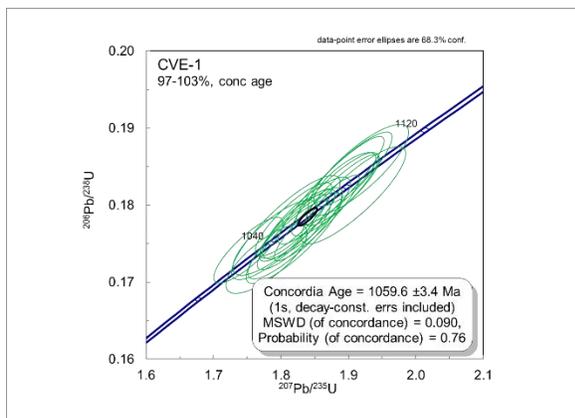
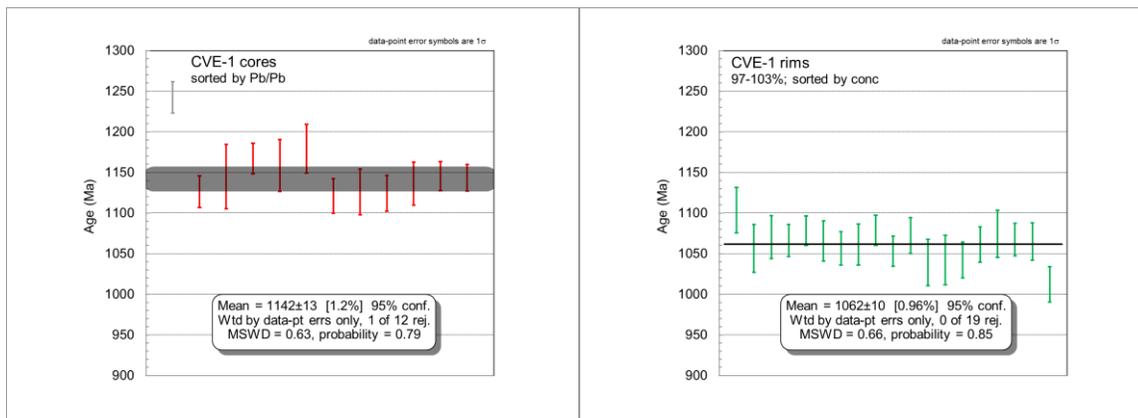
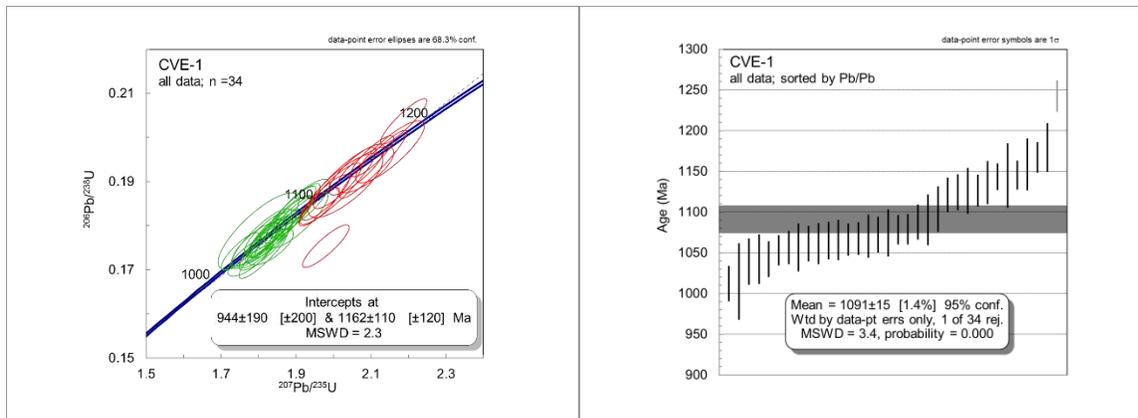


Rare Earth Elements (ppm)

	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sum
CVE-1.1	0	2.85	0.0106	0.192	0.76	0.043	3.53	1.37	22.2	11.1	69.1	19.76	228.7	59.9	420
CVE-1.2	0.147	53.3	0.1	0.84	2.64	0.185	7.89	3.47	51.1	23.11	125.2	31.3	321.9	65.1	686
CVE-1.3	7.9	48.7	4.3	20.5	16.4	4.18	18.6	5.92	67.9	27.9	143.4	38.7	413	91	908
CVE-1.4	4.6	46	2.4	10.4	13	4.2	21.1	7	86.5	34.5	178.7	47.3	514	110.4	1080
CVE-1.5	3.2	22.3	1.23	7.33	15.4	0.517	35.9	12.9	151	57.1	249	51.8	461	85.4	1154
CVE-1.6	0.0038	7.02	0.16	3.69	13	0.77	36.7	12.32	142.3	53.2	222.6	43.59	358.2	66.6	960
CVE-1.7	0.034	55.8	0.0142	0.56	3.01	0.309	12.02	5.81	88.1	43.6	242.3	62.2	627	129.1	1270
CVE-1.8	62	152	10	32	11.4	0.78	11	3.43	49.5	23.8	134.8	35.6	365	78.5	970
CVE-1.9	0.217	9.31	0.266	2.83	10.89	0.63	29.9	10.38	127.1	49.9	232.7	50.5	451	85.7	1061
CVE-1.10	0.277	60.8	0.194	1.82	4.22	0.44	12.6	4.99	72.1	32	170.3	43.8	455	94.8	953
CVE-1.11	0.0019	7.63	0.125	3	11.85	0.634	32.8	11.23	132.3	49.6	207.2	41.2	343	63.1	904
CVE-1.12	0.241	13.3	0.082	0.73	1.25	0.098	3.63	1.5	23.1	11.63	68	18	210	49.6	401

U-Pb Isotopic Ages

- **Range of 207Pb/206Pb ages:** cores 1103.5-1242.5; rims 1012.3-1090.3
- **Upper Intercept (all data):** na
- **Weighted average (all data):** 1091±15 Ma
- **Weighted average (97-103):** cores - 1142±13; rims - 1062±10 Ma
- **Concordia age:** 1069.6±3.4 Ma



Comparison of Analyses on Same Grain

Analysis #	Position	207Pb/206Pb	U (ppm)	U/Th	Concordancy
40	center	1143±16	660	3.7	104.5
41	center	1127±16	1363	4.6	96.8
42	edge	1078±18	1051	7.4	98.1
38	edge	1042±22	1202	9.1	101.4
39	edge	1053±18	1100	9.4	99.9
43	r. edge	1090±31	843	9.0	95.5
44	int.	1066±20	995	14.7	98.1
45	center	1145±18	1004	7.8	100.6
46	l. edge	1066±25	945	8.2	98.3
68	center	1124±22	892	4.1	99.3
69	center	1104±28	1030	42.6	97.3
57	center	1042±31	912	7.8	100.9
58	edge	1056±21	389	7.8	99.7
50	l. edge	1072±22	1092	43.1	100.2
51	center	1079±18	1192	11.1	99.9
52	r. edge	1070±26	766	10.7	97.5
61	center	1088±22	1013	6.1	94.9
62	edge	1039±28	476	4.9	100.4
64	center	1179±30	257	2.9	98.8
64	edge	1012±21	372	6.9	102.3

Interpretation: The zircons in this sample appear to be igneous with typical core/rim relations, shapes, U-content, and some elevated U/Th ratios. The REE signature of both rims and cores are indistinguishable and show considerable scatter. The U-Pb zircon systematics of this rock are complex. Many of the zircons, but not all, contain older inherited cores. In most cases these can be seen in BSE imaging. Some inherited grains lack any type of younger overgrowth and are considered xenocrysts. Grains are found that give entirely older ages (40 & 41 and 68 & 69), and grains that give all younger ages (38 & 39, 57 & 58, and 50-52). The age of the crystallization of this rock is interpreted as 1059.6 ± 3.4 Ma.

Geochronological Results (Analytical Data)

Table CVE-1. U-Pb geochronologic analyses.																			
Analysis	Isotope ratios									Apparent ages (Ma)									
	U (ppm)	206Pb 204Pb	U/Th	206Pb* 207Pb*	± (%)	207Pb* 235U*	± (%)	206Pb* 238U	± (%)	error corr.	206Pb* 238U*	± (Ma)	207Pb* 235U	± (Ma)	206Pb* 207Pb*	± (Ma)	Best age (Ma)	± (Ma)	Conc (%)
CV-1 sorted by 207Pb/206Pb ages																			
-Sample 2 Spot 65	372	193527	6.9	13.7100	1.1	1.7516	1.9	0.1742	1.6	0.83	1035.1	15.4	1027.8	12.5	1012.3	21.8	1012.3	21.8	102.3
-Sample 2 Spot 70	335	139450	7.6	13.6938	2.3	1.7997	4.0	0.1787	3.2	0.81	1060.1	31.2	1045.3	25.8	1014.6	47.2	1014.6	47.2	104.5
-Sample 2 Spot 62	476	70951	4.9	13.5286	1.4	1.7914	2.3	0.1758	1.8	0.79	1043.8	17.7	1042.3	15.1	1039.2	28.3	1039.2	28.3	100.4
-Sample 2 Spot 57	912	70604	7.8	13.5093	1.5	1.8074	2.9	0.1771	2.5	0.86	1051.0	24.5	1048.1	19.2	1042.1	30.5	1042.1	30.5	100.9
-Sample 2 Spot 38	1202	175211	9.1	13.5090	1.1	1.8186	2.1	0.1782	1.8	0.85	1057.0	17.2	1052.2	13.6	1042.1	21.9	1042.1	21.9	101.4
-Sample 2 Spot 39	1100	151145	9.4	13.4366	0.9	1.8187	1.8	0.1772	1.5	0.86	1051.8	15.0	1052.2	11.7	1053.0	18.4	1053.0	18.4	99.9
-Sample 2 Spot 58	389	70348	7.8	13.4139	1.0	1.8238	2.0	0.1774	1.8	0.86	1052.9	17.0	1054.1	13.3	1056.4	20.6	1056.4	20.6	99.7
-Sample 2 Spot 63	622	187689	8.5	13.4131	1.5	1.7785	2.2	0.1730	1.7	0.76	1028.7	16.2	1037.6	14.6	1056.5	29.3	1056.5	29.3	97.4
-Sample 2 Spot 48	3517	600781	9.7	13.3832	1.1	1.8744	2.8	0.1819	2.5	0.92	1077.5	25.3	1072.1	18.3	1061.0	21.7	1061.0	21.7	101.6
-Sample 2 Spot 56	1033	59901	6.7	13.3811	1.3	1.8376	2.3	0.1783	2.0	0.84	1057.9	19.2	1059.0	15.3	1061.3	25.2	1061.3	25.2	99.7
-Sample 2 Spot 66	756	61098	9.6	13.3565	1.1	1.8936	2.5	0.1834	2.2	0.89	1085.7	21.9	1078.9	16.4	1065.0	23.0	1065.0	23.0	101.9
-Sample 2 Spot 46	945	162967	8.2	13.3528	1.2	1.8211	2.5	0.1764	2.2	0.87	1047.0	21.5	1053.1	16.7	1065.6	24.8	1065.6	24.8	98.3
-Sample 2 Spot 44	995	101832	14.7	13.3497	1.0	1.8193	2.0	0.1761	1.7	0.86	1045.9	16.4	1052.4	12.9	1066.1	19.9	1066.1	19.9	98.1
-Sample 2 Spot 36	2988	848398	5.8	13.3418	1.0	1.8947	1.6	0.1833	1.3	0.78	1085.2	12.6	1079.2	10.7	1067.2	20.1	1067.2	20.1	101.7
-Sample 2 Spot 52	766	366874	10.7	13.3225	1.3	1.8191	2.6	0.1758	2.2	0.86	1043.8	21.4	1052.4	16.9	1070.2	26.4	1070.2	26.4	97.5
-Sample 2 Spot 50	1092	7304440	43.1	13.3081	1.1	1.8797	2.3	0.1814	2.0	0.87	1074.8	19.5	1074.0	15.0	1072.3	22.2	1072.3	22.2	100.2
-Sample 2 Spot 55	2524	267354	7.7	13.2941	1.4	1.9144	2.6	0.1846	2.1	0.83	1091.9	21.3	1086.1	17.1	1074.4	29.0	1074.4	29.0	101.6
-Sample 2 Spot 42	1051	59025	7.4	13.2694	0.9	1.8530	2.2	0.1783	2.1	0.92	1057.8	20.1	1064.5	14.8	1078.2	18.0	1078.2	18.0	98.1
-Sample 2 Spot 51	1192	294883	11.1	13.2646	0.9	1.8913	1.9	0.1819	1.7	0.88	1077.6	16.6	1078.0	12.7	1078.9	18.5	1078.9	18.5	99.9
-Sample 2 Spot 61	1013	85406	6.1	13.2062	1.1	1.8134	2.4	0.1737	2.1	0.89	1032.4	20.3	1050.3	15.6	1087.8	21.6	1087.8	21.6	94.9
-Sample 2 Spot 43	843	14528405	9.0	13.1890	1.6	1.8317	2.2	0.1752	1.6	0.71	1040.8	15.0	1056.9	14.5	1090.3	31.2	1090.3	31.2	95.5
-Sample 2 Spot 69	1030	112120	42.6	13.1028	1.4	1.9077	2.7	0.1813	2.3	0.86	1074.0	22.7	1083.8	17.9	1103.5	27.8	1103.5	27.8	97.3
-Sample 2 Spot 37	1635	108298	14.2	12.9878	1.1	1.9789	2.1	0.1864	1.8	0.87	1101.9	18.7	1108.4	14.3	1121.1	21.1	1121.1	21.1	98.3
-Sample 2 Spot 68	892	83191	4.1	12.9660	1.1	2.0105	2.1	0.1891	1.8	0.85	1116.3	18.5	1119.1	14.3	1124.4	21.9	1124.4	21.9	99.3
-Sample 2 Spot 67	1693	7504966	17.0	12.9562	1.4	2.0117	3.4	0.1890	3.0	0.91	1116.1	31.1	1119.5	22.8	1125.9	28.3	1125.9	28.3	99.1
-Sample 2 Spot 41	1363	908692	4.6	12.9527	1.0	1.9617	1.8	0.1843	1.5	0.85	1090.3	15.5	1102.5	12.3	1126.5	19.5	1126.5	19.5	96.8
-Sample 2 Spot 47	130	88088	2.4	12.8905	1.3	2.0617	2.4	0.1928	2.0	0.83	1136.3	20.5	1136.2	16.3	1136.1	26.4	1136.1	26.4	100.0
-Sample 2 Spot 40	660	85272	3.7	12.8435	0.8	2.1865	1.9	0.2037	1.7	0.90	1195.0	18.2	1176.8	13.0	1143.3	16.3	1143.3	16.3	104.5
-Sample 2 Spot 54	140	53263	2.5	12.8337	2.0	2.0323	3.2	0.1892	2.5	0.79	1116.8	26.1	1126.4	22.0	1144.8	39.5	1144.8	39.5	97.6
-Sample 2 Spot 45	1004	262605	7.8	12.8302	0.9	2.1035	1.8	0.1957	1.6	0.87	1152.4	16.6	1150.0	12.5	1145.4	17.8	1145.4	17.8	100.6
-Sample 2 Spot 53	107	88518	2.8	12.7462	1.6	2.0847	2.4	0.1927	1.8	0.74	1136.1	18.7	1143.8	16.6	1158.4	32.0	1158.4	32.0	98.1
-Sample 2 Spot 60	1537	272814	8.9	12.6903	0.9	2.1068	2.8	0.1939	2.6	0.94	1142.5	27.6	1151.0	19.3	1167.1	18.7	1167.1	18.7	97.9
-Sample 2 Spot 64	257	268243	2.9	12.6138	1.5	2.1507	2.8	0.1968	2.4	0.84	1157.9	25.1	1165.3	19.5	1179.1	30.1	1179.1	30.1	98.2
-Sample 2 Spot 59	2243	174470	7.4	12.2142	1.0	1.9799	2.1	0.1754	1.8	0.88	1041.8	17.5	1108.7	14.0	1242.5	19.4	1242.5	19.4	83.8

Supplemental file S-2.

Sample CVE-2

Field Data

Location: Cheever Mine, exposed quarry excavation

Rock type: High-SiO₂ sodic granite

Mineralogy: Plagioclase-quartz-perthite-magnetite

Other: Cpx-titanite-monzite-zircon

Field relations: Uppermost granite sheet intruded by CVE-1

Sample	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	LOI
CVE-1	70.59	0.39	10.99	10.68	0.01	0.05	0.36	5.77	0.64	0.05	0.00
CVE-2	80.28	0.33	10.35	1.41	0.01	0.11	0.57	4.80	1.40	0.01	0.23
CVE-3	67.94	0.26	11.20	12.21	0.02	0.24	0.76	6.38	0.07	0.09	0.00
CV-4	4.95	0.70	0.49	86.97	0.07	0.23	2.65	0.29	0.07	2.90	0.00
CV-7	65.93	0.47	14.40	8.68	0.02	0.08	0.56	9.03	0.20	0.09	0.00

Zircon Chemical and Isotopic Properties

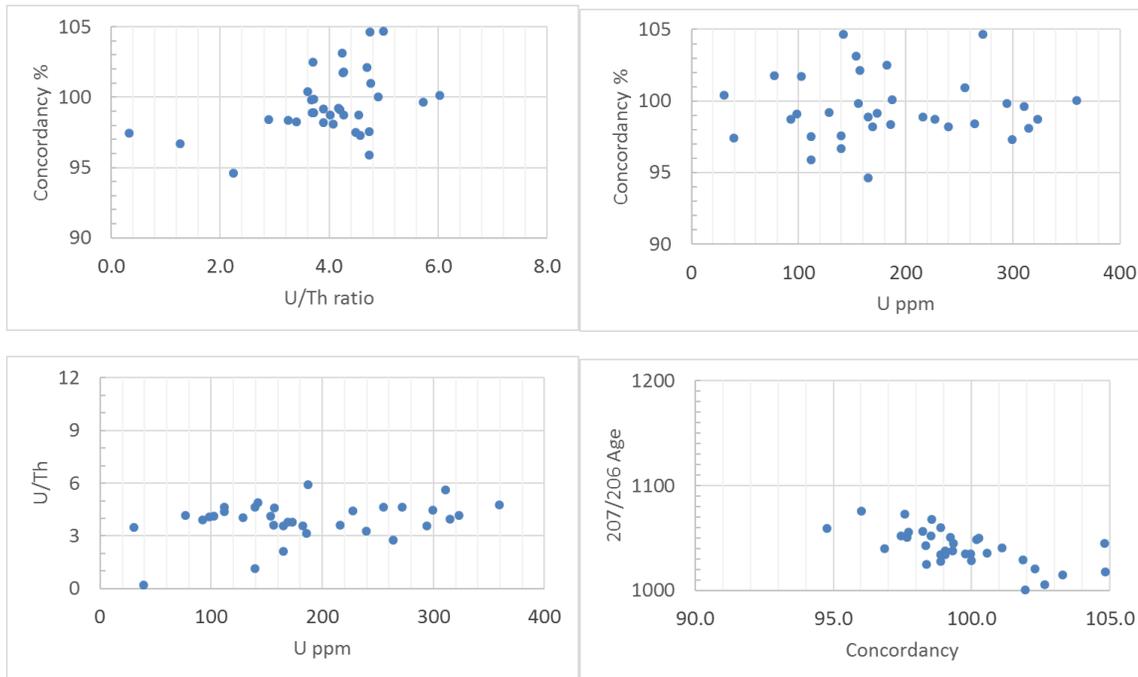
Analyses: 35 (34 passed quality control screening)

Concordant Analyses: 28/34 (97-103%)

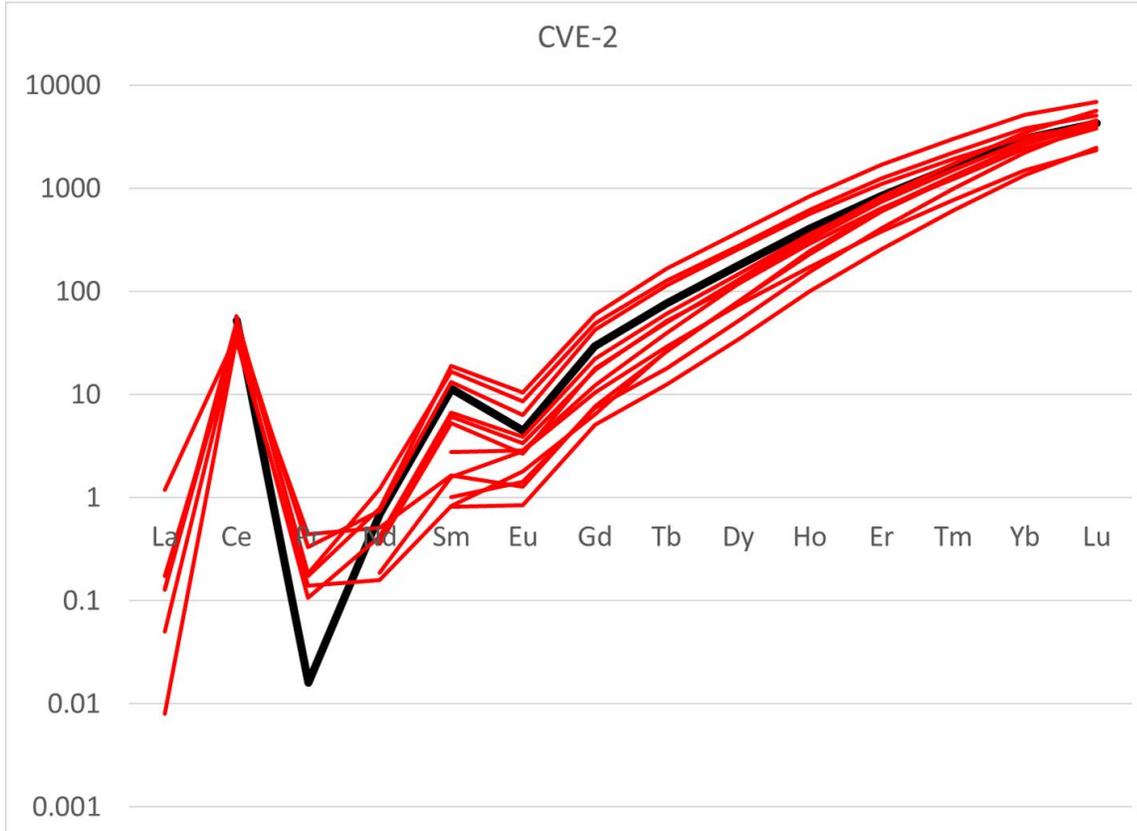
U content: 188 ± 90

U/Th ratio: 4.0 ± 1.0

$^{206}\text{Pb}/^{204}\text{Pb}$: 422280



Zircon REE Analysis: 12

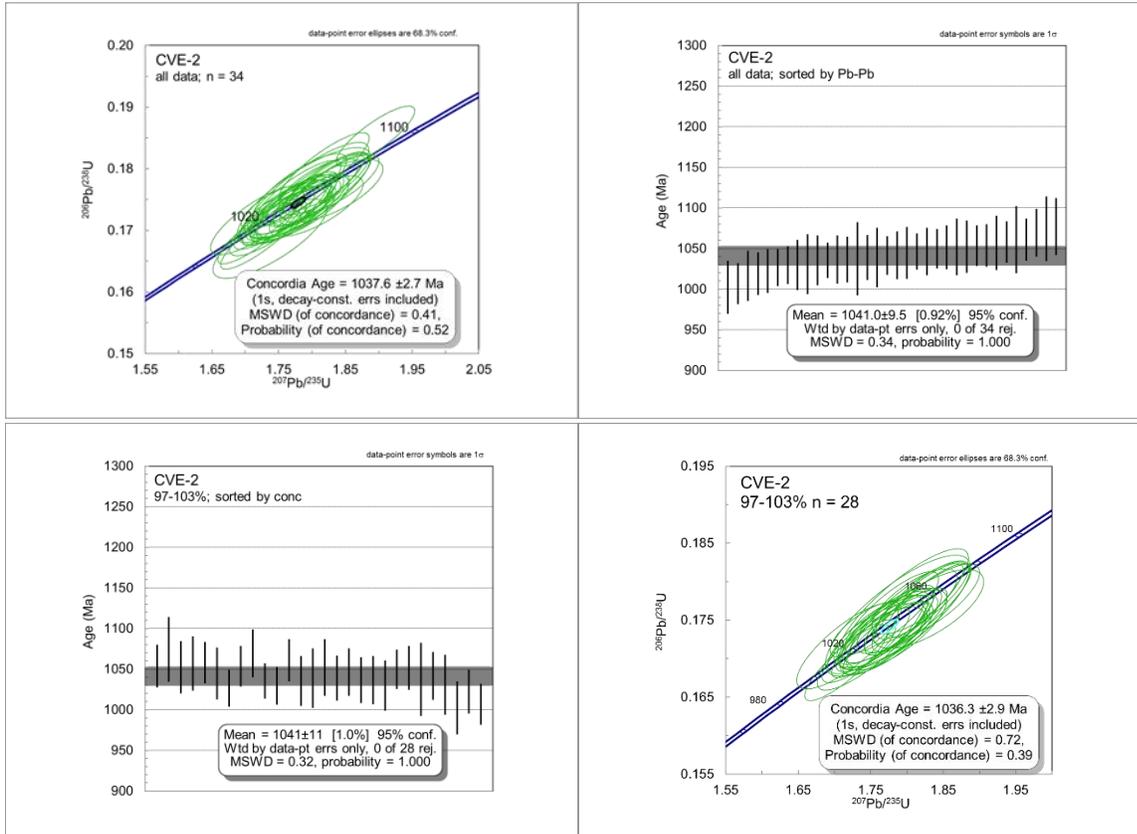


Rare Earth Elements (ppm)

	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sum
CVE-2.1	-0.00017	32.4	0.0015	0.32	1.68	0.253	5.86	2.76	43.5	22.25	135.6	40.4	490	105.9	881
CVE-2.2	0.012	21.88	-0.00022	0.085	0.235	0.159	2.08	1.06	18.3	9.49	61.1	19.1	242.4	58	434
CVE-2.3	-0.00016	28.56	-0.00022	0.163	0.79	0.15	3.6	1.81	32	19	133.5	42.5	561	138.8	962
CVE-2.4	0.031	30.92	0.031	0.34	1.95	0.354	8.55	4.14	63.1	30.9	178	47.3	517	101.1	984
CVE-2.5	-0.00016	25.36	-0.00022	0.186	0.9	0.19	3.47	1.87	29.1	15.98	102.6	30.4	389	93.8	693
CVE-2.6	-0.00016	34.4	0.016	0.36	2.82	0.586	11.87	5.99	92.4	46.1	273.1	75.2	838	168.9	1550
CVE-2.7	-0.00016	35.22	0.017	0.55	2.46	0.485	9.85	4.58	67.5	34	201.4	55.1	615	125.2	1151
CVE-2.8	0.0019	20.97	-0.00022	-0.00027	0.409	0.161	2.46	1.42	29.1	17.5	118.7	36.9	473	109.9	811
CVE-2.9	0.281	23.21	0.041	0.232	0.245	0.072	1.54	0.946	19.5	12.72	95.4	31.65	434.2	112.7	733
CVE-2.10	-0.00016	12.99	-0.00021	-0.00027	0.149	0.08	1.49	0.645	12.7	8.45	66.2	24.5	357	104.5	589
CVE-2.11	-0.00016	11.9	-0.00021	-0.00027	0.121631	0.048	1.01	0.45	8.4	5.5	41.4	15.1	218	61.2	363
CVE-2.12	0.041	20.6	0.013	0.072	0.123	0.101	1.29	0.971	19.79	13.49	100.7	32.7	429	103.8	723

U-Pb Isotopic Ages

- Range of $^{207}\text{Pb}/^{206}\text{Pb}$ ages: 1002-1077 Ma
- Upper Intercept (all data): na; Concordia Age 1037.6 ± 2.7 Ma
- Weighted average (all data): 1041 ± 9.5 Ma
- Weighted average (97-103%): 1041 ± 11 Ma
- Concordia age: 1036.3 ± 2.9 Ma



Comparison of Analyses on Same Grain

Analysis #	Position	207Pb/206Pb	U (ppm)	U/Th	Concordancy
38	center	1041±23	138	1.2	101.8
39	edge	1002±32	76	4.2	101.9
40	edge	1046±29	127	4.1	99.3
45	center	1036±28	309	5.7	99.7
46	edge	1016±31	152	4.2	103.3
36	center	1052±32	110	4.5	97.6
37	edge	1030±36	101	4.2	101.8
66	center	1049±29	127	4.9	100.1
67	edge	1061±26	358	4.5	98.8
59	r. end	1022±27	156	4.7	102.2
60	center	1019±26	140	5.0	104.8
61	l. end	1041±29	254	4.7	101.1
47	center	1074±39	38	0.3	97.5
48	l. end	1060±11	163	2.2	94.7
49	r. end	1046±22	271	4.7	104.8
41	center	1053±25	185	3.2	98.5
42	l. end	1077±35	110	4.7	96.0
43	r. end	1057±33	138	4.7	97.7

Interpretation: The zircons in this sample appear to be igneous with appropriate shapes and chemical properties. Their REE patterns are very similar as a group. In CL mode some have small, bright cores, darker interior portions, and light rims. With low Uranium contents and relative high concordancy these zircons have likely not lost much Pb. The crystallization age of the rock is 1041±11 Ma.

Geochronology Results (Analytical Data)

Table CVE-2. U-Pb geochronologic analyses.																			
Analysis	Isotope ratios										Apparent ages (Ma)								
	U (ppm)	206Pb 204Pb	U/Th	206Pb* 207Pb*	± (%)	207Pb* 235U*	± (%)	206Pb* 238U	± (%)	error corr.	206Pb* 238U*	± (Ma)	207Pb* 235U	± (Ma)	206Pb* 207Pb*	± (Ma)	Best age (Ma)	± (Ma)	Conc (%)
CVE-2 sorted by 207Pb/206Pb ages																			
-Sample 2 Spot 39	76	47155	4.2	13.7775	1.6	1.7177	2.7	0.1716	2.2	0.80	1021.1	20.3	1015.2	17.3	1002.3	32.7	1002.3	32.7	101.9
-Sample 2 Spot 56	181	64287	3.7	13.7468	1.2	1.7429	1.9	0.1738	1.4	0.74	1032.9	13.1	1024.5	11.9	1006.8	25.3	1006.8	25.3	102.6
-Sample 2 Spot 46	152	131047	4.2	13.6825	1.5	1.7814	2.6	0.1768	2.1	0.81	1049.4	20.5	1038.7	17.0	1016.3	31.1	1016.3	31.1	103.3
-Sample 2 Spot 60	140	111266	5.0	13.6637	1.3	1.8180	2.5	0.1802	2.1	0.85	1067.8	20.6	1052.0	16.1	1019.1	26.2	1019.1	26.2	104.8
-Sample 2 Spot 59	156	46655	4.7	13.6422	1.3	1.7789	2.4	0.1760	2.0	0.83	1045.1	19.2	1037.8	15.6	1022.3	27.0	1022.3	27.0	102.2
-Sample 2 Spot 54	238	137072	3.4	13.6132	1.1	1.7168	2.2	0.1695	1.9	0.86	1009.4	18.0	1014.8	14.3	1026.6	22.7	1026.6	22.7	98.3
-Sample 2 Spot 55	91	61116	4.0	13.5943	1.1	1.7339	1.9	0.1710	1.6	0.81	1017.4	14.7	1021.2	12.5	1029.4	23.2	1029.4	23.2	98.8
-Sample 2 Spot 52	155	77185	3.7	13.5917	1.5	1.7561	2.5	0.1731	1.9	0.79	1029.2	18.4	1029.4	16.0	1029.8	30.9	1029.8	30.9	99.9
-Sample 2 Spot 37	101	209878	4.2	13.5860	1.8	1.7941	3.3	0.1768	2.8	0.84	1049.4	27.2	1043.3	21.8	1030.6	36.8	1030.6	36.8	101.8
-Sample 2 Spot 53	163	198712	3.7	13.5546	1.5	1.7530	2.9	0.1723	2.5	0.85	1024.9	23.3	1028.3	18.7	1035.3	30.7	1035.3	30.7	99.0
-Sample 2 Spot 68	322	108718	4.2	13.5540	1.1	1.7500	2.0	0.1720	1.7	0.85	1023.3	16.4	1027.1	13.2	1035.4	21.9	1035.4	21.9	98.8
-Sample 2 Spot 70	293	95709	3.6	13.5470	1.5	1.7735	2.3	0.1743	1.8	0.78	1035.5	17.5	1035.8	15.2	1036.4	29.7	1036.4	29.7	99.9
-Sample 2 Spot 45	309	51759	5.7	13.5466	1.4	1.7702	2.5	0.1739	2.1	0.84	1033.7	20.3	1034.6	16.5	1036.5	28.3	1036.5	28.3	99.7
-Sample 2 Spot 69	29	39449	3.6	13.5407	2.2	1.7877	3.7	0.1756	2.9	0.80	1042.7	28.4	1041.0	24.1	1037.4	45.0	1037.4	45.0	100.5
-Sample 2 Spot 63	172	168748	3.9	13.5307	1.4	1.7678	2.3	0.1735	1.8	0.80	1031.3	17.3	1033.7	14.7	1038.9	27.6	1038.9	27.6	99.3
-Sample 2 Spot 64	215	97191	3.7	13.5297	1.8	1.7631	2.4	0.1730	1.6	0.66	1028.7	15.1	1032.0	15.6	1039.0	36.7	1039.0	36.7	99.0
-Sample 2 Spot 38	138	43545	1.2	13.5132	1.2	1.7271	2.5	0.1693	2.2	0.88	1008.1	20.2	1018.7	15.8	1041.5	23.8	1041.5	23.8	96.8
-Sample 2 Spot 61	254	171197	4.7	13.5113	1.5	1.8104	2.2	0.1774	1.6	0.74	1052.8	15.4	1049.2	14.1	1041.8	29.5	1041.8	29.5	101.1
-Sample 2 Spot 57	168	71353	3.9	13.4929	1.6	1.7643	2.2	0.1727	1.6	0.70	1026.7	14.9	1032.4	14.5	1044.5	32.0	1044.5	32.0	98.3
-Sample 2 Spot 49	271	230786	4.7	13.4824	1.1	1.8950	2.0	0.1853	1.7	0.84	1095.9	17.4	1079.4	13.6	1046.1	22.2	1046.1	22.2	104.8
-Sample 2 Spot 40	127	100841	4.1	13.4804	1.4	1.7890	2.2	0.1749	1.6	0.74	1039.1	15.4	1041.5	14.0	1046.4	29.1	1046.4	29.1	99.3
-Sample 2 Spot 66	358	643154	4.9	13.4573	1.2	1.8149	2.3	0.1771	1.9	0.85	1051.3	18.8	1050.8	14.9	1049.9	24.3	1049.9	24.3	100.1
-Sample 2 Spot 58	186	91344	6.0	13.4456	1.3	1.8212	2.3	0.1776	1.9	0.82	1053.9	18.4	1053.1	15.2	1051.6	26.9	1051.6	26.9	100.2
-Sample 2 Spot 44	97	43117	4.2	13.4432	1.7	1.8021	3.1	0.1757	2.6	0.83	1043.5	24.8	1046.2	20.2	1052.0	34.7	1052.0	34.7	99.2
-Sample 2 Spot 36	110	163324	4.5	13.4423	1.6	1.7717	2.4	0.1727	1.8	0.75	1027.1	17.1	1035.1	15.6	1052.1	32.1	1052.1	32.1	97.6
-Sample 2 Spot 41	185	259195	3.2	13.4344	1.2	1.7915	1.9	0.1746	1.4	0.75	1037.2	13.5	1042.4	12.2	1053.3	25.0	1053.3	25.0	98.5
-Sample 2 Spot 50	298	658548	4.5	13.4320	1.3	1.7716	2.2	0.1726	1.8	0.81	1026.4	17.2	1035.1	14.5	1053.7	26.1	1053.7	26.1	97.4
-Sample 2 Spot 43	138	99728	4.7	13.4101	1.7	1.7857	2.6	0.1737	2.0	0.77	1032.4	18.8	1040.3	16.7	1057.0	33.2	1057.0	33.2	97.7
-Sample 2 Spot 62	314	435318	4.0	13.4039	1.3	1.7985	2.1	0.1748	1.7	0.79	1038.7	15.9	1044.9	13.6	1057.9	25.5	1057.9	25.5	98.2
-Sample 2 Spot 48	163	81756	2.2	13.3848	2.1	1.7373	3.3	0.1686	2.5	0.78	1004.7	23.5	1022.5	21.0	1060.8	41.3	1060.8	41.3	94.7
-Sample 2 Spot 67	226	2043186	4.5	13.3827	1.3	1.8201	2.5	0.1767	2.1	0.85	1048.7	20.6	1052.7	16.3	1061.1	26.0	1061.1	26.0	98.8
-Sample 2 Spot 51	263	5594241	2.9	13.3279	1.5	1.8365	2.3	0.1775	1.8	0.77	1053.4	17.2	1058.6	15.1	1069.3	29.3	1069.3	29.3	98.5
-Sample 2 Spot 47	38	45656	0.3	13.2965	2.0	1.8296	2.8	0.1764	1.9	0.69	1047.5	18.5	1056.1	18.1	1074.1	39.8	1074.1	39.8	97.5
-Sample 2 Spot 42	110	166690	4.7	13.2765	1.7	1.8063	2.6	0.1739	1.9	0.73	1033.7	17.9	1047.7	16.8	1077.1	35.1	1077.1	35.1	96.0

Supplemental File S-3.

Sample CVE-3

Field Data

Location: Cheever Mine, exposed quarry excavation

Rock type: Sodic-rich granite

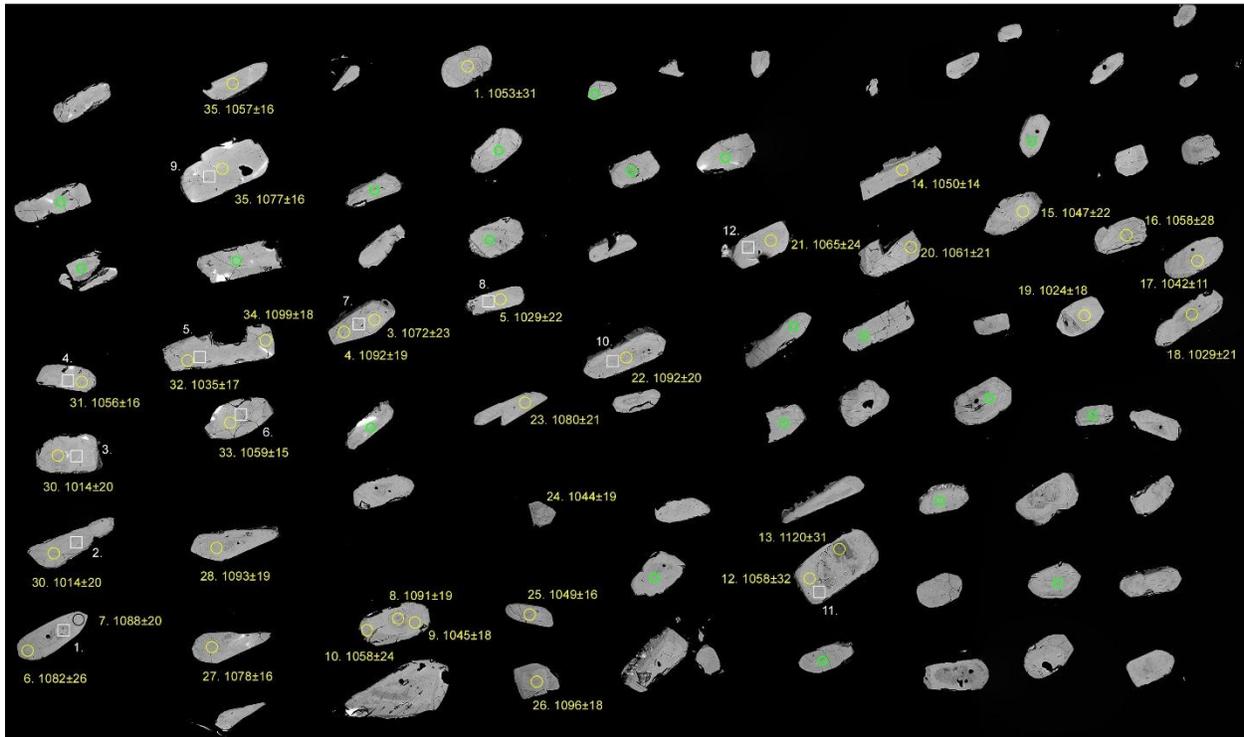
Mineralogy: Plagioclase-quartz-cpx-magnetite

Other: Lacks fabric

Field relations: Lowest exposed granite sheet intruded by ore

Sample	SiO2	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	LOI
CVE-1	70.59	0.39	10.99	10.68	0.01	0.05	0.36	5.77	0.64	0.05	0.00
CVE-2	80.28	0.33	10.35	1.41	0.01	0.11	0.57	4.80	1.40	0.01	0.23
CVE-3	67.94	0.26	11.20	12.21	0.02	0.24	0.76	6.38	0.07	0.09	0.00
CV-4	4.95	0.70	0.49	86.97	0.07	0.23	2.65	0.29	0.07	2.90	0.00
CV-7	65.93	0.47	14.40	8.68	0.02	0.08	0.56	9.03	0.20	0.09	0.00

Zircon Physical Properties



Zircon yield: Good

Size: 50-700 μm (avg. length 300 μm)

Shape: elongate (4:1) dipyrramids and fragments

Internal Features:

- Metamict cores
- A few well-defined cores, generally darker in BSE and appear metamict
- inclusions
- fractures
- zoning apparent in many spots

Zircon Chemical and Isotopic Properties

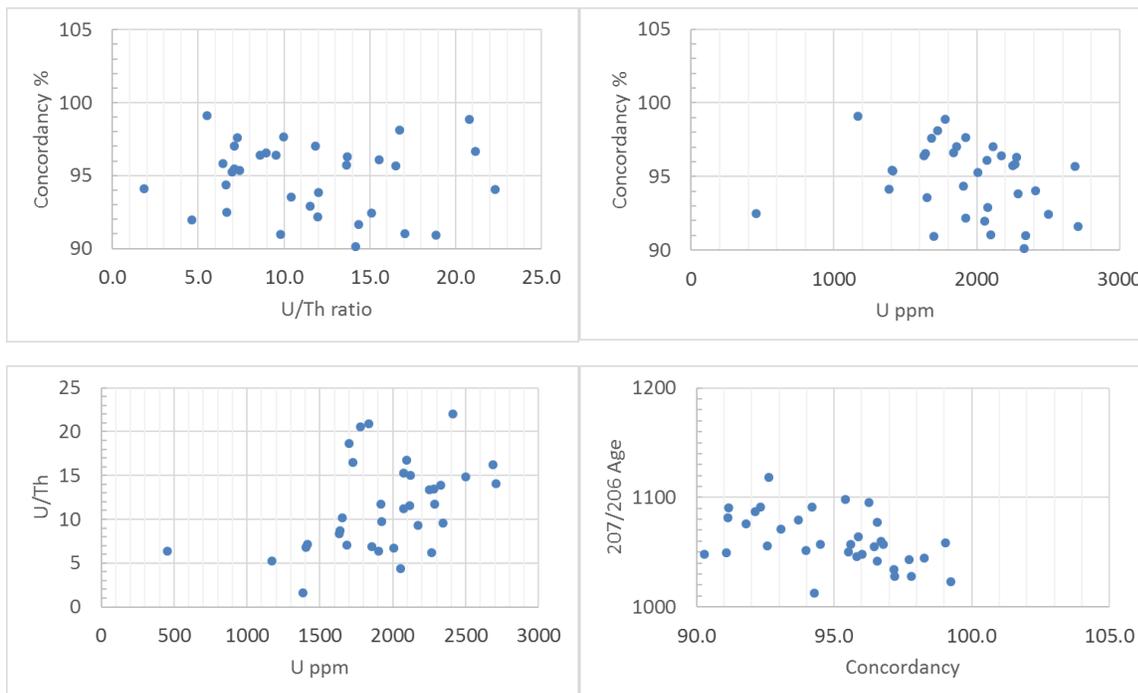
Analyses: 35 (35 passed quality control screening)

Concordant Analyses: 7/35 (97-103%)

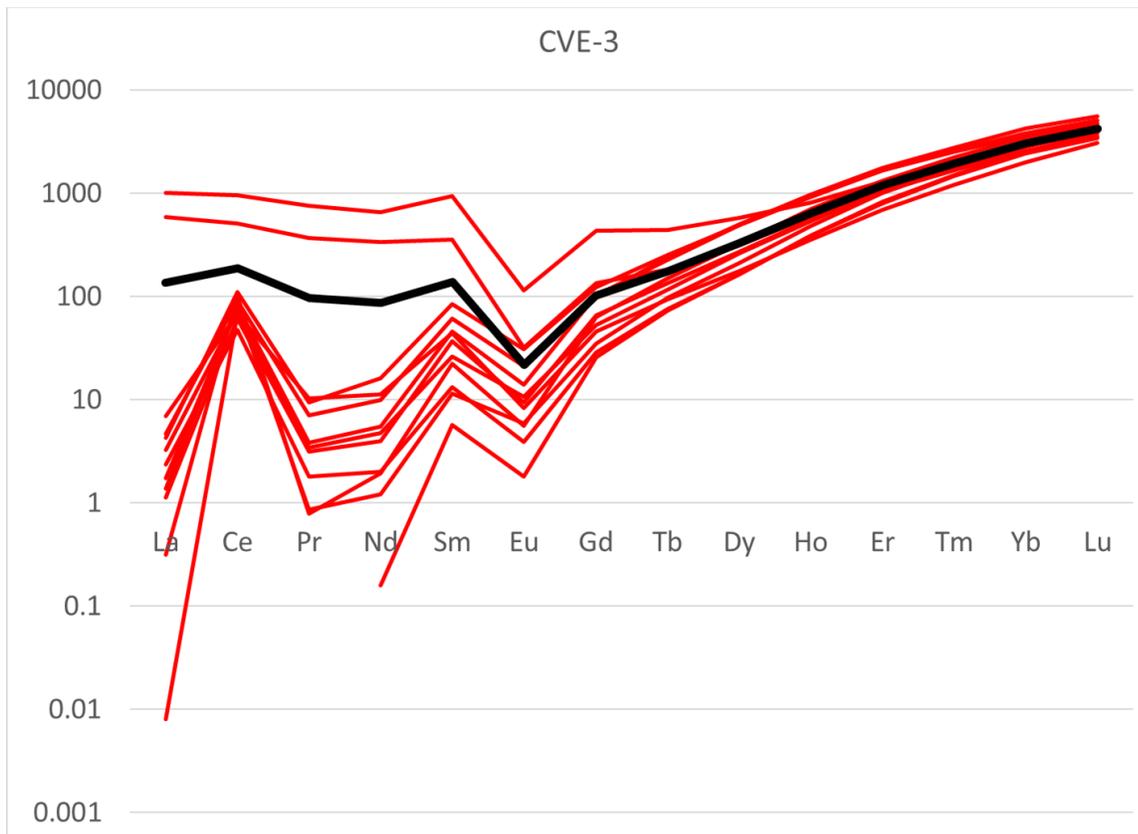
U content: 1740 ± 294

U/Th ratio: 11.2 ± 5.6

$^{206}\text{Pb}/^{204}\text{Pb}$: 511531



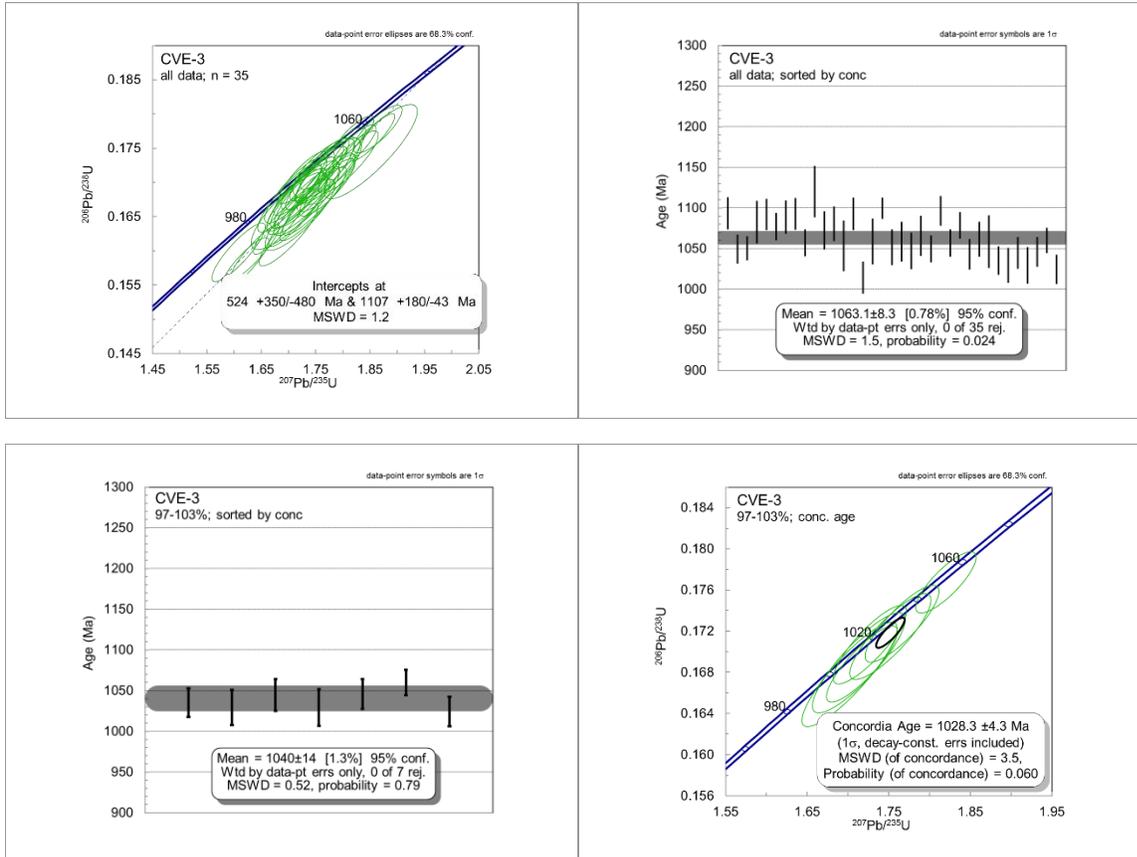
Zircon REE Analysis: 12



	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sum
CVE-3.1	139	312	34.1	153	52.6	1.79	27	6.58	77	32.5	167.8	40.9	415.3	87.3	1547
CVE-3.2	1.02	68.3	0.88	7.4	12.57	1.74	24.7	9.13	120	49.9	269.2	63.5	617	124.2	1370
CVE-3.3	0.323	49.1	0.355	2.49	6.76	0.79	20.6	8.2	120	52.1	266	62.6	587	116.9	1293
CVE-3.4	0.268	37.6	0.291	1.82	5.51	0.528	13.1	4.87	66.7	30.3	175.2	47.3	505	107.9	996
CVE-3.5	0.075	61.5	0.073	0.89	3.31	0.313	12.63	5.37	79.4	38.7	213.2	54.6	564	116.4	1150
CVE-3.6	241	590	70	299	139	6.5	86	16	141	44.4	208	48.9	500	109.8	2500
CVE-3.7	1.11	55.7	0.65	4.53	9.05	1.2	19.7	8.59	123	53.6	284	68.3	685	136.7	1451
CVE-3.8	0.413	47.8	0.08	0.55	1.7	0.334	6.97	3.54	51.9	26.4	160.9	43.2	480	102.9	927
CVE-3.9	0.77	43	0.32	2.17	3.85	0.6	10.6	4.2	64	29.4	169	43.1	456	99.8	927
CVE-3.10	0.0019	41.5	-0.0002	0.073	0.84	0.101	5.13	2.66	40.2	21.41	131.4	37.1	409	93.1	783
CVE-3.11	1.64	41.7	0.95	5.16	6.5	0.471	9.12	3.42	43.6	19.38	111	29.7	323.7	75	671
CVE-3.12	0.56	29.3	0.166	0.91	1.95	0.218	5.75	2.72	40.5	21.3	128	36.1	392	84.8	744

U-Pb Isotopic Ages

- Range of 207Pb/206Pb ages: 1014-1100 Ma; core – 1120 Ma
- Upper Intercept (all data): 1107+180/-43 Ma
- Weighted average (all data): 1063.1±8.3 Ma
- Weighted average (97-103): 1040±14 Ma
- Concordia age: 1028.3 ±4.3 Ma



Comparison of Analyses on Same Grain

Analysis #	Position	207Pb/206Pb	U (ppm)	U/Th	Concordancy
32	l. end	1035±17	1847	7.0	97.1
34	r. end	1099±18	1997	6.9	95.4
3	r. center	1072±23	2065	11.4	93.0
4	l. end	1092±19	1909	11.9	92.3
6	l. end	1082±26	2333	9.7	91.1
7	r. end	1088±20	2043	4.5	92.1
8	center	1091±19	2084	16.9	91.1
9	Int. zone	1045±18	1716	16.6	98.2
10	rim	1058±24	1396	7.0	95.5
12	core	1120±31	1827	21.1	96.7
13	rim	1058±32	443	6.6	92.6

Interpretation: Interpretation of U-Pb zircon results from this sample is complicated by Pb-loss and high-U content. Analyses #6 and 7 yields anomalous REE patterns, likely related to their high U content and discordance and possible alteration. Very few zircons fall within 97-103% of Concordia. However, the size, euhedral shape, and observed internal features of these zircon suggest they are igneous in origin. Evidence of a modest number of cores comes from U-Pb data and observation. The zircons form a near concordant cluster but do not line on a well-defined discordia line or have a credible upper intercept. The weighted average of all the data is 1063.1 ± 8.3 Ma, but that of just the concordant analyses (97-103%) are 1040 ± 14 Ma, interpreted as the crystallization age of the unit.

Geochronological Results (Analytical Data)

Table CVE-3. U-Pb geochronologic analyses.																			
Analysis	Isotope ratios										Apparent ages (Ma)								
	U (ppm)	206Pb 204Pb	U/Th	206Pb* 207Pb*	± (%)	207Pb* 235U*	± (%)	206Pb* 238U	± (%)	error corr.	206Pb* 238U*	± (Ma)	207Pb* 235U	± (Ma)	206Pb* 207Pb*	± (Ma)	Best age (Ma)	± (Ma)	Conc (%)
CVE-3 sorted by 207Pb/206Pb ages																			
-SAMPLE 1 Spot 30	1372	619801	1.7	13.6976	1.0	1.6082	2.0	0.1598	1.8	0.87	955.5	15.7	973.4	12.6	1014.1	19.8	1014.1	19.8	94.2
-SAMPLE 1 Spot 19	1159	2502808	5.4	13.6296	0.9	1.7267	1.7	0.1707	1.5	0.86	1015.9	13.8	1018.5	11.0	1024.2	18.0	1024.2	18.0	99.2
-SAMPLE 1 Spot 5	1911	156399	9.9	13.5951	1.1	1.7132	2.2	0.1689	1.9	0.86	1006.2	17.7	1013.5	14.1	1029.3	22.3	1029.3	22.3	97.8
-SAMPLE 1 Spot 18	2105	139071	11.7	13.5947	1.1	1.7019	2.3	0.1678	2.0	0.88	1000.0	18.5	1009.2	14.5	1029.3	21.6	1029.3	21.6	97.1
-SAMPLE 1 Spot 32	1847	81847	7.0	13.5549	0.9	1.7171	1.7	0.1688	1.4	0.86	1005.5	13.4	1014.9	10.8	1035.3	17.6	1035.3	17.6	97.1
-SAMPLE 1 Spot 17	2161	267510	9.5	13.5044	0.9	1.7253	1.5	0.1690	1.2	0.78	1006.5	10.7	1018.0	9.5	1042.8	18.8	1042.8	18.8	96.5
-SAMPLE 1 Spot 24	1672	251196	7.2	13.4939	1.0	1.7519	1.9	0.1715	1.6	0.86	1020.1	15.1	1027.9	12.1	1044.4	19.6	1044.4	19.6	97.7
-SAMPLE 1 Spot 9	1716	136405	16.6	13.4849	0.9	1.7661	1.7	0.1727	1.4	0.85	1027.1	13.6	1033.1	11.0	1045.8	18.2	1045.8	18.2	98.2
-SAMPLE 1 Spot 15	2675	203768	16.4	13.4760	1.1	1.7221	2.4	0.1683	2.1	0.89	1002.8	19.8	1016.8	15.4	1047.1	22.5	1047.1	22.5	95.8
-SAMPLE 1 Spot 29	2319	413726	14.1	13.4614	0.9	1.6205	1.8	0.1582	1.6	0.87	946.8	13.7	978.2	11.2	1049.3	17.6	1049.3	17.6	90.2
-SAMPLE 1 Spot 25	2255	273631	6.3	13.4609	0.8	1.7315	1.4	0.1690	1.2	0.82	1006.8	10.9	1020.3	9.2	1049.4	16.6	1049.4	16.6	95.9
-SAMPLE 1 Spot 14	1689	142464	18.8	13.4534	0.7	1.6385	1.8	0.1599	1.6	0.91	956.1	14.6	985.1	11.4	1050.5	14.9	1050.5	14.9	91.0
-SAMPLE 1 Spot 11	1402	499086	7.3	13.4469	1.1	1.7278	2.3	0.1685	2.0	0.88	1003.9	19.0	1018.9	14.9	1051.4	21.9	1051.4	21.9	95.5
-SAMPLE 1 Spot 1	2278	1549562	11.9	13.4354	1.5	1.7019	2.7	0.1658	2.2	0.82	989.1	20.6	1009.2	17.4	1053.2	31.2	1053.2	31.2	93.9
-SAMPLE 1 Spot 31	2270	751830	13.6	13.4129	0.8	1.7594	1.8	0.1712	1.6	0.89	1018.5	14.9	1030.6	11.6	1056.6	16.8	1056.6	16.8	96.4
-SAMPLE 1 Spot 35	2490	200524	15.0	13.4092	0.8	1.6847	1.9	0.1638	1.8	0.91	978.1	16.0	1002.8	12.4	1057.1	16.6	1057.1	16.6	92.5
-SAMPLE 1 Spot 12	1827	353120	21.1	13.4003	1.6	1.7713	2.3	0.1721	1.7	0.73	1023.9	16.1	1035.0	15.2	1058.4	32.4	1058.4	32.4	96.7
-SAMPLE 1 Spot 10	1396	100890	7.0	13.3997	1.2	1.7477	2.8	0.1699	2.5	0.90	1011.3	23.5	1026.3	18.0	1058.5	24.5	1058.5	24.5	95.5
-SAMPLE 1 Spot 16	1894	346690	6.5	13.3989	1.4	1.7265	2.6	0.1678	2.1	0.83	999.8	19.7	1018.4	16.4	1058.7	28.4	1058.7	28.4	94.4
-SAMPLE 1 Spot 33	1767	312994	20.7	13.3903	0.8	1.8199	1.3	0.1767	1.1	0.82	1049.2	10.7	1052.7	8.8	1059.9	15.4	1059.9	15.4	99.0
-SAMPLE 1 Spot 20	1629	7612583	8.9	13.3811	1.1	1.7773	2.4	0.1725	2.2	0.89	1025.8	20.4	1037.2	15.6	1061.3	21.7	1061.3	21.7	96.7
-SAMPLE 1 Spot 21	2242	196517	13.5	13.3522	1.2	1.7726	2.2	0.1717	1.8	0.83	1021.2	17.4	1035.5	14.4	1065.7	24.8	1065.7	24.8	95.8
-SAMPLE 1 Spot 3	2065	122482	11.4	13.3094	1.2	1.7333	2.3	0.1673	2.0	0.86	997.3	18.4	1021.0	14.9	1072.1	23.6	1072.1	23.6	93.0
-SAMPLE 1 Spot 2	2700	236328	14.3	13.2771	0.8	1.7200	2.2	0.1656	2.0	0.92	988.0	18.3	1016.0	13.9	1077.0	16.6	1077.0	16.6	91.7
-SAMPLE 1 Spot 27	1621	343406	8.5	13.2669	0.8	1.8212	1.4	0.1752	1.2	0.83	1040.9	11.5	1053.1	9.5	1078.5	16.3	1078.5	16.3	96.5
-SAMPLE 1 Spot 23	1641	608315	10.3	13.2531	1.1	1.7684	2.0	0.1700	1.7	0.84	1012.0	15.6	1033.9	12.8	1080.6	21.3	1080.6	21.3	93.7
-SAMPLE 1 Spot 6	2333	172063	9.7	13.2407	1.3	1.7210	2.5	0.1653	2.1	0.84	986.0	19.0	1016.4	15.8	1082.5	26.4	1082.5	26.4	91.1
-SAMPLE 1 Spot 7	2043	326272	4.5	13.2013	1.0	1.7569	2.5	0.1682	2.3	0.91	1002.3	21.5	1029.7	16.4	1088.5	20.6	1088.5	20.6	92.1
-SAMPLE 1 Spot 8	2084	3319272	16.9	13.1801	1.0	1.7455	2.3	0.1669	2.1	0.91	994.7	19.6	1025.5	15.0	1091.7	19.3	1091.7	19.3	91.1
-SAMPLE 1 Spot 22	2400	1734909	22.2	13.1753	1.0	1.8101	2.0	0.1730	1.7	0.87	1028.4	16.5	1049.1	13.1	1092.4	20.0	1092.4	20.0	94.1
-SAMPLE 1 Spot 4	1909	214937	11.9	13.1750	1.0	1.7712	1.9	0.1692	1.6	0.86	1008.0	15.2	1035.0	12.3	1092.4	19.5	1092.4	19.5	92.3
-SAMPLE 1 Spot 28	2108	161050	15.2	13.1684	1.0	1.7000	2.1	0.1624	1.9	0.88	969.9	16.8	1008.5	13.5	1093.5	19.8	1093.5	19.8	88.7
-SAMPLE 1 Spot 26	2061	783906	15.5	13.1490	0.9	1.8641	1.6	0.1778	1.3	0.81	1054.8	12.6	1068.4	10.5	1096.4	18.4	1096.4	18.4	96.2
-SAMPLE 1 Spot 34	1997	194110	6.9	13.1281	0.7	1.8550	1.4	0.1766	1.3	0.89	1048.5	12.4	1065.2	9.5	1099.6	13.0	1099.6	13.0	95.4
-SAMPLE 1 Spot 13	443	53433	6.6	12.9945	1.6	1.8515	3.1	0.1745	2.6	0.85	1036.8	25.0	1064.0	20.2	1120.1	31.7	1120.1	31.7	92.6

Supplemental File S-4.

Sample CVE-4

Field Data

Location: Cheever Mine, exposed quarry excavation

Rock type: Magnetite-rich ore

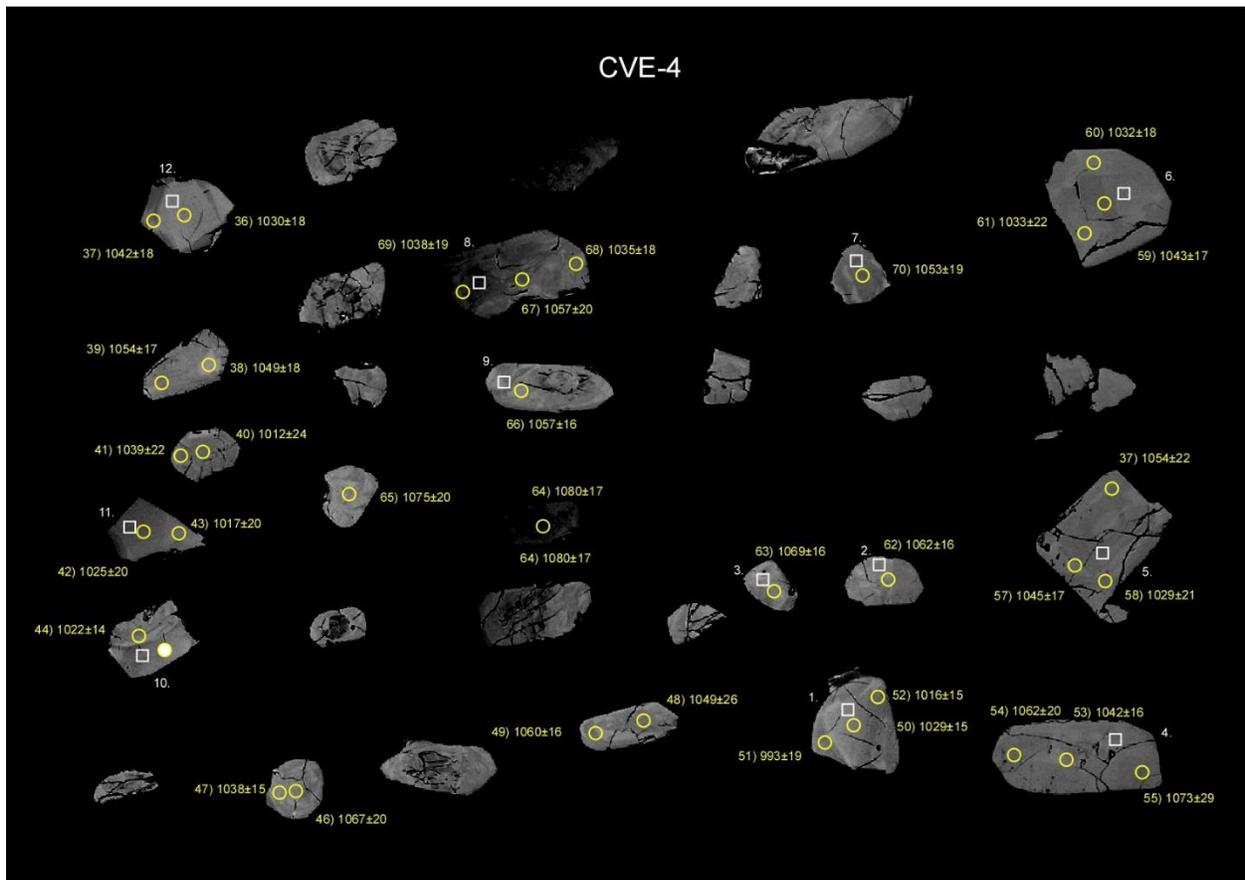
Mineralogy: Magnetite-apatite-cpx-quartz

Other: Lacks fabric

Field relations: Thin (<2m thick) planar sheet of magnetite-rich ore containing little NaO or K₂O

Sample	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	LOI
CVE-1	70.59	0.39	10.99	10.68	0.01	0.05	0.36	5.77	0.64	0.05	0.00
CVE-2	80.28	0.33	10.35	1.41	0.01	0.11	0.57	4.80	1.40	0.01	0.23
CVE-3	67.94	0.26	11.20	12.21	0.02	0.24	0.76	6.38	0.07	0.09	0.00
CV-4	4.95	0.70	0.49	86.97	0.07	0.23	2.65	0.29	0.07	2.90	0.00
CV-7	65.93	0.47	14.40	8.68	0.02	0.08	0.56	9.03	0.20	0.09	0.00

Zircon Physical Properties



Zircon yield: Few

Size: 100-800 μm (avg. length 300 μm)

Shape: elongate (3:1) dipyrramids and euhedral, equant crystals

Internal Features:

- Metamict cores
- A few well-defined cores, generally darker in BSE and appear metamict
- Sparse inclusions
- Numerous fractures
- Well defined to nebulous zoning apparent in many spots

Zircon Chemical and Isotopic Properties

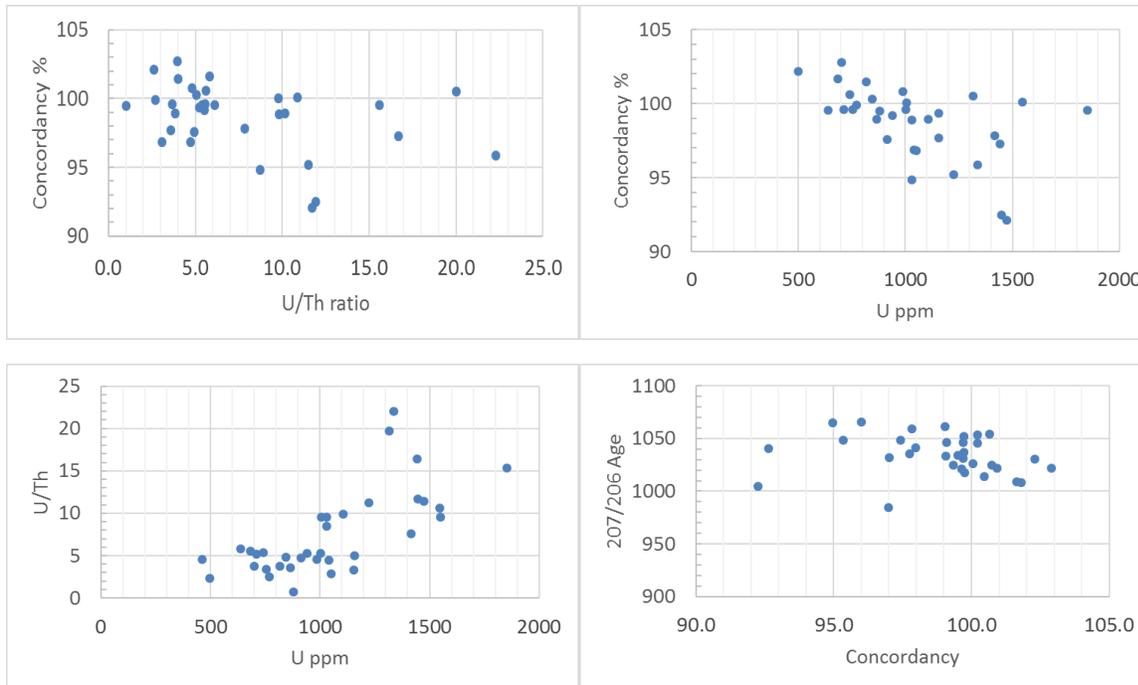
Analyses: 35 (35 passed quality control screening)

Concordant Analyses: 27/35 (97-103%)

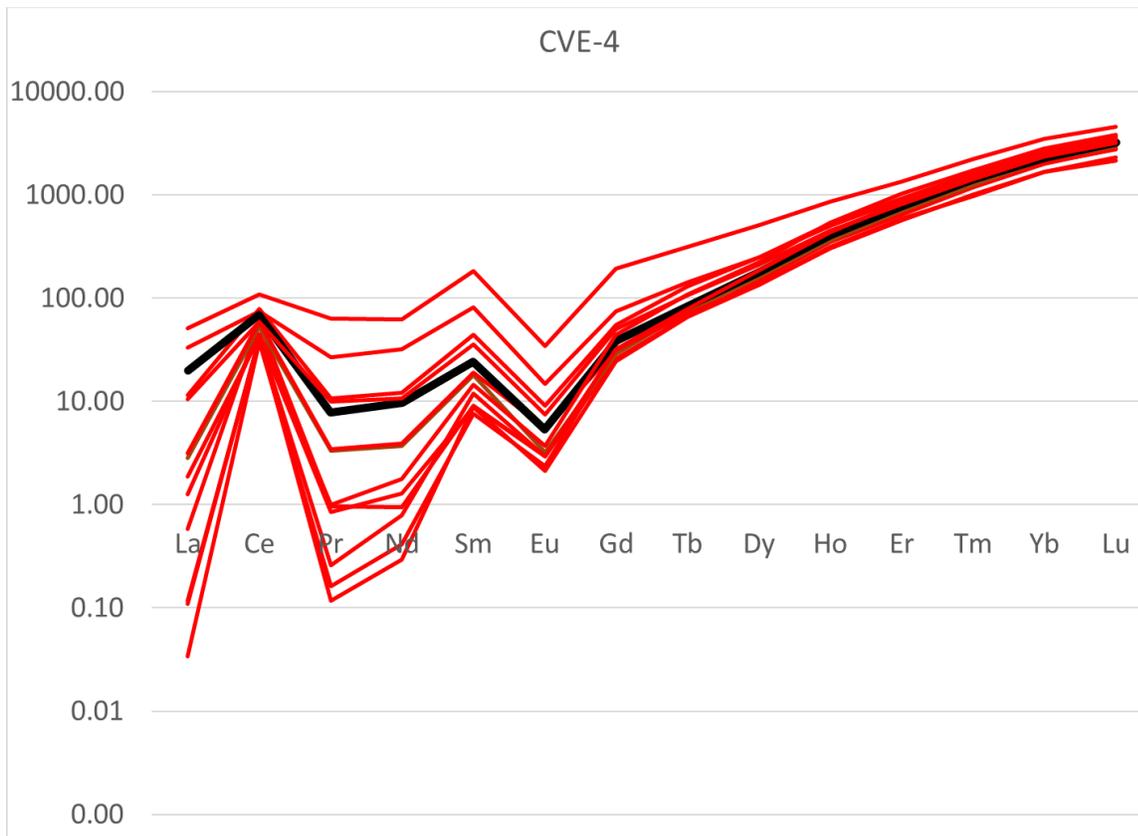
U content: 986 ± 310

U/Th ratio: 6.8 ± 4.5

$^{206}\text{Pb}/^{204}\text{Pb}$: 408387



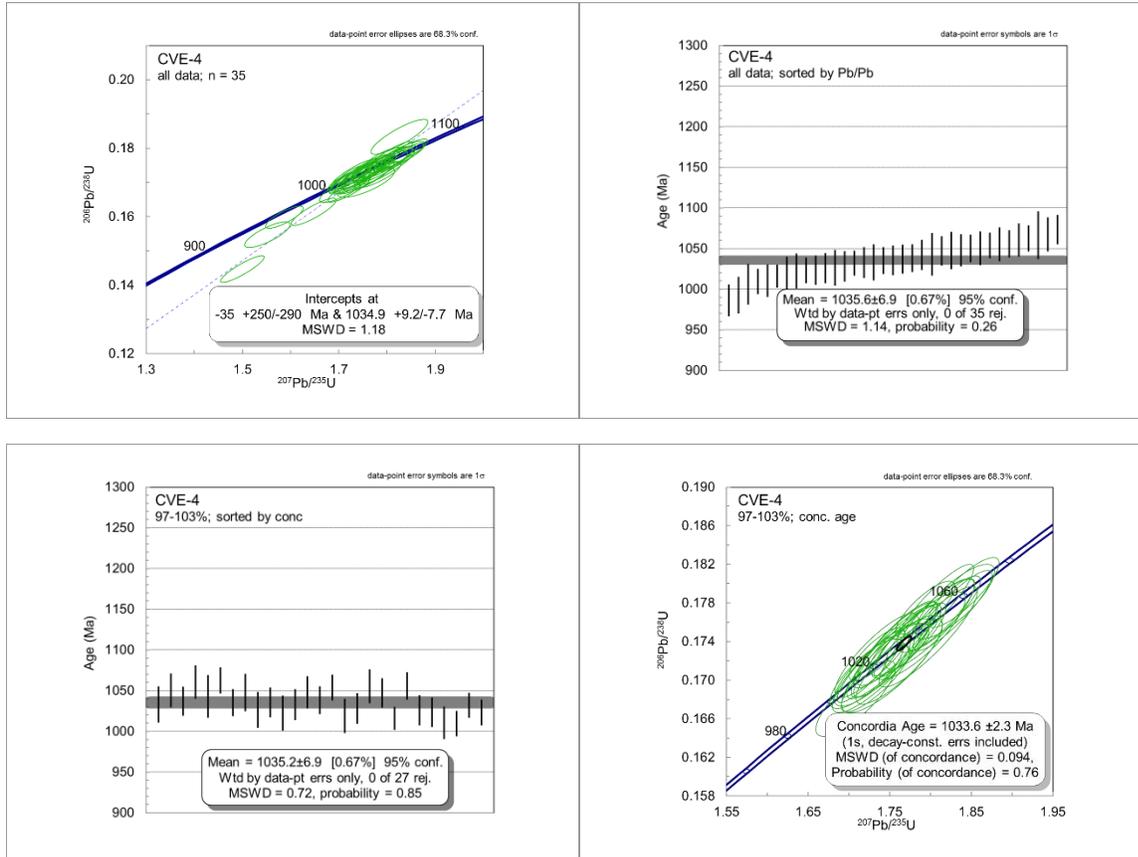
Zircon REE Analysis: 12



	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sum
CVE-4.1	0.028	25.23	0.0109	0.135	1.32	0.166	6.07	2.78	41.8	20.75	114.3	30.86	335.4	70.5	649
CVE-4.2	7.9	45.3	2.48	14.5	12.01	0.83	14.7	5.11	60.7	27.51	145.8	38.4	428	91.4	895
CVE-4.3	2.7	48.4	0.99	5.5	6.5	0.51	11	4.7	61.6	28.8	147.9	40.1	428	88.1	875
CVE-4.4	0.137	35.4	0.089	0.43	1.34	0.168	5.16	2.43	36.3	19	102.5	29.5	320	68.8	621
CVE-4.5	12	66.7	5.9	28.2	27.2	1.92	38.1	11.3	126	47	216	54.5	557	111.6	1303
CVE-4.6	0.008	23.22	0.015	0.189	1.13	0.133	6.25	2.6	41.9	21.14	115.4	30.6	328	67.7	638
CVE-4.7	0.441	26.32	0.079	0.59	1.31	0.12	4.84	2.39	33.2	17.05	94.2	24.26	266.5	52.9	524
CVE-4.8	0.67	32.4	0.31	1.69	2.67	0.179	5.7	2.67	39.7	19.82	112	30.66	352	73.6	674
CVE-4.9	0.75	36	0.317	1.78	2.81	0.308	6.24	2.54	33.1	16.51	91.2	24.9	270	56.8	543
CVE-4.10	4.7	42.3	0.73	4.4	3.6	0.301	7.7	3.04	43.9	22.41	125	34.5	371	79.3	743
CVE-4.11	0.026	25.37	0.024	0.36	1.77	0.164	6.33	2.83	45.7	23.7	138.5	37.1	406	84	772
CVE-4.12	0.299	27.68	0.092	0.81	2.15	0.207	8.77	3.92	55.2	29.3	163	42.6	456	93.8	884

U-Pb Isotopic Ages

- Range of 207Pb/206Pb ages: 861-1073 Ma
- Upper Intercept (all data): 1034.9±9.2 Ma
- Weighted average (all data): 1035.6±6.9 Ma
- Weighted average (97-103): 1035.2±6.9 Ma
- Concordia age: 1033.6 ±2.3 Ma



Comparison of Analyses on Same Grain

Analysis #	Position	207Pb/206Pb	U (ppm)	U/Th	Concordancy
36	center	1030±18	980	5.1	99.5
37	edge	1042±18	1149	4.7	100.0
38	center	1049±18	1441	11.8	92.6
39	edge	1054±17	1539	10.8	100.2
40	center	1012±24	1466	11.6	92.2
41	edge	1039±22	1032	4.6	97.0
42	center	1025±20	997	5.5	101.6
43	edge	1017±20	811	3.9	100.4
44	center	1022±14	839	5.0	109.3
45	rim	993±23	456	4.7	97.8
46	center	1067±20	1149	3.5	102.2
47	edge	1038±15	491	2.5	97.4
67	center	1057±20	1436	16.6	100.6
68	r. edge	1035±18	763	2.6	99.6
69	l. edge	1038±19	1844	15.5	97.9
48	center	1049±26	1410	7.8	97.9
49	edge	1060±16	748	3.6	99.7
50	center	1029±15	694	3.9	102.9
51	rim	993±19	1045	3.0	96.9
52	edge	1016±15	677	5.7	101.7
59	center	1043±17	907	4.9	97.7
60	edge	1032±18	735	5.5	100.7
61	edge	1033±22	934	5.4	99.3
56	edge	1054±22	857	3.8	99.0
57	edge	1045±17	705	5.3	99.7
58	edge	1029±21	874	0.9	99.6
53	center	1042±16	1099	10.1	99.0
54	l. edge	1062±20	999	9.7	100.2
55	r. edge	1073±29	1024	8.6	94.9

Interpretation: Interpretation of U-Pb zircon results from this sample is straight forward. The vast bulk of the zircons crystallized ca. 1035 Ma. Their size, shape, internal features, REE pattern, and U-content assures that are igneous zircons. Two, thick unzoned rims yield Pb/Pb ages of 993±23 and 993±19 Ma, suggesting later event of minor significance effected some of these zircons.

Geochronology Results (Analytical Data)

Table CVE-4. U-Pb geochronologic analyses.																			
Analysis	Isotope ratios					Apparent ages (Ma)						Best age (Ma)	Conc (%)						
	U (ppm)	206Pb/204Pb	U/Th	206Pb*/207Pb*	± (%)	207Pb*/235U*	± (%)	206Pb*/238U	± (%)	error corr.	206Pb*/238U*			± (Ma)	207Pb*/235U	± (Ma)	206Pb*/207Pb*	± (Ma)	
CVE-4 sorted by 207Pb/206Pb ages																			
-Sample 2 Spot 51	1045	127207	3.0	13.8874	1.0	1.5869	1.6	0.1598	1.3	0.81	955.9	11.7	965.1	10.1	986.1	19.4	986.1	19.4	96.9
-Sample 2 Spot 45	456	139183	4.7	13.8433	1.1	1.8256	2.1	0.1833	1.8	0.85	1085.0	18.3	1054.7	14.1	992.6	22.7	992.6	22.7	109.3
-Sample 2 Spot 40	1466	757320	11.6	13.7527	1.2	1.5515	2.0	0.1548	1.6	0.79	927.6	13.7	951.1	12.4	1005.9	24.8	1005.9	24.8	92.2
-Sample 2 Spot 52	677	89865	5.7	13.7295	0.8	1.7344	1.3	0.1727	1.1	0.81	1027.0	10.0	1021.4	8.4	1009.4	15.5	1009.4	15.5	101.7
-Sample 2 Spot 43	811	311020	3.9	13.7233	1.0	1.7338	1.9	0.1726	1.7	0.86	1026.2	15.9	1021.1	12.6	1010.3	20.1	1010.3	20.1	101.6
-Sample 2 Spot 44	839	136645	5.0	13.6865	0.7	1.7270	1.6	0.1714	1.4	0.90	1020.0	13.5	1018.6	10.2	1015.7	14.1	1015.7	14.1	100.4
-Sample 2 Spot 42	997	97063	5.5	13.6653	1.0	1.7218	1.7	0.1707	1.4	0.80	1015.7	13.1	1016.7	11.2	1018.9	20.9	1018.9	20.9	99.7
-Sample 2 Spot 58	874	91683	0.9	13.6424	1.1	1.7289	1.8	0.1711	1.4	0.81	1018.0	13.6	1019.3	11.5	1022.3	21.3	1022.3	21.3	99.6
-Sample 2 Spot 50	694	204318	3.9	13.6356	0.8	1.7933	1.3	0.1773	1.1	0.81	1052.5	10.6	1043.0	8.7	1023.3	15.8	1023.3	15.8	102.9
-Sample 2 Spot 36	980	2661279	4.7	13.6344	0.9	1.7565	1.9	0.1737	1.7	0.89	1032.5	16.3	1029.6	12.4	1023.4	18.0	1023.4	18.0	100.9
-Sample 2 Spot 60	735	645176	5.5	13.6185	0.9	1.7592	1.9	0.1738	1.6	0.87	1032.8	15.6	1030.6	12.2	1025.8	18.7	1025.8	18.7	100.7
-Sample 2 Spot 61	934	89184	5.4	13.6150	1.1	1.7344	2.1	0.1713	1.8	0.85	1019.1	16.8	1021.4	13.4	1026.3	22.0	1026.3	22.0	99.3
-Sample 2 Spot 68	763	353732	2.6	13.6044	0.9	1.7521	2.1	0.1729	1.8	0.89	1027.9	17.5	1027.9	13.3	1027.9	18.9	1027.9	18.9	100.0
-Sample 2 Spot 47	491	158855	2.5	13.5772	0.8	1.8060	1.7	0.1778	1.5	0.90	1055.2	15.0	1047.6	11.3	1032.0	15.5	1032.0	15.5	102.2
-Sample 2 Spot 69	1844	403700	15.5	13.5728	0.9	1.7579	2.1	0.1730	1.8	0.89	1028.9	17.5	1030.1	13.4	1032.6	19.1	1032.6	19.1	99.6
-Sample 2 Spot 41	1032	229022	4.6	13.5692	1.1	1.7082	1.9	0.1681	1.5	0.81	1001.7	14.3	1011.6	12.1	1033.1	22.2	1033.1	22.2	97.0
-Sample 2 Spot 53	1099	117636	10.1	13.5570	0.8	1.7525	1.8	0.1723	1.6	0.88	1024.9	14.7	1028.1	11.3	1035.0	16.6	1035.0	16.6	99.0
-Sample 2 Spot 37	1149	505945	5.1	13.5549	0.9	1.7617	1.4	0.1732	1.0	0.75	1029.7	9.8	1031.5	8.9	1035.3	18.3	1035.3	18.3	99.5
-Sample 2 Spot 59	907	87517	4.9	13.5435	0.9	1.7324	1.6	0.1702	1.3	0.83	1013.0	12.5	1020.6	10.3	1037.0	18.0	1037.0	18.0	97.7
-Sample 2 Spot 57	705	162044	5.3	13.5361	0.9	1.7734	1.7	0.1741	1.5	0.87	1034.7	14.1	1035.8	11.0	1038.1	17.2	1038.1	17.2	99.7
-Sample 2 Spot 38	1441	169861	11.8	13.5089	0.9	1.6480	1.9	0.1615	1.6	0.87	964.9	14.5	988.8	11.8	1042.1	18.6	1042.1	18.6	92.6
-Sample 2 Spot 48	1410	185182	7.8	13.5036	1.3	1.7528	2.3	0.1717	1.9	0.83	1021.3	18.3	1028.2	15.1	1042.9	26.2	1042.9	26.2	97.9
-Sample 2 Spot 39	1539	1160155	10.8	13.4756	0.9	1.8081	1.7	0.1767	1.4	0.85	1049.0	13.9	1048.4	11.0	1047.2	18.0	1047.2	18.0	100.2
-Sample 2 Spot 56	857	85399	3.8	13.4735	1.1	1.7868	2.1	0.1746	1.7	0.84	1037.4	16.5	1040.7	13.4	1047.5	22.9	1047.5	22.9	99.0
-Sample 2 Spot 70	631	95075	6.0	13.4717	1.0	1.7993	2.0	0.1758	1.7	0.87	1044.0	16.8	1045.2	13.1	1047.7	19.8	1047.7	19.8	99.6
-Sample 2 Spot 66	1218	2986538	11.4	13.4561	0.8	1.7207	1.7	0.1679	1.5	0.87	1000.7	13.6	1016.3	10.8	1050.1	16.9	1050.1	16.9	95.3
-Sample 2 Spot 67	1436	191886	16.6	13.4556	1.0	1.7616	2.0	0.1719	1.7	0.85	1022.7	16.0	1031.4	12.8	1050.1	20.9	1050.1	20.9	97.4
-Sample 2 Spot 49	748	688165	3.6	13.4322	0.8	1.8164	1.6	0.1770	1.4	0.87	1050.3	13.9	1051.4	10.7	1053.6	16.0	1053.6	16.0	99.7
-Sample 2 Spot 54	999	126162	9.7	13.4223	1.0	1.8300	1.8	0.1781	1.4	0.81	1056.8	13.9	1056.3	11.6	1055.1	20.9	1055.1	20.9	100.2
-Sample 2 Spot 62	1310	451463	19.9	13.4190	0.8	1.8401	1.6	0.1791	1.3	0.85	1062.0	13.0	1059.9	10.3	1055.6	16.9	1055.6	16.9	100.6
-Sample 2 Spot 46	1149	1446616	3.5	13.3880	1.0	1.7971	2.2	0.1745	2.0	0.89	1036.8	18.8	1044.4	14.5	1060.3	20.6	1060.3	20.6	97.8
-Sample 2 Spot 63	1024	251650	9.8	13.3733	0.8	1.8270	1.7	0.1772	1.6	0.89	1051.7	15.1	1055.2	11.5	1062.5	16.1	1062.5	16.1	99.0
-Sample 2 Spot 55	1024	3277659	8.6	13.3486	1.5	1.7559	2.2	0.1700	1.7	0.75	1012.1	15.7	1029.3	14.4	1066.2	29.5	1066.2	29.5	94.9
-Sample 2 Spot 65	1331	391664	22.2	13.3406	1.0	1.7798	1.8	0.1722	1.5	0.82	1024.3	14.0	1038.1	11.8	1067.4	20.9	1067.4	20.9	96.0
-Sample 2 Spot 64	1542	188663	9.7	13.3022	0.9	1.4995	2.0	0.1447	1.8	0.89	871.0	14.6	930.2	12.2	1073.2	17.9	1073.2	17.9	81.2

Supplemental file S-5.

Sample CVE-7

Field Data

Location: Cheever Mine outcrop

Rock type: Sodic-rich granite

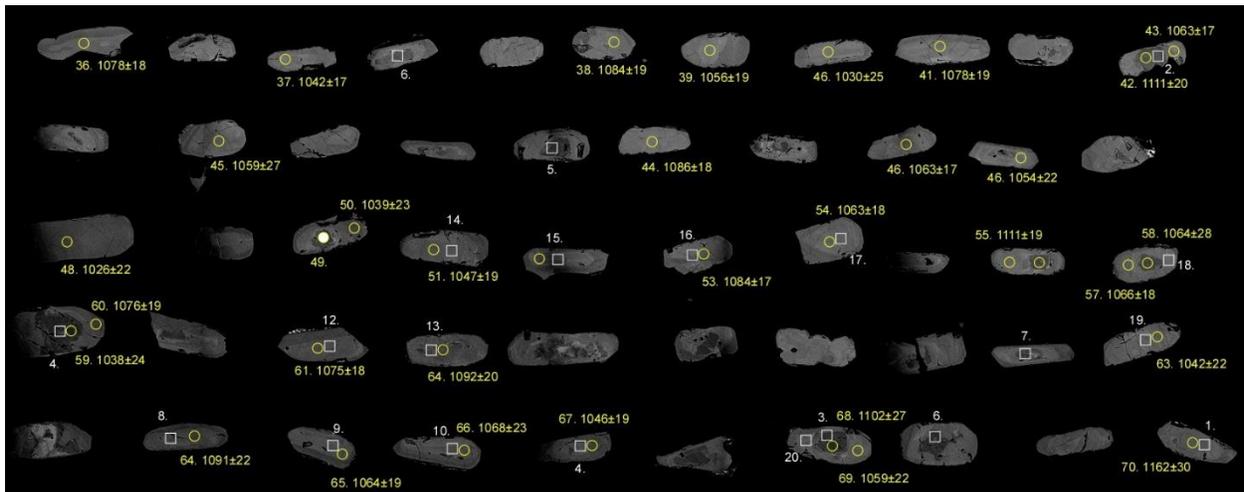
Mineralogy: Plag-quartz-magnetite

Other: Lacks fabric, but appears to show layering defined by magnetite-rich layers and grain-size

Field relations: Granitic sheets intruding country rock gabbro and marble

Sample	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	LOI
CVE-1	70.59	0.39	10.99	10.68	0.01	0.05	0.36	5.77	0.64	0.05	0.00
CVE-2	80.28	0.33	10.35	1.41	0.01	0.11	0.57	4.80	1.40	0.01	0.23
CVE-3	67.94	0.26	11.20	12.21	0.02	0.24	0.76	6.38	0.07	0.09	0.00
CV-4	4.95	0.70	0.49	86.97	0.07	0.23	2.65	0.29	0.07	2.90	0.00
CV-7	65.93	0.47	14.40	8.68	0.02	0.08	0.56	9.03	0.20	0.09	0.00

Zircon Physical Properties



Zircon yield: Many

Size: 300-600 μm (avg. length 450 μm)

Shape: elongate (3:1) dipyrramids

Internal Features:

- Metamict cores
- Cores generally darker in BSE and appear metamict
- Inclusions
- Numerous fractures
- Most crystals notably zoned

Zircon Chemical and Isotopic Properties

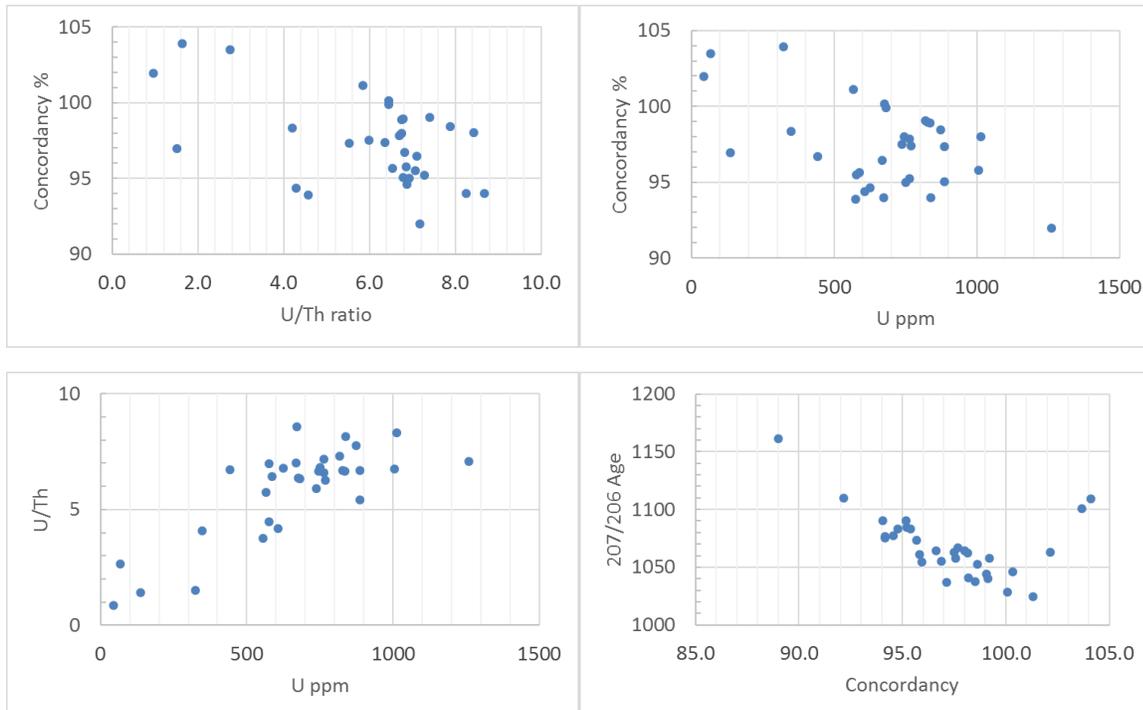
Analyses: 33 (35 passed quality control screening)

Concordant Analyses: 16/33 (97-103%)

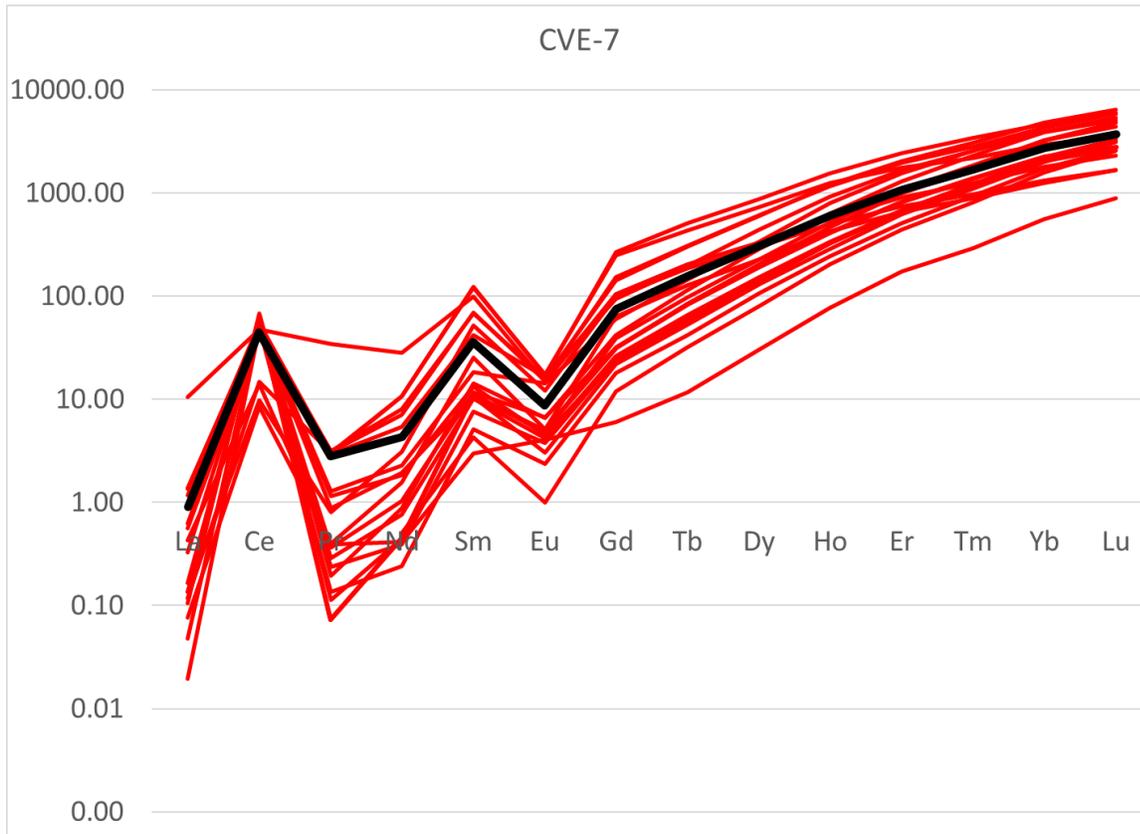
U content: 665±271

U/Th ratio: 5.8±2.0

²⁰⁶Pb/²⁰⁴Pb: 1536825



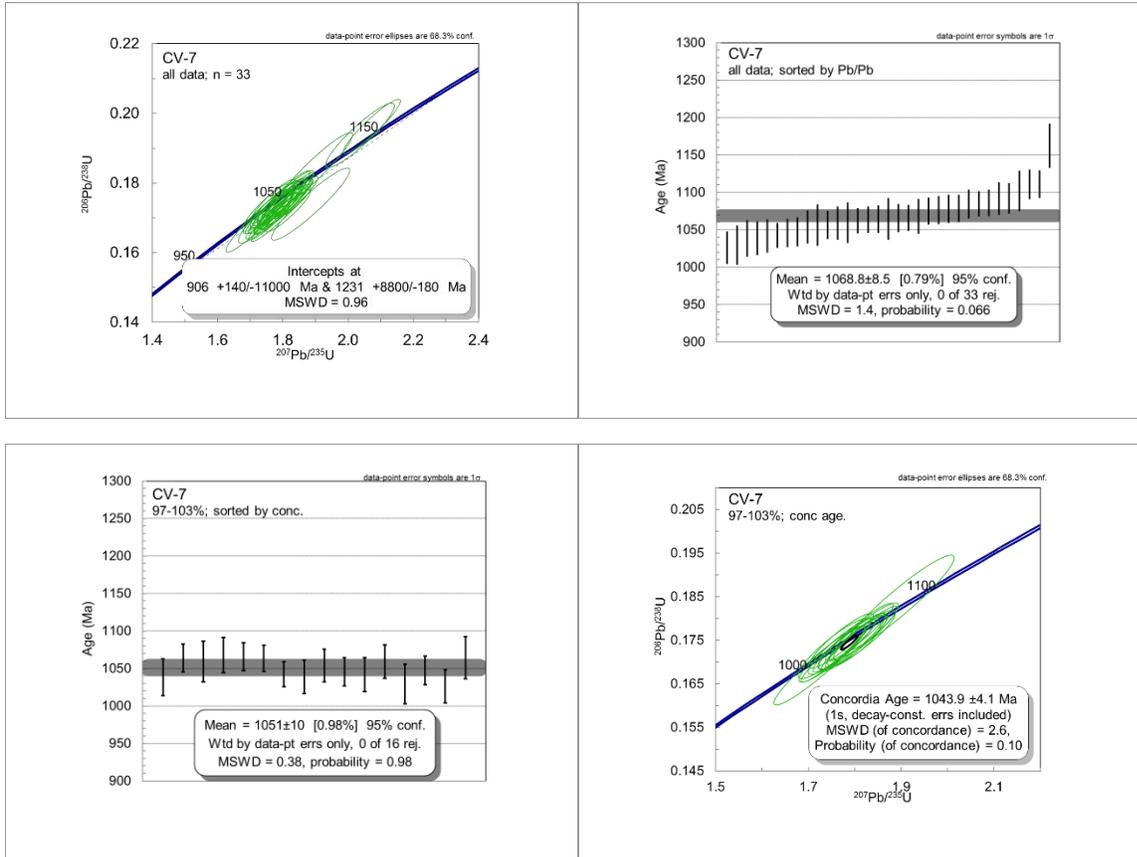
Zircon REE Analysis: 20



	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Sum
CVE-7.1	0.147	30.94	0.082	0.89	1.55	0.17	4.36	1.91	31.79	15.72	99	27.28	320.6	76.9	611
CVE-7.2	0.018	5.2	0.037	0.71	3.78	0.289	12.5	4.64	55.7	23.2	104.7	22	200	40.8	474
CVE-7.3	0.032	5.97	0.074	1.41	7.66	0.68	19.6	6.75	74.6	27.16	118	24.04	213.8	41.22	541
CVE-7.4	0.322	31.7	0.119	1.05	2.7	0.8	12.03	5.21	83.1	43.4	248	63.2	692	145	1329
CVE-7.5	0.22	30.4	0.294	3.67	10.07	0.9	28.2	11.02	147.8	65.9	328	76.3	780	157	1640
CVE-7.6	0.028	9.08	0.282	4.87	17.93	0.98	49	15.6	180	67.8	283	54.4	478	86.6	1248
CVE-7.7	2.5	29	3.2	13	14.8	0.83	20.8	7.3	81	31.1	145.5	30.7	290	56.6	726
CVE-7.8	0.077	31.3	0.107	0.84	1.97	0.255	4.76	2.07	34.6	17.65	105.5	29.7	358	81.5	668
CVE-7.9	0.025	41.5	0.018	0.4	2.11	0.372	8.36	4.14	70.4	34.7	208.1	56.7	621	125.8	1174
CVE-7.10	-9.3E-05	38.2	0.0105	0.202	1.68	0.263	7.79	3.55	55.8	28.2	170.4	46.2	522	107.6	982
CVE-7.11	0.134	27.5	0.272	4.9	18.11	0.95	53.3	18.3	216	84.5	389	84.3	752	146.3	1796
CVE-7.12	0.032	36.33	0.027	0.35	1.51	0.237	5.23	2.38	37.3	18.4	109.2	29.69	328	66.4	635
CVE-7.13	0.327	30.7	0.271	2.46	6.23	0.93	18.6	7.08	107.9	50.1	266.2	63.1	639	133.2	1326
CVE-7.14	-8.7E-05	38.14	0.0068	0.21	1.6	0.281	6.33	3.03	46.7	22.58	130.4	34.39	359.7	68.9	712
CVE-7.15	0.039	34.2	0.034	0.47	1.72	0.376	6.23	3.04	49.7	25.6	160	43.1	524	118.3	967
CVE-7.16	0.278	33.6	0.287	3.25	10.26	0.84	30.4	11.2	150	63.4	312	70	693	144	1523
CVE-7.17	0.0114	32.7	0.022	0.178	1.13	0.214	4.86	2.17	34.5	17.9	108	30.3	346	76.9	655
CVE-7.18	-8.7E-05	25.1	-7.2E-05	0.23	0.63	0.056	2.35	1.156	19.6	11.18	70.7	20.05	255.7	63.6	470
CVE-7.19	0.102	8.6	0.036	0.188	0.439	0.226	1.19	0.42	7.4	4.2	27.7	7.2	90	21.9	170
CVE-7.20	0.0046	30.31	0.0125	0.11	0.762	0.134	3.6	1.51	26.22	13.39	82.1	23.28	278.9	66	526

U-Pb Isotopic Ages

- Range of 207Pb/206Pb ages: 1026-1111 Ma; 1162 Ma
- Upper Intercept (all data): na
- Weighted average (all data): 1069±8.5 Ma
- Weighted average (97-103): 1051±10 Ma
- Concordia age: 1043.9 ±4.1 Ma



U-Pb zircon geochronological data for sample CV-7.

Table CV-7. U-Pb geochronological analyses.																			
Analysis	U (ppm)	206Pb 204Pb	U/Th	Isotope ratios						Apparent ages (Ma)						Best age (Ma)	Conc (%)		
				206Pb* 207Pb*	± (%)	207Pb* 235U*	± (%)	206Pb* 238U	± (%)	error corr.	206Pb* 238U*	± (Ma)	207Pb* 235U	± (Ma)	206Pb* 207Pb*			± (Ma)	
CV-7 sorted by 207Pb/206Pb																			
-CV-7 Spot 48	562	1114038	5.8	13.6167	1.1	1.7704	2.6	0.1748	2.4	0.91	1038.7	22.7	1034.7	16.9	1026.1	21.9	1026.1	21.9	101.2
-CV-7 Spot 40	675	16953653	6.4	13.5934	1.3	1.7564	3.0	0.1732	2.6	0.90	1029.5	25.2	1029.5	19.1	1029.5	26.4	1029.5	26.4	100.0
-CV-7 Spot 59	131	41505	1.5	13.5351	1.2	1.7235	3.7	0.1692	3.5	0.95	1007.7	33.0	1017.3	24.0	1038.2	24.4	1038.2	24.4	97.1
-CV-7 Spot 50	343	73728	4.2	13.5315	1.1	1.7516	2.7	0.1719	2.5	0.91	1022.6	23.5	1027.7	17.6	1038.8	22.5	1038.8	22.5	98.4
-CV-7 Spot 63	823	3997880	6.8	13.5118	1.1	1.7712	2.7	0.1736	2.4	0.91	1031.7	23.3	1034.9	17.4	1041.7	22.3	1041.7	22.3	99.0
-CV-7 Spot 37	1008	171855	8.4	13.5085	0.8	1.7543	2.6	0.1719	2.5	0.95	1022.5	23.4	1028.8	16.9	1042.2	16.7	1042.2	16.7	98.1
-CV-7 Spot 67	829	293957	6.7	13.4867	0.9	1.7803	2.6	0.1741	2.4	0.94	1034.9	23.4	1038.3	17.0	1045.5	18.7	1045.5	18.7	99.0
-CV-7 Spot 51	671	529652	6.4	13.4747	1.0	1.8099	2.7	0.1769	2.5	0.93	1049.9	24.1	1049.0	17.4	1047.3	19.2	1047.3	19.2	100.2
-CV-7 Spot 47	869	321688	7.8	13.4313	1.1	1.7942	2.7	0.1748	2.4	0.91	1038.4	23.2	1043.3	17.3	1053.8	22.0	1053.8	22.0	98.5
-CV-7 Spot 43	1000	922914	6.8	13.4166	1.4	1.7478	3.1	0.1701	2.8	0.90	1012.5	26.5	1026.3	20.3	1056.0	27.6	1056.0	27.6	95.9
-CV-7 Spot 39	437	82647	6.8	13.4142	0.9	1.7668	2.7	0.1719	2.5	0.94	1022.5	23.7	1033.4	17.3	1056.3	18.7	1056.3	18.7	96.8
-CV-7 Spot 69	813	152143	7.4	13.3968	1.1	1.8203	2.7	0.1769	2.5	0.91	1049.9	23.9	1052.8	17.7	1059.0	22.3	1059.0	22.3	99.1
-CV-7 Spot 45	764	313043	6.3	13.3956	1.3	1.7881	2.5	0.1737	2.1	0.84	1032.6	20.1	1041.1	16.3	1059.2	27.2	1059.2	27.2	97.5
-CV-7 Spot 46	582	3927439	6.5	13.3750	0.8	1.7620	2.8	0.1709	2.7	0.96	1017.2	25.6	1031.6	18.4	1062.2	16.9	1062.2	16.9	95.8
-CV-7 Spot 54	740	68651	6.7	13.3672	0.9	1.8116	2.1	0.1756	1.9	0.91	1043.1	18.3	1049.7	13.7	1063.4	17.6	1063.4	17.6	98.1
-CV-7 Spot 65	881	117396	5.5	13.3633	0.9	1.7999	2.7	0.1744	2.5	0.94	1036.6	24.1	1045.4	17.5	1064.0	18.6	1064.0	18.6	97.4
-CV-7 Spot 58	39	84489	0.9	13.3613	1.4	1.8939	4.2	0.1835	4.0	0.94	1086.2	39.5	1078.9	27.9	1064.3	27.9	1064.3	27.9	102.1
-CV-7 Spot 52	759	163245	6.7	13.3528	0.9	1.8147	2.8	0.1757	2.7	0.94	1043.7	25.9	1050.8	18.6	1065.6	18.7	1065.6	18.7	97.9
-CV-7 Spot 57	663	49803	7.1	13.3513	0.9	1.7876	2.5	0.1731	2.3	0.94	1029.1	22.1	1040.9	16.1	1065.8	17.5	1065.8	17.5	96.6
-CV-7 Spot 66	731	192281	6.0	13.3377	1.2	1.8144	2.7	0.1755	2.4	0.90	1042.4	23.1	1050.7	17.4	1067.9	23.3	1067.9	23.3	97.6
-CV-7 Spot 61	571	203641	7.0	13.2919	0.9	1.7924	2.5	0.1728	2.3	0.93	1027.5	21.9	1042.7	16.1	1074.8	18.1	1074.8	18.1	95.6
-CV-7 Spot 60	667	1474096	8.6	13.2815	0.9	1.7661	2.0	0.1701	1.8	0.88	1012.8	16.7	1033.1	13.0	1076.3	18.9	1076.3	18.9	94.1
-CV-7 Spot 41	832	1574135	8.2	13.2717	0.9	1.7699	2.7	0.1704	2.6	0.94	1014.1	24.2	1034.5	17.8	1077.8	18.7	1077.8	18.7	94.1
-CV-7 Spot 36	603	1671177	4.3	13.2674	0.9	1.7795	2.5	0.1712	2.3	0.93	1018.9	21.9	1038.0	16.2	1078.4	18.0	1078.4	18.0	94.5
-CV-7 Spot 38	619	181221	6.8	13.2289	1.0	1.8001	2.5	0.1727	2.4	0.93	1027.0	22.4	1045.5	16.6	1084.3	19.2	1084.3	19.2	94.7
-CV-7 Spot 53	757	140907	7.2	13.2268	0.8	1.8135	2.9	0.1740	2.7	0.96	1033.9	26.2	1050.3	18.8	1084.6	16.9	1084.6	16.9	95.3
-CV-7 Spot 44	882	191867	6.7	13.2174	0.9	1.8136	2.8	0.1739	2.7	0.95	1033.3	25.7	1050.4	18.5	1086.0	17.7	1086.0	17.7	95.1
-CV-7 Spot 64	745	1082338	6.9	13.1823	1.1	1.8268	2.1	0.1747	1.8	0.86	1037.7	17.6	1055.1	14.0	1091.3	21.8	1091.3	21.8	95.1
-CV-7 Spot 62	570	262259	4.5	13.1790	1.0	1.8053	3.7	0.1726	3.6	0.96	1026.2	34.1	1047.4	24.4	1091.8	20.3	1091.8	20.3	94.0
-CV-7 Spot 68	62	11889	2.7	13.1139	1.4	2.0367	3.4	0.1937	3.1	0.92	1141.5	32.9	1127.9	23.3	1101.8	27.1	1101.8	27.1	103.6
-CV-7 Spot 42	318	94189	1.6	13.0556	1.0	2.0732	2.8	0.1963	2.6	0.94	1155.4	27.7	1140.0	19.2	1110.7	19.8	1110.7	19.8	104.0
-CV-7 Spot 55	1255	223327	7.1	13.0540	0.9	1.8163	2.5	0.1720	2.3	0.93	1022.9	21.8	1051.4	16.3	1110.9	18.7	1110.9	18.7	92.1
-CV-7 Spot 70	550	75167	3.8	12.7205	1.5	1.8851	4.2	0.1739	3.9	0.94	1033.7	37.7	1075.9	28.0	1162.4	29.5	1162.4	29.5	88.9

Comparison of Analyses on Same Grain

Analysis #	Position	207Pb/206Pb	U (ppm)	U/Th	Concordancy
59	core	1038±24	131	1.5	97.1
60	rim	1076±19	667	2.6	94.1
68	core	1102±27	62	2.7	103.6
69	rim	1059±22	813	7.4	99.1
57	rim	1066±18	663	7.1	96.6
58	core	1064±28	39	0.9	102.1
42	core	1111±20	318	1.6	104.0
43	rim	1063±17	1000	6.8	95.9

Interpretation: Interpretation of U-Pb zircon results from this sample is straight forward. The vast bulk of the zircons crystallized ca. 1044 Ma. Their size, shape, internal features, REE pattern, and U-content assures that they are igneous zircons. A few cores as old as 1162 Ma are also found.

Supplemental file S-6.

Sample CV-2013

Field Data

Location: ~100 m south of Quarry face sampled Cheever Mine

Rock type: Magnetite-rich leucogranite

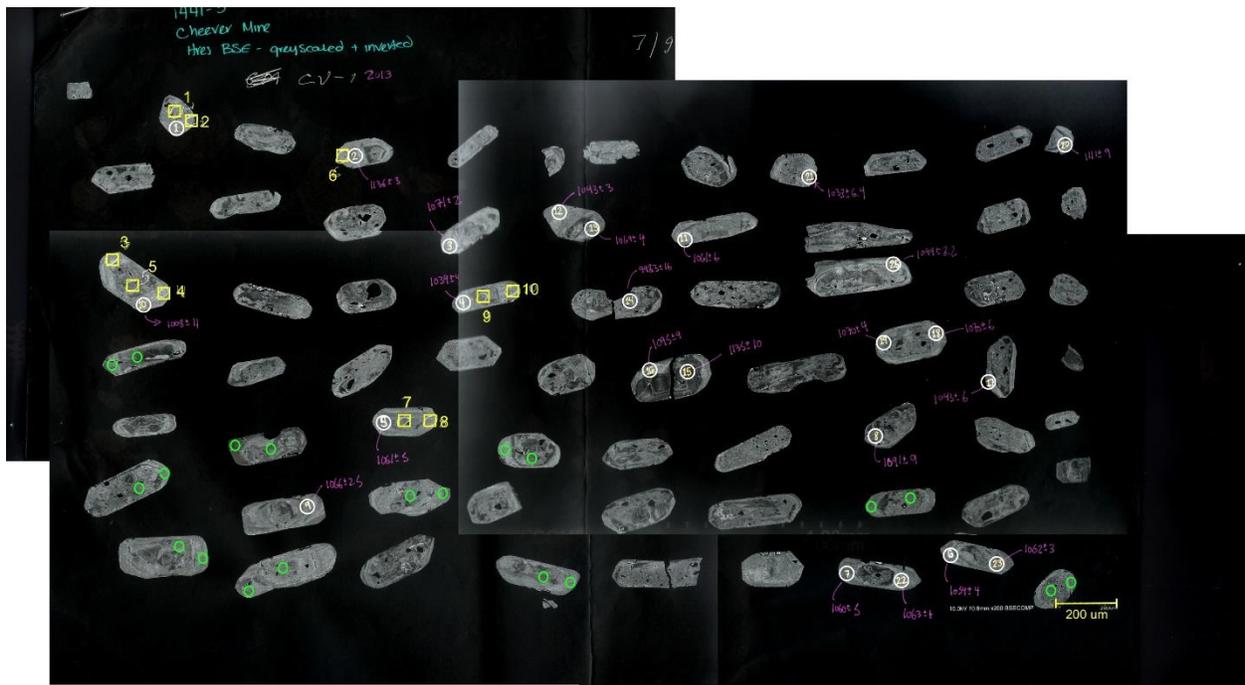
Mineralogy: Plag-quartz-cpx-magnetite

Other: lacks foliation

Field relations: Cut by IOA ore

Sample	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	LOI
CVE-1	70.59	0.39	10.99	10.68	0.01	0.05	0.36	5.77	0.64	0.05	0.00
CVE-2	80.28	0.33	10.35	1.41	0.01	0.11	0.57	4.80	1.40	0.01	0.23
CVE-3	67.94	0.26	11.20	12.21	0.02	0.24	0.76	6.38	0.07	0.09	0.00
CV-4	4.95	0.70	0.49	86.97	0.07	0.23	2.65	0.29	0.07	2.90	0.00
CV-7	65.93	0.47	14.40	8.68	0.02	0.08	0.56	9.03	0.20	0.09	0.00

Zircon Physical Properties



Zircon yield: Many

Size: 150-700 μm (avg. length 450 μm)

Shape: Euhedral, elongate grains

Internal Features:

- Cores and rims
- Numerous inclusions and metamictization in cores
- Rims zoned and discontinuous

Zircon Chemical and Isotopic Properties

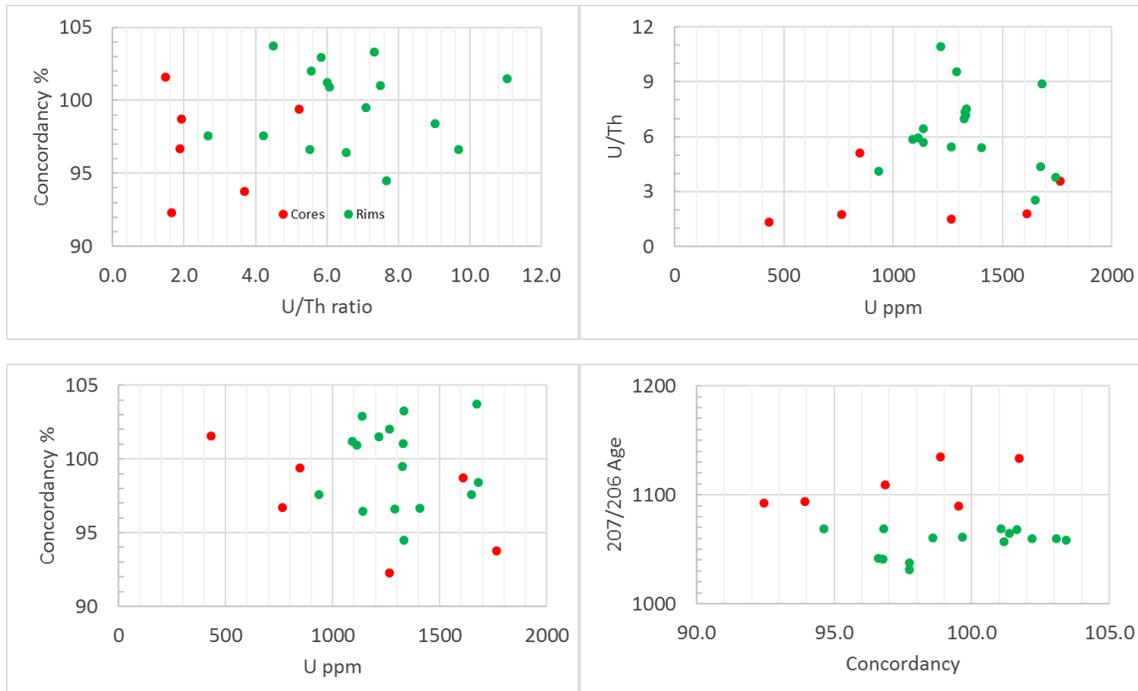
Analyses: 34/35 passed quality control screening)

Concordant Analyses: 22/34 (97-103%)

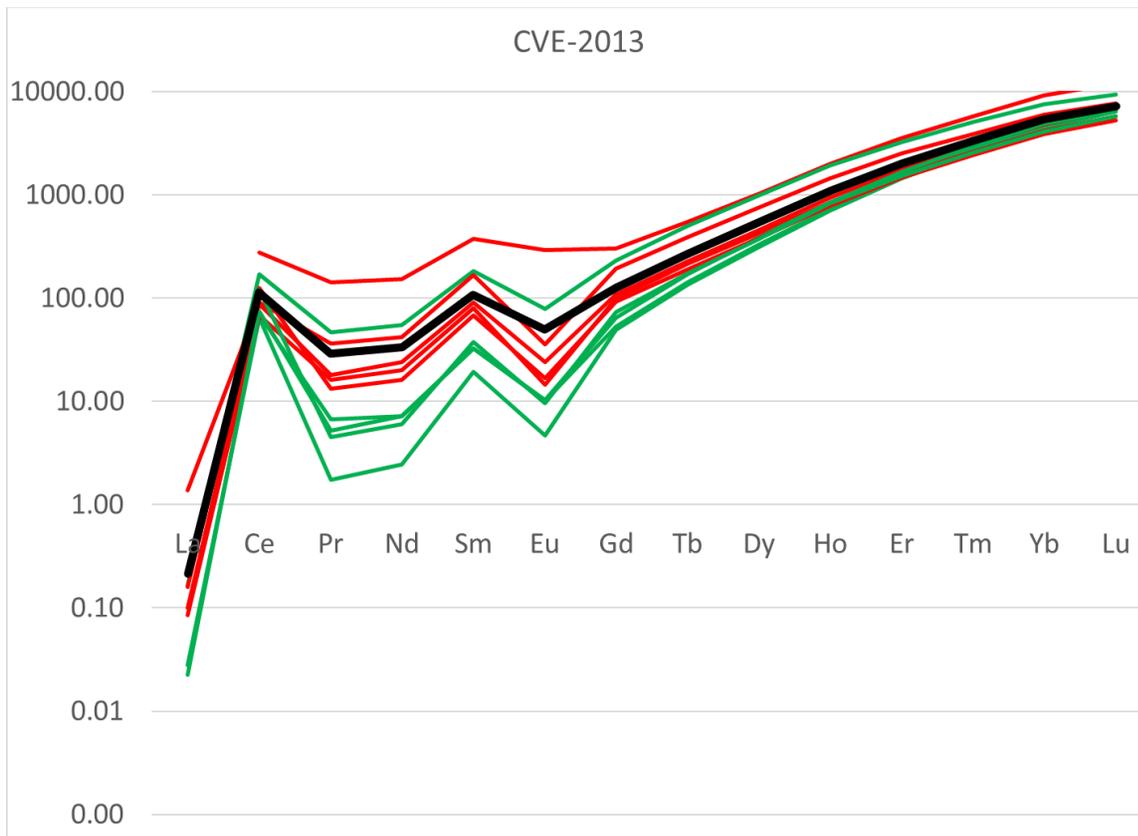
U content: 281 ± 154

U/Th ratio: 1.8 ± 0.3

$^{206}\text{Pb}/^{204}\text{Pb}$: 46101



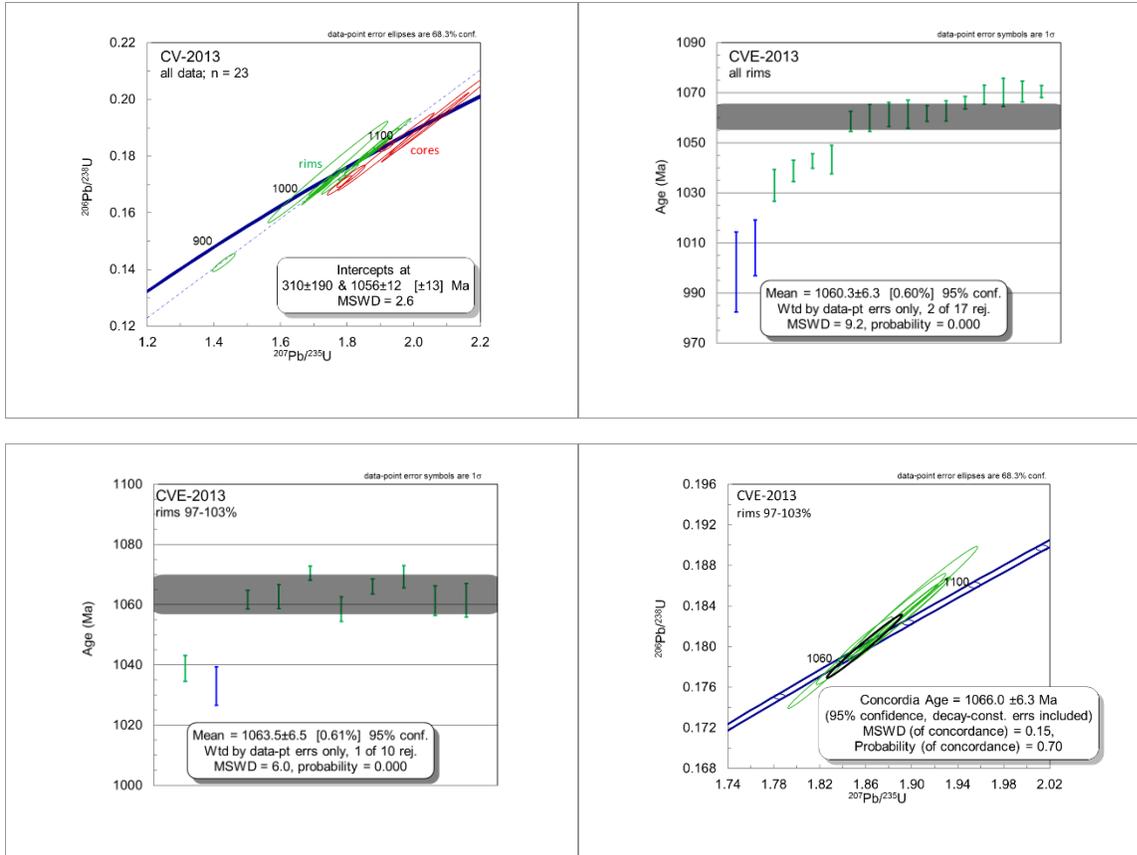
Zircon REE Analysis: 10



	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
CV-13.1		168.3	13.15	70	55.4	16.52	60.5	19.67	251	108.2	566	142.5	1486	298.4
CV-13.2	0.039	103.6	4.34	25.2	27.2	4.46	45.6	18	243	104.5	519	124.7	1211	229
CV-13.3	-6.1E-06	42.2	0.62	3.31	4.78	0.566	10.63	5.14	80.9	39.71	239.1	67.9	759	164.4
CV-13.4	0.0066	39.4	0.161	1.11	2.86	0.265	9.87	4.87	77.2	38.61	230.4	64.4	725	158.4
CV-13.5	0.325	55.6	3.37	19.22	24.74	2.01	38.5	14.15	185.2	79.5	406	96.5	963	190.6
CV-13.6	0.02	41.9	1.51	9.2	11.9	0.824	19.6	7.71	104.9	46.4	252	65	675	140.8
CV-13.7	0.0236	53.6	1.67	10.95	13.44	1.36	21.56	8.18	113	51.6	281.4	74.2	777	163.5
CV-13.8	0.0053	45.8	0.483	3.31	4.82	0.582	12.94	6.12	95.5	46.4	269.5	72.7	786	161.7
CV-13.9	0.038	77.1	1.22	7.41	10.12	0.95	18.54	6.83	93.9	42.9	235.8	59.9	626	130.5
CV-13.10	-8.3E-06	74	0.42	2.74	5.52	0.541	14.49	6.27	92.5	44.86	244.2	63.2	662	141.1

U-Pb Isotopic Ages

- **Range of 207Pb/206Pb ages:** rims 998-1071 Ma; cores 1091-1136 Ma
- **Upper Intercept (all data):** na
- **Weighted average (all data):** rims 1060±6.3 Ma
- **Weighted average (97-103):** rims 1063.5±6.5 Ma
- **Concordia age:** 1066.0±6.3 Ma



Comparison of Analyses on Same Grain

Analysis #	Position	207Pb/206Pb	U (ppm)	U/Th	Concordancy
12	rim	1043±3	1284	9.6	96.7
13	rim	1069±4	1209	11.0	101.6
15	core	1135±10	424	1.4	101.7
16	core	1095±9	1757	3.7	93.9
18	rim	1070±4	1327	7.6	94.6
19	rim	1070±6	1399	5.5	96.7
7	rim	1060±5	1324	7.3	103.4
22	rim	1063±4	1318	7.1	99.6
6	rim	1059±4	1323	7.4	101.1
23	rim	1062±3	1673	9.0	98.5

Geochronological results U-Pb zircon sample CV-2013.

Table CV-2013. U-Pb geochron		AgePick Table										Apparent ages (Ma)							
Analysis	U (ppm)	206Pb/204Pb	U/Th	206Pb*/207Pb*	± (%)	Isotope ratios				error corr.	206Pb*/238U*	± (Ma)	207Pb*		206Pb*		Best age		Conc (%)
						235U*	± (%)	238U	± (%)				235U	± (Ma)	207Pb*	± (Ma)	206Pb*	± (Ma)	
Cheever 2013 sorted by 207Pb/206Pb ages																			
CHEEVER-14 <>	1668	215345	4.5	13.8046	0.8	1.7423	6.8	0.1744	6.8	0.99	1036.5	64.9	1024.3	44.0	998.3	16.0	998.3	16.0	103.8
CHEEVER-10 <>	1736	420808	3.9	13.7386	0.6	1.4298	1.6	0.1425	1.5	0.94	858.6	11.9	901.5	9.5	1008.0	11.2	1008.0	11.2	85.2
CHEEVER-21 <>	927	114623	4.2	13.5703	0.3	1.7217	1.4	0.1694	1.4	0.97	1009.1	12.7	1016.6	9.0	1033.0	6.4	1033.0	6.4	97.7
CHEEVER-4 <>	1642	232561	2.6	13.5312	0.2	1.7368	2.3	0.1704	2.3	1.00	1014.6	21.3	1022.3	14.7	1038.8	4.3	1038.8	4.3	97.7
CHEEVER-12 <>	1284	1552556	9.6	13.5055	0.1	1.7288	2.5	0.1693	2.5	1.00	1008.5	23.8	1019.3	16.4	1042.6	2.9	1042.6	2.9	96.7
CHEEVER-17 <>	1133	230623	6.5	13.5016	0.3	1.7268	1.1	0.1691	1.1	0.97	1007.1	10.1	1018.6	7.2	1043.2	5.7	1043.2	5.7	96.5
CHEEVER-6 <>	1323	1225170	7.4	13.3997	0.2	1.8588	0.9	0.1806	0.8	0.97	1070.5	8.3	1066.6	5.7	1058.5	4.1	1058.5	4.1	101.1
CHEEVER-7 <>	1324	866818	7.3	13.3909	0.3	1.9077	2.9	0.1853	2.9	1.00	1095.7	29.1	1083.8	19.3	1059.9	5.4	1059.9	5.4	103.4
CHEEVER-5 <>	1258	709177	5.5	13.3810	0.2	1.8867	1.5	0.1831	1.5	0.99	1083.9	14.8	1076.4	9.9	1061.3	4.8	1061.3	4.8	102.1
CHEEVER-11 <>	1130	787225	5.8	13.3804	0.3	1.9050	1.8	0.1849	1.8	0.99	1093.5	18.0	1082.8	12.1	1061.4	5.6	1061.4	5.6	103.0
CHEEVER-23 <>	1673	799048	9.0	13.3789	0.2	1.8156	0.9	0.1762	0.8	0.98	1046.0	8.1	1051.1	5.6	1061.7	3.1	1061.7	3.1	98.5
CHEEVER-22 <>	1318	645585	7.1	13.3719	0.2	1.8403	0.8	0.1785	0.8	0.97	1058.7	8.0	1060.0	5.5	1062.7	4.0	1062.7	4.0	99.6
CHEEVER-9 <>	1083	557520	6.0	13.3496	0.1	1.8841	1.4	0.1824	1.4	1.00	1080.2	13.6	1075.5	9.1	1066.1	2.5	1066.1	2.5	101.3
CHEEVER-13 <>	1209	1101174	11.0	13.3284	0.2	1.8986	1.2	0.1835	1.2	0.99	1086.3	12.1	1080.6	8.2	1069.3	3.8	1069.3	3.8	101.6
CHEEVER-18 <>	1327	185301	7.6	13.3223	0.3	1.7596	1.3	0.1700	1.3	0.98	1012.2	12.3	1030.7	8.7	1070.2	5.6	1070.2	5.6	94.6
CHEEVER-19 <>	1399	604170	5.5	13.3206	0.2	1.8038	1.1	0.1743	1.1	0.98	1035.6	10.4	1046.9	7.3	1070.4	4.2	1070.4	4.2	96.7
CHEEVER-3 <>	1105	761358	6.0	13.3202	0.1	1.8906	1.5	0.1827	1.5	1.00	1081.4	14.9	1077.8	10.0	1070.5	2.4	1070.5	2.4	101.0
CHEEVER-8 <>	840	184362	5.2	13.1833	0.4	1.9181	0.8	0.1834	0.7	0.83	1085.5	6.5	1087.4	5.2	1091.2	8.8	1091.2	8.8	99.5
CHEEVER-24 <>	1258	251892	1.6	13.1667	0.4	1.7722	1.4	0.1697	1.3	0.96	1010.5	12.4	1037.2	9.0	1093.7	8.2	1093.7	8.2	92.4
CHEEVER-16 <>	1757	411461	3.7	13.1562	0.5	1.8122	1.6	0.1729	1.5	0.95	1028.2	14.2	1049.9	10.3	1095.3	9.4	1095.3	9.4	93.9
CHEEVER-20 <>	758	53956	1.8	13.0548	0.5	1.9170	5.0	0.1815	5.0	1.00	1075.2	49.3	1087.0	33.4	1110.8	9.2	1110.8	9.2	96.8
CHEEVER-15 <>	424	871878	1.4	12.9000	0.5	2.0943	5.3	0.1959	5.3	1.00	1153.5	55.5	1146.9	36.3	1134.6	9.8	1134.6	9.8	101.7
CHEEVER-2 <>	1603	452098	1.9	12.8908	0.2	2.0344	4.3	0.1902	4.3	1.00	1122.5	44.0	1127.1	29.1	1136.0	3.4	1136.0	3.4	98.8

Interpretation: The zircons found in this rock convincingly display core/rim relations. Cores tend to be complex, inclusion-rich, with or without zoning. Rims are oscillatory zoned and form euhedral faces to crystals. Most of the cores appear to be partially resorbed or smaller fragments in larger crystals. Most zircons have U-contents over 1000 ppm and many have lost Pb. Analysis of the rims yield a concordia age of 1066 ± 6.3 Ma, interpreted as the time of crystallization. Cores yield Pb/Pb ages ranging from 1091-1136 Ma, have slightly lower U/Th ratios, and are interpreted as xenocrysts. REE patterns are very similar but rims have lower overall concentrations than cores. The field relations here indicate that the intrusive, planar magnetite ore here must be younger than 1066 Ma.