

Table SUPP. 4: LA-ICP-MS data on titanite

	Sample number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1	SC1
wt%	Titanite type	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)	ttn-(I)
	SiO2	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
	CaO	26.3	24.1	25.2	25.3	25.9	26.2	24.7	25.8	27.6	24.9	24.9	25.8	25.7	25.2	25.3
	TiO2	36.9	36.1	37.1	37.3	36.6	38.1	36.1	38.1	38.9	36.9	35.8	38.1	37.4	37.7	36.4
	Al2O3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Fe2O3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Y2O3	2.4	5.0	4.7	4.5	4.4	4.3	3.6	3.4	1.4	3.6	4.2	4.3	4.2	4.3	3.9
	Nb2O5	0.4	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4
	F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	-O=F	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ppm	SUM	96.8	97.5	99.2	99.2	99.0	100.6	96.2	99.1	98.9	96.9	96.9	100.2	99.2	99.1	97.4
	Mg	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Mn	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Na	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Zn	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
	Sr	24.5	33.8	33.6	33.5	32.6	33.2	30.2	31.9	23.4	30.8	33.2	33.2	32.1	33.4	31.3
	As	84.0	53.9	53.4	54.7	58.8	59.8	62.5	64.8	77.5	47.4	52.4	60.4	58.6	56.7	50.2
	La	24.2	39.0	42.3	40.8	41.0	40.7	37.3	40.6	19.4	31.8	38.0	40.3	37.7	37.3	35.4
	Ce	180.4	287.8	305.5	310.2	302.5	302.6	275.4	296.7	138.2	239.6	276.6	294.2	277.8	279.4	258.0
	Pr	52.7	83.5	88.8	88.3	86.7	86.7	79.5	85.7	39.2	68.7	81.4	83.3	80.5	79.4	74.0
	Nd	417.5	654.1	692.1	688.5	687.6	695.1	631.8	678.3	294.2	550.8	627.1	664.9	623.0	611.3	594.7
	Sm	360.7	590.2	602.3	587.7	594.5	588.9	528.5	554.5	246.9	470.1	550.8	577.9	557.9	547.3	508.9
	Eu	52.2	92.3	91.1	88.9	87.7	87.3	76.6	78.4	34.3	69.8	86.6	90.1	84.9	86.4	77.1
	Gd	914.3	1889.7	1860.8	1782.2	1684.2	1619.0	1391.7	1353.6	566.1	1344.8	1718.1	1772.3	1702.9	1718.0	1501.5
	Tb	287.3	658.7	642.4	607.8	569.7	536.3	449.7	430.2	165.9	458.1	595.9	607.6	591.1	587.1	515.3
	Dy	2994.2	6626.3	6314.1	5999.3	5985.6	5651.2	4697.5	4481.1	1718.2	4885.3	6087.1	6275.4	6016.8	6125.3	5403.1
	Ho	751.9	1603.1	1507.6	1455.8	1439.7	1372.9	1148.9	1100.0	441.6	1172.6	1399.0	1435.2	1409.5	1401.6	1294.1
	Er	2406.0	4646.9	4317.7	4216.1	4250.2	4146.9	3543.7	3390.9	1480.4	3522.1	3981.0	4145.3	3996.2	4071.1	3792.2
	Tm	355.6	675.8	605.8	595.8	573.3	568.9	490.4	478.1	233.1	474.3	535.5	544.0	531.2	544.3	513.1
	Yb	2170.8	3807.6	3363.1	3293.1	3267.3	3249.9	2821.8	2785.8	1494.9	2683.0	2935.7	3056.2	2949.0	3013.5	2876.1
	Lu	229.7	368.3	321.2	315.4	315.9	318.4	281.7	279.6	164.4	259.7	274.6	280.1	274.3	283.7	278.7
	Pb	11.0	18.1	18.7	17.2	18.1	16.5	14.9	16.0	9.3	14.8	18.6	19.4	18.7	18.3	15.8
	Th	9.1	24.2	20.5	19.6	16.8	15.8	13.0	12.6	5.4	11.5	19.6	19.2	18.8	18.1	13.7
	U	105.3	87.0	70.8	72.0	75.5	77.9	79.2	87.3	95.3	59.3	57.9	67.1	56.8	59.4	60.5
Si_pfu		1.02	1.03	1.01	1.01	1.01	0.99	1.03	1.00	0.99	1.03	1.03	1.00	1.01	1.01	1.02
	Ti_pfu	0.95	0.94	0.95	0.95	0.94	0.96	0.95	0.97	0.98	0.96	0.94	0.96	0.95	0.97	0.94
	Nb_pfu	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Fe_pfu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Al_pfu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM_Y_site		0.96	0.95	0.96	0.96	0.94	0.97	0.96	0.98	0.99	0.97	0.94	0.97	0.96	0.97	0.95
	Ca_pfu	0.97	0.90	0.92	0.92	0.94	0.94	0.92	0.94	0.99	0.92	0.93	0.93	0.94	0.92	0.93
	Na_pfu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Y_pfu	0.04	0.09	0.09	0.08	0.08	0.08	0.07	0.06	0.03	0.07	0.08	0.08	0.08	0.08	0.07
	ΣREE_pfu	0.01	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02
SUM_X_site		1.03	1.02	1.03	1.03	1.05	1.04	1.01	1.02	1.02	1.01	1.03	1.03	1.03	1.02	1.03
F		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
O_calc		5.01	5.05	5.03	5.03	5.01	5.01	5.04	5.03	5.00	5.04	5.02	5.02	5.02	5.03	5.02
O_F(tot)		5.01	5.05	5.03	5.03	5.01	5.01	5.04	5.03	5.00	5.04	5.02	5.02	5.02	5.03	5.02

16 SC1 ttn-(I)	17 SC1 ttn-(I)	18 SC1 ttn-(I)	19 SC1 ttn-(I)	20 SC1 ttn-(I)	21 SC1 ttn-(I)	22 SC1 ttn-(I)	23 SC1 ttn-(I)	24 SC1 ttn-(I)	25 SC1 ttn-(I)	26 SC1 ttn-(I)	27 SC1 ttn-(I)	28 SC1 ttn-(I)	29 SC1 ttn-(I)	30 SC1 ttn-(I)	31 SC1 ttn-(I)	32 SC1 ttn-(I)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
26.8	26.1	25.2	25.8	25.9	25.4	25.3	27.2	25.5	27.0	26.4	26.3	26.6	27.7	27.3	26.4	26.9
37.2	37.8	36.1	36.8	36.5	35.8	36.0	36.8	36.5	36.3	36.2	36.3	37.6	35.7	36.1	35.7	36.3
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.4	4.4	4.8	5.0	5.0	5.6	4.0	4.0	3.5	3.1	2.6	2.2	2.0	1.8	1.7	1.6	1.5
0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.4	100.3	98.3	99.9	99.8	99.4	97.0	99.9	97.2	97.9	96.5	96.1	97.4	96.3	96.2	94.8	95.8
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
33.7	34.5	34.4	35.2	36.0	35.7	32.5	33.1	31.2	30.5	28.6	26.7	25.8	22.7	22.5	21.8	22.1
55.1	53.8	50.4	46.0	48.4	60.7	42.5	44.3	45.3	51.8	57.4	58.0	72.4	79.8	89.5	85.0	81.7
37.1	39.0	41.1	44.2	47.3	46.2	32.5	32.6	30.8	29.2	28.1	24.9	23.6	20.2	19.5	17.5	16.8
279.9	281.1	307.4	327.8	341.7	341.5	239.8	247.8	229.5	225.4	204.4	190.0	177.3	152.2	146.6	131.6	126.3
80.1	82.2	88.4	95.8	99.6	99.3	70.6	72.6	67.7	65.4	61.3	55.1	52.1	44.4	41.7	38.9	36.4
630.9	640.9	694.8	754.6	790.9	772.1	558.7	570.7	539.7	520.3	476.8	448.3	401.1	345.9	340.3	305.9	286.0
559.0	560.2	607.3	663.7	676.4	689.0	502.6	508.1	463.1	440.7	403.5	376.4	338.5	295.0	288.0	256.8	243.9
88.4	87.2	95.7	100.1	104.6	103.5	77.7	79.3	69.4	64.9	58.1	51.4	47.1	42.6	40.9	36.6	33.8
1792.8	1768.6	1948.1	2095.8	2110.5	2160.2	1591.0	1558.9	1327.1	1163.3	979.2	859.0	785.5	716.1	688.8	621.1	590.8
614.7	613.5	674.9	721.0	724.8	759.8	560.2	547.6	459.2	391.0	314.5	263.8	231.1	212.1	204.9	187.4	177.9
6289.4	6016.4	6595.9	6971.6	6993.6	7371.6	5692.5	5660.5	4814.9	4056.3	3232.4	2700.1	2315.7	2110.7	2038.2	1906.9	1782.8
1475.2	1450.0	1571.6	1633.4	1662.4	1776.5	1328.3	1319.4	1149.9	1007.3	812.5	687.5	599.4	552.3	526.4	496.4	467.2
4257.6	4121.8	4406.9	4613.6	4632.8	5063.4	3786.1	3736.8	3415.4	3044.9	2532.3	2231.0	1978.2	1859.1	1773.2	1663.1	1579.4
563.0	543.1	602.6	634.4	630.9	712.9	498.1	501.3	461.8	418.7	363.0	325.0	299.2	282.8	268.8	257.0	243.1
3061.5	2958.2	3338.6	3454.2	3432.0	4040.8	2745.5	2806.4	2610.9	2421.5	2127.1	1980.5	1846.0	1773.9	1708.1	1635.9	1549.4
291.8	281.9	317.9	325.3	321.6	387.8	257.6	264.7	253.0	239.8	216.8	203.8	200.1	196.4	190.5	182.2	174.8
18.7	17.8	19.1	19.0	19.1	20.0	17.0	17.4	15.4	14.6	14.0	12.9	11.2	9.6	9.0	9.4	9.6
18.3	19.2	23.8	25.9	26.6	35.6	18.1	15.5	12.1	9.6	8.3	7.0	7.4	7.1	7.8	6.6	6.8
57.7	58.0	66.1	70.8	70.2	94.8	57.4	60.4	61.6	65.9	71.4	75.7	89.1	113.2	110.9	108.4	109.0
0.99	1.00	1.02	1.00	1.00	1.01	1.03	0.99	1.02	1.01	1.02	1.02	1.01	1.01	1.02	1.03	1.02
0.94	0.96	0.93	0.94	0.93	0.92	0.94	0.93	0.95	0.93	0.94	0.94	0.96	0.92	0.93	0.94	0.94
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.94	0.96	0.94	0.94	0.94	0.93	0.94	0.94	0.95	0.93	0.94	0.95	0.97	0.93	0.94	0.94	0.95
0.96	0.94	0.93	0.93	0.94	0.93	0.94	0.98	0.94	0.98	0.97	0.97	0.97	1.01	1.00	0.98	0.99
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.08	0.08	0.09	0.09	0.09	0.10	0.07	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.03
0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1.06	1.04	1.04	1.05	1.06	1.06	1.03	1.07	1.03	1.06	1.04	1.03	1.02	1.06	1.04	1.02	1.03
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.99	5.01	5.02	5.01	5.00	5.01	5.02	4.98	5.02	4.98	5.00	5.00	5.01	4.97	4.98	5.00	4.99
4.99	5.01	5.02	5.01	5.00	5.01	5.02	4.98	5.02	4.98	5.00	5.00	5.01	4.97	4.98	5.00	4.99

33 SC1 ttn-(I)	34 SC1 ttn-(I)	35 SC1 ttn-(I)	36 SC1 ttn-(I)	37 SC1 ttn-(I)	38 SC1 ttn-(I)	39 SC1 ttn-(I)	40 SC1 ttn-(I)	41 SC10 ttn-(I)	42 SC10 ttn-(I)	43 SC10 ttn-(I)	44 SC10 ttn-(I)	45 SC10 ttn-(I)	46 SC10 ttn-(I)	47 SC10 ttn-(I)	48 SC2 ttn-(I)	49 SC2 ttn-(I)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
26.7	26.7	28.0	24.7	27.2	25.6	26.3	26.0	27.8	27.0	27.3	28.1	27.6	27.9	27.3	28.8	28.7
35.9	35.0	36.2	33.0	34.6	34.0	35.2	33.7	22.8	23.9	23.0	25.4	24.7	25.1	20.9	23.7	23.8
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	3.1	3.1	2.9	2.6	2.7	2.7	3.0	2.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.5	3.8	2.5	3.4	2.9	2.5	2.6	2.7
1.6	1.5	1.5	1.4	1.5	1.5	1.5	1.5	4.7	5.9	5.5	4.3	5.5	5.3	4.2	1.5	1.5
0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	1.4	0.8	0.7	1.1	0.9	0.5	0.3	0.3
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.2	94.2	96.6	90.1	94.3	92.1	94.1	92.3	94.3	97.7	96.3	96.7	97.7	97.4	90.2	91.7	91.6
nd	nd	nd	nd	nd	nd	nd	nd	2083	554	999	763	381	212	1844	362	362
nd	nd	nd	nd	nd	nd	nd	nd	1560	1804	1854	17800	4744	2147	7744	1634	1584
nd	nd	nd	nd	nd	nd	nd	nd	653	1040	727	764	1000	1064	773	1812	1737
nd	nd	nd	nd	nd	nd	nd	nd	76	49	45	358	75	47	247	29	28
22.1	21.6	22.3	20.9	21.4	21.0	21.7	21.6	69.3	278.3	79.1	88.0	88.9	78.3	77.2	51.2	52.1
84.8	85.6	92.5	85.3	87.2	83.1	84.2	84.1	341.7	630.3	2844.4	472.5	580.8	1348.8	5964.0	245.1	264.6
16.6	16.4	17.3	16.1	16.6	16.6	17.3	17.5	93.3	135.4	95.6	862.5	279.8	132.5	201.9	289.0	294.3
124.7	118.5	121.9	118.4	127.0	125.0	128.3	131.3	622.8	901.9	646.1	3514.2	1284.5	1032.2	1807.5	2613.1	2629.7
36.9	35.0	35.3	35.1	36.8	36.7	38.1	38.5	183.1	248.8	187.1	524.8	279.8	247.8	194.0	710.8	713.8
290.8	276.0	275.8	269.7	288.6	295.6	296.1	305.4	1570.8	2048.9	1625.9	3404.1	2166.3	2019.5	1554.3	5583.2	5554.8
240.9	235.1	239.3	225.8	241.3	241.9	248.4	258.5	1641.5	2046.1	1741.5	2293.8	1956.2	1766.3	1578.2	2930.6	2894.8
35.3	33.4	33.7	33.0	34.8	35.1	34.7	35.8	280.7	345.4	306.0	335.8	321.1	278.6	267.9	320.4	315.4
599.4	564.7	557.6	550.2	582.8	607.5	602.9	620.9	4168.4	5165.7	4679.4	4330.8	4751.9	4041.7	3890.3	3232.5	3148.1
183.2	171.3	170.4	166.8	176.5	180.5	180.6	185.1	1093.7	1386.4	1257.0	1048.7	1211.1	1098.3	1016.6	442.0	434.3
1834.2	1710.6	1705.9	1645.4	1758.3	1797.4	1780.8	1820.4	8367.9	10432.4	9771.7	7670.6	9349.7	8624.8	7661.4	2267.2	2227.8
483.5	453.1	447.5	436.7	461.3	467.9	468.5	472.9	1545.1	1961.7	1887.4	1392.8	1814.9	1772.7	1394.7	396.1	390.9
1635.9	1525.1	1519.1	1464.4	1564.6	1577.9	1598.4	1588.5	3609.6	4679.4	4624.4	3367.4	4422.5	4569.3	3257.2	962.5	946.9
249.3	234.9	233.2	223.4	237.4	238.3	241.9	240.6	458.3	574.4	561.5	430.3	558.6	572.5	416.6	127.0	124.8
1590.6	1513.6	1500.7	1432.9	1494.3	1501.4	1510.2	1517.5	2562.7	3248.1	3147.1	2425.0	3177.4	3372.9	2257.1	778.3	772.6
174.9	171.6	165.1	157.9	167.4	167.5	169.7	167.9	235.3	294.4	291.8	229.0	308.7	336.6	209.2	84.9	84.3
9.5	8.8	9.3	9.0	9.3	9.2	8.7	9.0	30.6	107.4	27.2	150.5	85.8	89.8	331.2	36.3	38.1
6.9	6.1	6.1	6.1	6.5	6.6	7.0	7.1	69.3	127.4	103.6	146.5	117.5	134.0	93.5	25.3	25.2
116.0	112.9	112.6	101.4	104.5	104.1	103.9	103.5	36.5	53.2	48.9	51.7	61.6	64.0	37.8	7.6	7.5
1.03	1.03	1.01	1.08	1.03	1.06	1.04	1.06	1.02	1.00	1.01	0.98	1.00	1.00	1.05	1.03	1.03
0.93	0.92	0.93	0.91	0.90	0.91	0.93	0.90	0.59	0.61	0.59	0.64	0.63	0.64	0.56	0.62	0.62
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.10	0.06	0.09	0.07	0.07	0.07	0.07
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.12	0.13	0.11	0.10	0.11	0.11	0.12	0.12
0.94	0.93	0.94	0.92	0.92	0.92	0.94	0.91	0.80	0.84	0.83	0.82	0.83	0.83	0.74	0.82	0.82
0.99	1.00	1.02	0.97	1.02	0.98	0.99	0.99	1.03	0.98	1.00	1.00	1.00	1.01	1.03	1.07	1.07
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.09	0.11	0.10	0.08	0.10	0.10	0.08	0.03	0.03
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03
1.03	1.04	1.05	1.00	1.05	1.02	1.02	1.03	1.15	1.14	1.14	1.12	1.14	1.15	1.15	1.15	1.14
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.00	4.99	4.97	5.02	4.97	5.00	5.00	4.99	4.76	4.81	4.77	4.70	4.79	4.80	4.69	4.76	4.76
5.00	4.99	4.97	5.02	4.97	5.00	5.00	4.99	4.76	4.81	4.77	4.70	4.79	4.80	4.69	4.76	4.76

50 SC2 ttn-(I)	51 SC2 ttn-(I)	52 SC2 ttn-(I)	53 SC2 ttn-(I)	54 SC2 ttn-(I)	55 SC2 ttn-(I)	56 SC2 ttn-(I)	57 SC2 ttn-(I)	58 SC2 ttn-(I)	85 Sc18 ttn-(I)	86 Sc18 ttn-(I)	87 Sc18 ttn-(I)	88 Sc18 ttn-(I)	89 Sc18 ttn-(I)	90 Sc18 ttn-(I)	91 Sc18 ttn-(I)	92 Sc18 ttn-(I)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
28.7	28.7	29.3	29.1	28.9	29.6	29.8	29.4	29.9	29.5	22.9	31.0	30.8	30.7	30.8	30.8	30.0
23.8	23.9	23.9	24.0	23.8	24.1	23.5	23.9	24.4	26.6	20.7	26.7	27.0	26.9	27.0	27.1	26.4
3.0	2.9	2.9	3.0	2.9	3.0	3.6	3.1	2.7	2.4	1.9	2.5	2.4	2.3	2.5	2.4	2.4
2.8	2.8	2.7	2.7	2.8	2.8	2.6	2.6	2.6	1.3	1.1	1.7	1.7	1.6	1.7	1.8	2.0
1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.5	1.5	0.7	1.0	0.2	0.1	0.0	0.4	0.5	2.0
0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.3	1.6	0.9	1.0	1.0	0.9	1.1	0.8	1.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.1	91.8	92.3	92.3	91.8	92.9	92.7	92.4	92.9	92.1	78.4	92.8	92.8	92.1	93.2	93.2	94.7
454	357	352	362	361	359	495	379	313	112	64	72	69	70	79	85	115
1549	1587	1639	1641	1631	1652	2102	1675	1531	2019	1560	2052	2023	1956	1912	1819	1947
1739	1737	1723	1717	1698	1707	1184	1589	1809	225	153	143	135	132	168	177	341
28	29	29	28	28	28	29	28	29	26	20	25	27	24	26	24	24
53.8	53.1	52.2	52.2	50.6	53.5	33.9	47.4	56.7	6.6	3.9	9.1	8.9	9.7	11.0	12.3	14.2
267.8	267.6	264.1	261.6	264.2	262.1	422.1	252.4	267.6	729.4	448.7	998.3	986.3	954.2	941.4	1000.1	1040.5
303.5	304.9	290.0	289.0	287.2	293.3	208.8	282.1	303.9	5.8	7.6	0.2	0.1	0.1	0.6	1.2	8.7
2720.5	2709.5	2596.6	2592.0	2551.7	2592.0	1867.2	2625.1	3008.6	39.6	55.4	1.4	0.5	0.4	3.9	8.1	59.6
738.4	731.6	704.7	703.2	691.2	697.2	564.5	708.6	758.5	10.9	15.9	0.4	0.1	0.1	1.1	2.3	16.8
5728.2	5630.9	5459.3	5445.6	5343.7	5396.9	4493.2	5378.6	5006.1	85.9	126.6	3.3	1.2	0.7	8.9	17.4	134.2
2973.7	2850.8	2770.0	2767.3	2700.3	2696.6	2406.7	2723.2	2267.2	69.3	106.4	3.6	1.4	0.6	8.8	17.2	125.4
324.2	304.3	295.8	294.8	287.1	287.4	259.1	291.0	237.1	12.7	18.3	0.7	0.3	0.2	1.9	3.6	21.3
3238.9	3032.5	2946.2	2971.0	2888.4	2870.0	2648.9	2849.9	2247.0	180.3	261.5	14.7	5.9	2.1	32.7	59.4	399.3
460.7	420.2	408.9	410.6	402.0	402.5	386.6	405.5	360.0	63.3	90.1	7.5	3.2	1.1	15.9	25.2	157.9
2472.8	2214.0	2182.8	2188.3	2155.3	2187.4	2147.9	2172.7	2103.0	675.4	926.7	111.5	48.0	16.2	228.5	318.4	1791.0
446.1	399.4	396.0	393.8	393.8	402.2	399.5	392.0	405.3	192.6	255.1	45.3	19.5	6.9	87.2	110.8	534.4
1101.0	980.8	979.9	995.5	979.1	999.2	1001.0	975.3	1047.5	684.5	859.7	223.2	98.7	39.0	404.6	456.0	1877.3
147.4	129.7	130.3	132.9	130.3	132.5	133.4	130.0	143.0	118.5	144.1	51.7	24.3	10.5	87.0	88.1	306.8
906.5	798.8	804.8	821.8	807.5	823.3	829.5	810.1	880.2	860.7	1018.5	453.3	232.7	109.0	730.4	682.6	2079.1
99.3	86.4	86.9	89.4	87.4	89.0	91.1	85.9	90.7	112.1	126.6	66.7	36.1	18.4	103.2	92.6	254.0
38.7	38.7	36.7	36.5	35.5	36.0	19.0	32.6	46.0	5.1	2.4	4.9	5.1	5.4	6.4	7.6	7.9
33.3	27.5	26.9	26.6	26.7	27.7	31.0	24.1	24.0	2.0	2.4	0.2	0.1	0.0	0.5	1.5	9.9
32.2	8.7	8.8	9.0	9.4	9.7	26.2	9.4	7.6	50.1	42.8	47.2	11.7	3.9	70.5	48.7	115.2
1.03	1.03	1.02	1.02	1.03	1.02	1.01	1.02	1.02	1.03	1.20	1.01	1.01	1.02	1.01	1.01	1.01
0.62	0.62	0.62	0.62	0.62	0.62	0.60	0.62	0.63	0.69	0.63	0.68	0.69	0.69	0.69	0.69	0.67
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.03	0.02	0.02	0.02	0.01	0.02	0.01	0.02
0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05
0.12	0.12	0.12	0.12	0.12	0.12	0.14	0.12	0.11	0.10	0.09	0.10	0.10	0.09	0.10	0.10	0.10
0.82	0.82	0.81	0.82	0.82	0.82	0.82	0.82	0.81	0.85	0.77	0.84	0.85	0.84	0.85	0.85	0.85
1.07	1.07	1.08	1.08	1.07	1.09	1.09	1.08	1.10	1.09	0.99	1.13	1.13	1.13	1.12	1.12	1.09
0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.04
0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
1.14	1.14	1.15	1.15	1.14	1.15	1.15	1.15	1.17	1.11	1.02	1.14	1.13	1.13	1.13	1.14	1.14
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.77	4.77	4.75	4.76	4.76	4.75	4.74	4.75	4.75	4.82	4.92	4.78	4.79	4.79	4.79	4.78	4.80
4.77	4.77	4.75	4.76	4.76	4.75	4.74	4.75	4.75	4.82	4.92	4.78	4.79	4.79	4.79	4.78	4.80

93 Sc18 ttn-(I)	94 Sc18 ttn-(I)	95 Sc18 ttn-(I)	96 Sc18 ttn-(I)	97 Sc18 ttn-(I)	98 Sc18 ttn-(I)	99 Sc18 ttn-(I)	100 Sc18 ttn-(I)	101 Sc18 ttn-(I)	102 Sc18 ttn-(I)	103 Sc18 ttn-(I)	104 Sc18 ttn-(I)	105 Sc18 ttn-(I)	106 Sc18 ttn-(I)	107 TTN-16 ttn-(I)	108 TTN-16 ttn-(I)	109 TTN-16 ttn-(I)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
31.1	29.2	30.1	30.1	30.7	30.5	31.0	29.7	29.8	30.1	30.3	30.6	30.0	30.3	28.0	28.2	27.8
26.8	26.0	25.0	26.7	26.6	26.6	26.6	26.7	27.3	26.8	26.8	26.8	26.7	26.7	25.7	26.0	25.6
2.5	3.0	3.6	2.4	2.4	2.5	2.5	2.5	2.0	2.4	2.1	2.2	2.3	2.3	2.0	2.1	2.3
1.8	1.9	2.6	1.7	1.6	1.8	1.8	1.4	1.2	1.7	1.5	1.4	1.5	1.5	1.0	1.0	1.0
0.1	0.7	0.1	0.3	0.4	0.3	0.2	0.8	0.8	0.4	0.1	0.2	0.2	0.2	1.3	1.6	1.6
0.8	1.5	0.9	1.2	2.3	1.0	1.2	1.1	0.8	1.1	1.9	1.6	1.7	1.5	0.8	0.8	0.8
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.7	92.3	91.9	92.2	93.7	92.5	93.0	92.1	91.8	92.2	92.4	92.4	92.1	92.3	88.9	90.0	89.4
111	4982	10506	118	86	79	86	256	77	87	76	79	73	96	47	45	53
1822	2087	2780	1861	1975	1896	1919	1734	1706	1856	2023	2085	2038	2027	832	921	840
145	240	251	186	286	163	183	214	170	193	230	214	202	207	88	102	150
25	83	142	26	27	25	25	29	29	27	26	27	25	26	56	52	50
10.9	7.2	25.0	11.3	12.9	10.8	10.7	10.9	10.2	11.0	9.8	10.6	9.6	9.3	4.1	4.3	5.1
701.9	756.0	882.7	940.5	1263.4	757.9	753.3	528.5	387.2	664.3	1025.8	958.8	943.2	944.1	11.2	10.6	10.1
0.4	5.0	0.9	0.4	0.6	0.5	0.2	7.1	14.9	1.1	0.1	1.2	0.6	0.9	7.1	8.1	8.4
2.9	36.3	5.0	3.2	4.3	3.1	1.7	38.4	68.2	9.4	1.1	6.9	3.3	5.6	52.2	59.9	62.8
0.8	10.3	1.1	0.9	1.2	0.9	0.5	8.7	14.7	2.7	0.4	1.8	0.9	1.6	17.7	20.3	21.2
4.8	80.7	6.7	7.2	9.2	7.1	3.8	59.0	91.5	19.8	4.8	12.8	6.6	12.7	162.6	190.9	198.7
3.2	68.0	4.1	7.1	9.4	7.2	3.8	38.9	50.0	15.0	6.8	10.4	5.5	12.5	191.6	233.8	245.1
1.0	11.9	0.9	1.5	1.8	1.4	0.8	10.9	16.6	3.5	1.2	2.4	1.2	2.6	58.6	73.2	75.3
9.1	169.0	9.3	25.8	37.3	28.2	14.0	117.4	137.7	46.7	24.3	32.3	19.5	42.7	515.6	651.4	676.2
3.8	60.3	3.8	12.2	18.4	13.3	7.0	46.4	47.2	19.8	10.2	12.8	8.7	16.7	138.9	179.7	187.8
47.4	631.3	42.5	175.4	249.6	188.4	106.6	557.9	513.8	253.2	119.6	153.2	112.5	184.9	1161.6	1512.1	1561.6
17.5	182.9	13.0	68.7	87.8	71.1	42.7	183.8	87.2	157.0	36.5	48.9	40.0	53.7	293.9	378.5	381.1
82.3	653.3	55.9	325.8	361.5	322.4	214.6	714.8	584.5	378.0	146.6	198.2	180.3	200.8	953.3	1203.8	1189.1
18.3	116.2	13.1	72.0	69.7	67.5	50.0	131.2	105.1	78.4	31.1	40.9	39.5	39.9	157.7	197.7	191.5
163.5	851.5	123.2	614.1	550.5	552.5	443.9	957.9	779.0	623.0	273.7	343.2	345.0	329.4	1178.1	1423.1	1351.5
24.5	112.0	18.7	87.3	75.5	77.1	65.8	120.4	94.5	82.9	40.4	48.4	50.2	46.0	158.7	186.1	169.5
6.4	5.5	15.9	6.6	7.4	5.6	5.6	6.6	5.8	5.8	5.8	11.4	5.3	5.9	3.2	2.1	3.2
0.0	1.9	0.0	0.4	0.8	0.5	0.1	1.3	0.6	0.3	0.2	0.2	0.2	0.3	37.3	39.8	47.6
5.2	44.8	3.2	67.9	55.1	34.9	45.1	55.3	22.0	53.2	16.8	18.6	23.9	18.3	219.1	238.9	225.0
1.01	1.01	0.98	1.02	1.01	1.01	1.01	1.02	1.03	1.02	1.02	1.02	1.02	1.02	1.07	1.05	1.06
0.68	0.66	0.62	0.69	0.68	0.69	0.68	0.69	0.71	0.69	0.69	0.69	0.69	0.69	0.69	0.70	0.69
0.01	0.02	0.01	0.02	0.04	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.03	0.02	0.01	0.01	0.01
0.05	0.05	0.06	0.04	0.04	0.05	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03
0.10	0.12	0.14	0.10	0.09	0.10	0.10	0.10	0.08	0.10	0.08	0.09	0.09	0.09	0.08	0.09	0.10
0.84	0.86	0.84	0.85	0.85	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.85	0.85	0.82	0.82	0.83
1.14	1.06	1.07	1.11	1.12	1.12	1.13	1.10	1.11	1.11	1.12	1.13	1.11	1.12	1.08	1.08	1.07
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.03	0.03
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
1.14	1.08	1.07	1.12	1.13	1.13	1.14	1.12	1.13	1.12	1.12	1.13	1.12	1.12	1.11	1.12	1.11
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.77	4.75	4.63	4.80	4.80	4.79	4.78	4.81	4.82	4.80	4.81	4.80	4.81	4.80	4.85	4.84	4.85
4.77	4.75	4.63	4.80	4.80	4.79	4.78	4.81	4.82	4.80	4.81	4.80	4.81	4.80	4.85	4.84	4.85

110 TTN-16 ttn-(I)	111 TTN-16 ttn-(I)	112 TTN-16 ttn-(I)	113 TTN-16 ttn-(I)	114 TTN-16 ttn-(I)	115 TTN-16 ttn-(I)	116 TTN-16 ttn-(I)	117 TTN-16 ttn-(I)	118 TTN-16 ttn-(I)	119 TTN-16 ttn-(I)	120 TTN-16 ttn-(I)	121 TTN-16 ttn-(I)	122 TTN-16 ttn-(I)	123 TTN-16 ttn-(I)	124 TTN-16 ttn-(I)	125 TTN-16 ttn-(I)	126 TTN-16 ttn-(I)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
28.4	28.1	28.1	28.2	27.2	27.9	27.9	27.9	27.9	28.5	27.6	26.7	26.6	26.7	26.4	26.8	26.7
25.5	25.5	26.2	25.4	25.6	25.9	25.7	25.7	25.6	26.0	25.7	24.3	24.5	24.2	24.3	24.5	24.5
2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.5	2.4	2.4	2.4	2.2	2.2	2.3	2.2	2.3	2.3
1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.1	1.0	1.0	2.9	2.9	2.7	3.0	2.8	2.9
1.8	2.0	1.9	2.0	2.1	2.3	2.2	2.4	2.2	2.3	2.4	2.5	2.5	2.3	2.4	2.3	2.4
0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	1.1	1.0	0.8	1.0	1.1	1.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.0	90.3	90.7	90.0	89.6	90.9	90.6	91.1	90.5	91.7	90.8	92.5	92.5	91.7	91.9	92.4	92.5
48	46	49	48	91	51	50	53	53	48	52	318	325	319	304	298	306
965	879	820	777	2716	887	857	899	874	911	876	1324	1323	1317	1314	1297	1330
129	141	141	140	173	159	145	171	154	150	198	2387	2412	2335	2511	2482	2411
61	51	51	51	64	51	52	53	50	53	53	47	51	49	50	50	50
5.0	5.2	5.5	4.9	6.0	5.7	5.6	5.9	6.1	6.3	6.3	73.4	72.9	68.6	71.8	69.9	73.4
9.9	10.3	10.8	9.1	15.5	9.7	9.9	9.5	9.0	9.2	9.7	471.3	467.9	399.1	455.1	457.8	456.0
9.8	12.2	13.3	14.0	18.2	17.4	17.7	18.1	18.5	20.0	22.8	407.7	406.2	353.3	373.4	383.4	415.8
71.9	88.0	94.4	102.5	120.3	124.5	124.9	131.8	132.2	140.5	158.5	3404.1	3415.1	3115.0	3249.9	3238.0	3489.4
24.3	29.4	30.9	33.9	38.4	40.8	41.0	43.0	43.3	45.6	50.4	915.7	924.0	874.4	886.3	877.2	928.5
228.2	278.0	283.6	309.3	342.9	368.9	368.9	394.4	390.5	415.3	451.4	7184.3	7303.6	6988.9	6954.9	6890.7	7176.0
285.8	344.4	341.3	371.6	404.6	437.7	440.0	471.7	459.9	495.2	527.6	4367.5	4460.1	4324.3	4236.3	4188.5	4264.7
85.4	99.3	97.0	105.7	117.4	120.1	117.5	124.5	118.3	125.1	132.6	536.9	548.0	529.2	517.6	515.7	522.4
784.5	935.0	907.4	976.3	1040.5	1142.3	1135.9	1235.0	1175.4	1259.8	1333.2	5159.3	5296.9	5062.0	4956.5	4951.9	5029.9
217.2	260.8	250.4	269.9	288.3	316.2	315.0	344.2	326.7	352.1	369.0	835.0	854.2	808.3	802.8	803.8	818.4
1807.5	2166.3	2040.6	2201.2	2348.0	2574.6	2560.8	2796.6	2634.2	2840.7	2978.3	4466.6	4523.4	4219.7	4271.1	4214.2	4374.8
435.4	513.7	477.7	509.2	540.4	588.0	581.0	635.9	587.5	634.0	658.8	746.0	746.9	685.8	707.4	696.4	730.4
1338.7	1565.3	1438.7	1511.2	1576.3	1743.3	1701.1	1869.0	1706.6	1832.3	1905.7	1673.6	1677.3	1531.4	1578.2	1558.9	1647.0
213.5	246.8	224.3	234.4	243.5	268.3	260.9	286.3	256.7	278.3	288.7	203.2	203.1	185.6	190.8	188.6	200.1
1486.4	1680.9	1509.3	1558.0	1628.6	1775.4	1707.5	1882.8	1661.7	1796.5	1850.7	1104.7	1103.8	1015.7	1037.7	1031.3	1091.9
181.3	202.4	177.8	179.6	184.1	203.1	191.8	210.7	183.3	198.4	202.7	104.9	105.2	94.3	97.9	97.6	104.7
4.2	3.0	5.4	3.3	11.7	4.4	3.4	3.2	2.9	2.8	3.1	86.7	86.5	81.0	84.3	85.6	86.2
48.7	61.9	61.5	52.7	73.3	67.3	61.0	67.4	57.1	60.2	66.2	50.7	51.0	37.0	41.9	48.0	51.9
224.5	243.9	238.6	200.8	158.7	248.2	232.5	260.9	228.0	240.5	249.7	7.7	7.9	5.8	7.1	8.2	8.6
1.05	1.05	1.05	1.06	1.06	1.05	1.05	1.05	1.05	1.04	1.05	1.04	1.04	1.05	1.05	1.04	1.04
0.68	0.68	0.70	0.68	0.69	0.69	0.69	0.68	0.68	0.69	0.69	0.64	0.65	0.64	0.65	0.65	0.65
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.07	0.08	0.07	0.08
0.09	0.10	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.10	0.09	0.09	0.09
0.81	0.82	0.83	0.81	0.83	0.83	0.83	0.83	0.83	0.82	0.83	0.83	0.83	0.83	0.83	0.83	0.83
1.08	1.07	1.07	1.08	1.05	1.06	1.06	1.06	1.06	1.07	1.05	1.01	1.00	1.01	1.00	1.01	1.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02
0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.05
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04	0.04	0.04
1.13	1.12	1.11	1.13	1.10	1.11	1.12	1.12	1.12	1.13	1.11	1.12	1.11	1.12	1.11	1.12	1.12
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.83	4.84	4.85	4.84	4.85	4.85	4.84	4.84	4.84	4.83	4.85	4.82	4.82	4.82	4.82	4.82	4.82
4.83	4.84	4.85	4.84	4.85	4.85	4.84	4.84	4.84	4.83	4.85	4.82	4.82	4.82	4.82	4.82	4.82

127 TTN-16 ttn-(I)	128 TTN-16 ttn-(I)	129 TTN-16 ttn-(I)	130 TTN-16 ttn-(I)				59 Sc18 ttn-(II)	60 Sc18 ttn-(II)	61 Sc18 ttn-(II)	62 Sc18 ttn-(II)	63 Sc18 ttn-(II)	64 Sc18 ttn-(II)	65 Sc18 ttn-(II)	66 Sc18 ttn-(II)	67 Sc18 ttn-(II)	68 Sc18 ttn-(II)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
26.9	26.6	27.0	26.7	22.85	31.15	27.65	27.7	28.2	28.1	28.0	28.5	28.3	28.7	29.9	30.1	29.6
24.5	24.4	24.7	24.5	20.66	38.86	29.51	26.0	25.5	26.5	25.9	27.3	27.0	26.9	27.7	27.4	26.7
2.3	2.2	2.3	2.3	0.00	3.65	1.55	2.9	3.1	2.7	2.9	2.4	2.6	2.5	2.3	2.3	2.6
2.9	2.9	2.8	2.8	0.00	3.80	1.26	2.6	2.9	2.3	2.6	1.5	1.8	1.7	1.5	1.5	1.5
2.4	2.4	2.3	2.5	0.03	5.90	2.32	5.3	5.9	5.1	5.0	3.1	3.6	3.1	2.0	0.8	0.7
1.1	1.1	1.2	1.1	0.31	2.30	0.76	0.6	0.5	0.4	0.5	0.3	0.4	0.9	1.0	1.3	1.1
0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.9	92.2	92.8	92.4				96.8	98.0	96.8	96.7	93.9	94.8	94.6	94.8	93.4	92.1
301	305	288	306	45.2	10505.8	502.7	270	250	260	226	242	936	140	105	84	615
1315	1333	1336	1324	777.0	17800.2	1972.6	1862	2171	1623	1870	1554	1683	1856	1869	1970	1882
2370	2350	2486	2404	87.8	2511.3	859.8	441	534	441	569	313	323	284	251	217	223
52	51	54	51	20.4	357.8	50.0	26	24	27	23	27	35	27	25	25	27
70.4	73.0	73.6	71.8	3.9	278.3	33.6	17.2	18.8	15.0	18.0	12.4	12.8	12.4	10.0	8.8	10.2
451.4	446.8	454.7	460.6	9.0	5964.0	395.2	844.1	3605.9	3413.2	464.3	337.7	1192.8	724.9	570.7	769.8	814.8
406.3	424.1	407.6	421.4	0.1	862.5	100.2	53.3	70.7	47.2	59.1	31.4	38.3	29.7	20.0	4.5	4.1
3406.8	3527.0	3406.8	3506.6	0.4	3527.0	796.8	357.7	469.5	341.5	406.2	205.2	256.1	188.2	127.1	32.7	30.1
913.9	931.3	896.4	923.1	0.1	931.3	210.0	99.2	125.6	98.8	115.3	60.4	73.6	54.0	33.2	9.8	9.1
7129.2	7147.6	6826.5	6969.0	0.7	7303.6	1630.3	777.2	969.8	791.8	904.7	494.6	601.9	444.4	255.1	78.5	76.3
4227.1	4072.0	3873.8	3890.9	0.6	4460.1	1042.4	648.7	811.2	697.3	782.7	469.8	556.0	415.7	221.1	72.1	73.8
515.7	494.6	466.1	473.3	0.2	548.0	141.1	102.3	131.4	107.9	125.1	64.3	80.0	65.2	34.9	11.9	10.6
4995.1	4758.3	4490.4	4571.2	2.1	5296.9	1712.2	1780.0	2156.2	1873.6	2030.5	1247.8	1469.0	1167.1	626.7	208.3	212.0
813.9	783.6	741.4	765.9	1.1	1386.4	403.0	617.5	744.7	654.2	700.9	444.7	516.5	417.5	225.7	78.9	79.1
4369.3	4246.3	4022.5	4248.5	16.2	10432.4	3246.7	6386.0	7519.2	6578.7	6945.7	4172.9	5000.6	4029.8	2248.0	830.4	798.3
731.3	723.0	689.1	737.4	6.9	1961.7	712.3	1595.6	1802.0	1558.0	929.5	1102.0	949.6	555.1	227.7	200.7	200.7
1662.6	1643.3	1577.2	1690.8	39.0	5063.4	2013.6	4551.0	5037.3	4284.9	4244.5	2470.9	2904.0	2622.3	1605.7	761.6	625.8
202.5	200.2	193.1	206.4	10.5	712.9	281.6	601.0	665.5	569.8	553.8	340.7	398.1	364.8	234.0	129.8	103.1
1106.5	1095.5	1055.2	1124.4	109.0	4040.8	1681.9	3523.3	3840.8	3293.9	3160.9	1942.4	2277.3	2118.6	1438.7	913.9	704.2
106.4	104.7	101.3	107.7	18.4	387.8	174.8	352.3	372.7	314.7	292.1	169.2	204.3	202.8	145.4	109.1	80.8
83.8	84.5	88.5	85.2	2.1	331.2	27.3	8.8	12.9	8.8	11.7	7.5	8.3	7.7	7.5	6.5	7.3
52.8	50.9	47.2	52.2	0.0	146.5	28.3	28.8	40.5	33.8	31.4	9.8	13.9	12.8	5.3	1.3	0.7
9.1	8.8	8.6	8.9	3.2	260.9	76.4	61.8	97.4	54.6	54.3	16.8	27.5	30.6	23.2	36.4	35.9
1.04	1.05	1.04	1.04	0.98	1.20	1.03	1.00	0.99	1.00	1.00	1.02	1.01	1.01	1.01	1.01	1.02
0.65	0.65	0.65	0.65	0.56	0.98	0.77	0.66	0.64	0.67	0.66	0.71	0.69	0.69	0.71	0.70	0.69
0.02	0.02	0.02	0.02	0.00	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
0.08	0.08	0.07	0.07	0.00	0.10	0.03	0.07	0.07	0.06	0.07	0.04	0.05	0.04	0.04	0.04	0.04
0.09	0.09	0.09	0.09	0.00	0.14	0.06	0.11	0.12	0.11	0.12	0.10	0.10	0.10	0.09	0.09	0.10
0.83	0.83	0.83	0.83	0.74	0.99	0.87	0.85	0.84	0.85	0.85	0.84	0.85	0.85	0.85	0.86	0.85
1.01	1.00	1.01	1.00	0.90	1.14	1.02	1.01	1.01	1.02	1.02	1.05	1.04	1.05	1.09	1.10	1.09
0.02	0.02	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
0.05	0.05	0.04	0.05	0.00	0.11	0.04	0.09	0.10	0.09	0.09	0.06	0.07	0.06	0.04	0.01	0.01
0.04	0.04	0.04	0.04	0.00	0.04	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.00	0.00
1.12	1.11	1.12	1.11	1.00	1.17	1.09	1.13	1.15	1.14	1.14	1.13	1.12	1.13	1.13	1.12	1.11
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.82	4.83	4.82	4.82	4.63	5.05	4.88	4.82	4.78	4.80	4.81	4.83	4.81	4.82	4.81	4.81	4.80
4.82	4.83	4.82	4.82	4.63	5.05	4.88	4.82	4.78	4.80	4.81	4.83	4.81	4.82	4.81	4.81	4.80

American Mineralogist: April 2025 Online Materials AM-25-49378
BRUGGER ET AL.: CO-MOBILITY OF TI-REE-NB-AS DURING METAMORPHISM

69 Sc18 ttn-(II)	70 Sc18 ttn-(II)	71 Sc18 ttn-(II)	72 Sc18 ttn-(II)	73 Sc18 ttn-(II)	74 Sc18 ttn-(II)	75 Sc18 ttn-(II)	76 Sc18 ttn-(II)	77 Sc18 ttn-(II)	78 Sc18 ttn-(II)	79 Sc18 ttn-(II)	80 Sc18 ttn-(II)	81 Sc18 ttn-(II)	82 Sc18 ttn-(II)	83 Sc18 ttn-(II)	84 Sc18 ttn-(II)
29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64	29.64
29.8	27.6	27.9	29.0	27.5	27.5	28.7	28.2	27.3	27.5	27.4	27.1	28.3	27.4	27.5	27.4
27.0	25.6	25.6	26.7	25.1	25.1	25.2	25.5	25.4	25.0	25.2	25.4	25.5	25.4	25.3	25.3
2.5	3.1	3.0	2.6	3.1	3.1	3.2	3.0	3.1	3.2	3.1	2.8	2.7	2.9	2.8	2.8
1.6	2.8	2.7	1.8	3.0	2.9	2.9	2.6	2.9	2.9	2.7	2.8	2.9	2.8	2.7	2.8
2.8	5.1	4.9	3.7	5.2	5.1	5.1	4.9	5.1	5.1	4.9	4.6	4.7	4.7	4.6	4.6
0.6	0.6	0.5	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95.2	96.5	96.5	95.4	96.5	96.2	97.8	96.6	96.4	96.2	95.8	95.0	96.6	95.6	95.2	95.3
562	256	251	385	263	262	284	296	266	265	297	250	254	229	224	230
3698	2057	2025	1982	2142	2155	2542	2080	2200	2180	1975	2078	1995	2163	2016	2035
347	603	551	373	602	602	604	610	606	618	597	591	584	595	587	551
31	24	24	33	23	24	26	24	24	23	25	26	26	25	25	25
14.8	17.7	19.1	26.9	20.1	18.7	22.0	20.2	19.2	20.0	18.9	19.5	20.2	18.5	18.6	19.2
504.6	596.4	385.4	271.6	415.6	334.9	376.2	669.8	366.1	339.8	357.8	362.8	386.3	373.4	385.4	415.6
29.8	59.6	60.5	39.9	66.7	63.5	65.2	59.3	62.7	65.6	65.4	71.1	73.2	66.8	65.1	67.9
190.8	418.7	416.6	287.3	452.6	436.3	448.3	415.0	434.7	447.7	452.3	469.3	485.4	445.3	431.2	444.7
49.8	118.3	117.5	86.0	125.9	123.0	125.8	118.5	123.1	125.4	127.7	126.3	132.2	120.8	118.1	120.4
409.2	935.0	925.8	701.9	987.3	967.1	990.9	946.0	976.3	986.3	1002.9	968.0	1013.0	924.9	904.7	913.9
368.8	809.3	796.4	636.8	846.9	838.6	852.4	825.8	845.0	846.0	861.6	792.7	823.0	757.9	745.0	736.8
58.6	133.0	129.6	94.4	142.4	140.8	144.5	133.7	142.5	143.9	140.4	131.8	135.3	126.8	121.4	122.0
1023.1	2129.6	2064.5	1645.1	2243.4	2239.7	2263.6	2186.5	2262.6	2249.8	2248.9	2025.0	2084.6	1936.0	1910.3	1892.0
368.8	732.2	709.3	571.6	765.2	762.5	776.2	752.4	777.2	770.7	768.9	687.2	706.5	660.6	652.3	641.4
3569.2	7184.3	6899.9	5404.3	7422.9	7321.9	7477.9	7230.2	7441.2	7413.7	7318.3	6578.7	6771.4	6413.6	6376.9	6340.2
841.4	1641.5	1577.2	1158.8	1679.1	1650.6	1676.3	1604.8	1659.8	1657.1	1615.8	1476.3	1515.8	1479.1	1457.0	1460.7
2335.1	4376.6	4193.1	3016.9	4415.2	4365.6	4449.1	4239.0	4381.2	4358.3	4223.4	3889.4	4029.8	3970.2	3928.0	3972.0
331.2	576.2	552.4	410.8	579.1	571.0	580.9	553.3	575.3	571.4	552.7	513.2	528.0	527.8	518.3	525.4
1934.2	3285.7	3165.5	2325.9	3323.3	3253.6	3322.4	3147.1	3271.9	3269.2	3120.5	2943.5	3015.0	3052.6	2979.2	3031.5
183.0	304.5	290.9	201.2	308.8	300.2	306.8	284.4	301.2	304.4	284.5	273.9	280.5	287.4	278.7	286.7
28.9	10.3	10.6	8.7	10.4	11.0	10.7	13.1	10.6	10.4	10.9	10.9	12.1	10.1	12.1	11.0
10.1	35.0	32.3	14.5	38.8	37.0	39.8	44.1	39.7	40.0	39.6	32.6	34.3	29.7	29.9	31.5
28.5	60.7	57.3	27.3	66.0	61.5	65.1	61.8	64.5	65.3	60.6	59.1	61.7	58.1	58.5	63.9
1.00	1.01	1.00	1.01	1.01	1.01	0.99	1.00	1.01	1.01	1.01	1.02	1.00	1.01	1.02	1.02
0.69	0.65	0.65	0.68	0.64	0.64	0.63	0.65	0.65	0.64	0.65	0.66	0.65	0.65	0.65	0.65
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.04	0.07	0.07	0.05	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
0.10	0.12	0.12	0.10	0.13	0.13	0.13	0.12	0.13	0.13	0.12	0.11	0.11	0.12	0.11	0.11
0.84	0.86	0.85	0.84	0.85	0.85	0.84	0.84	0.86	0.85	0.85	0.85	0.84	0.85	0.85	0.85
1.08	1.00	1.01	1.05	1.00	1.00	1.03	1.02	0.99	1.00	1.00	1.00	1.03	1.01	1.01	1.01
0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
0.05	0.09	0.09	0.07	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.09	0.09	0.08	0.08
0.01	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
1.14	1.13	1.13	1.14	1.13	1.13	1.15	1.14	1.12	1.13	1.13	1.12	1.14	1.12	1.13	1.12
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.78	4.81	4.81	4.80	4.81	4.81	4.78	4.80	4.82	4.81	4.82	4.83	4.80	4.82	4.82	4.82
4.78	4.81	4.81	4.80	4.81	4.81	4.78	4.80	4.82	4.81	4.82	4.83	4.80	4.82	4.82	4.82