



**Ontario Geological Survey
Open File Report 6022**

**Tantalum Mineralogy of
Rare-Element Granitic
Pegmatites from the
Separation Lake Area,
Northwestern Ontario**

2000



ONTARIO GEOLOGICAL SURVEY

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Tantalum Mineralogy of Rare-Element Granitic Pegmatites from the Separation Lake Area, Northwestern Ontario

by

A.G. Tindle and F.W. Breaks

2000

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Tindle, A.G. and Breaks, F.W. 2000. Tantalum mineralogy of rare-element granitic pegmatites from the Separation Lake area, northwestern Ontario; Ontario Geological Survey, Open File Report 6022, 378p.

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Abstract

The Separation Lake area is host to the most important rare-element pegmatites in Ontario. They include the Big Whopper and Big Mack petalite pegmatite systems, which potentially represent the world's second largest lithium deposit (of this type). The Separation Rapids pluton is considered to be the source of the rare-elements and the pegmatites occur in two distinct clusters adjacent to it. Beryl-type and complex-type, petalite-subtype pegmatites are the most common, and a few pegmatites have characteristics similar to the lepidolite-subtype. This study has revealed a wide range of tantalum mineral species that include; ferrocolumbite, ferrotantalite, manganocolumbite, manganotantalite, ferrotapiolite, ixiolite, strüverite, wodginite, ferrowodginite, titanowodginite, ferrotitanowodginite, microlite, bismutomicrolite, stibiomicrolite, stibiobetafite, uranmicrolite, ytropyrochlore, cassiterite and a potentially new species—a tungsteniferous variety of wodginite. Zonation patterns seen in backscattered electron images show crystallization of these minerals was not a simple process and many reactions, overgrowths and exsolution phenomena have been documented. These variations are interpreted as primary magmatic features, as secondary features related to extreme fractionation involving the late stage development of albitic units, and as evidence for interaction of hosts rocks with the pegmatite magma. In some cases, these processes elevated the tantalum content of individual minerals to extreme compositions.

Precambrian Geology

Tantalum mineralogy of rare-element granitic pegmatites from the Separation Lake area, northwestern Ontario

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Introduction

The purpose of this report is to document a large dataset (almost 4000 analyses) of electron microprobe analyses collected over a six-year period from tantalum-bearing minerals found in the Separation Lake area. In total, over 200 samples of granite and related aplites and pegmatites were examined. Evidence is presented that indicates the Separation Rapids pluton is the source of the tantalum (and other rare elements). Both pluton and pegmatites outcrop within the Bird River – Separation Lake metavolcanic belt, the extension of which contains the world-famous Tanco pegmatite, in Manitoba. Limited data is also presented from the Treelined Lake Complex, a S-type granite located nearby in the English River Subprovince. By far the bulk of the data are from the pegmatites themselves and these are broadly divided into beryl pegmatites and petalite pegmatites. Generally, beryl-type pegmatites are found closer to their parent granite and are less fractionated than their complex-type, petalite subtype petalite counterparts. At Separation Lake, the situation is more complex and, although petalite pegmatites do have very evolved compositions, it is a beryl-type pegmatite (at location 93-265) that is considered the most fractionated. This is thought to be due to localized concentrations of volatile species, particularly fluorine, in the pegmatite melt.

Earlier work on these minerals has been presented by Tindle, Breaks and Webb (1998): wodginite species from the eastern subgroup; Tindle and Breaks (1998): a full range of tantalum species, but from a smaller dataset; and Tindle and Breaks (in press): columbite-tantalite group species. Additional publications that contain information on tantalum mineralization at Separation Lake include Breaks (1993); Breaks and Tindle (1994); Breaks and Tindle (1996); Breaks and Tindle (1997); Breaks, Tindle and Smith (1999b); and Breaks and Tindle (submitted).

Ideal compositions of the tantalum-bearing minerals found in the Separation Lake area are listed below and should be viewed together with means, standard deviations and the locations of those samples with maximum and minimum Ta₂O₅ contents (Table 1).

Columbite-Tantalite Group

Ferrocolumbite	FeNb ₂ O ₆
Ferrotantalite	(Fe>Mn)(Ta>Nb) ₂ O ₆
Manganocolumbite	MnNb ₂ O ₆
Manganotantalite	MnTa ₂ O ₆
Ferrotapiolite	FeTa ₂ O ₆
Ixiolite	(Ta,Nb,Sn,Fe,Mn) ₄ O ₈
Strüverite	(Ti,Ta,Fe ³⁺) ₃ O ₆

Wodginite Group

Ferrowodginite	Fe ²⁺ SnTa ₂ O ₈
Wodginite	MnSnTa ₂ O ₈
Ferrotitanowodginite	Fe ²⁺ TiTa ₂ O ₈
Titanowodginite	MnTiTa ₂ O ₈
Un-named tungsteniferous wodginite	possibly (LiMn ₃)(Fe ³⁺ ₃ Sn)(W ₄ Ta ₄)O ₃₂

Pyrochlore Group

Microlite	(Ca,Na) ₂ (Ta) ₂ O ₆ (O,OH,F)
Stibiomicrolite	(Sb,Ca,Na) ₂ (Ta,Nb) ₂ O ₇
Stibiobetafite	(Sb,Ca) ₂ (Ti,Nb,Ta) ₂ (O,OH) ₇
Bismutomicrolite	(Bi,Ca)(Ta,Nb) ₂ O ₆ (OH)
Uranmicrolite	(U,Ca,Ce) ₂ (Ta,Nb) ₂ O ₆ (O,OH)
Ytropyrochlore	(Y,Na,Ca,U) ₁₋₂ (Nb,Ta,Ti) ₂ (O,OH) ₇
Cassiterite	SnO ₂

Figure 1 illustrates the relative importance of these minerals in terms of both their tantalum content (minerals sorted in increasing Ta₂O₅ order) and presence in a wide range of samples. Note the logarithmic scale on the x-axis. Figure 1 summarizes the entire dataset of nearly 4000 analyses and shows, that for this study, columbite-tantalite group minerals were the dominant species, with cassiterite encountered nearly as often. Ferrotapiolite, pyrochlore group minerals and wodginite group minerals were encountered less frequently, the latter group being found hardly at all in the southwestern subgroup pegmatites. Strüverite and ixiolite have limited distribution and are of little importance. Apart from cassiterite, all these minerals can contain high levels of tantalum, with ferrotapiolite, pyrochlore group minerals (e.g., microlite) and columbite-tantalite group minerals (e.g., manganotantalite) capable of exceeding 80 wt % Ta₂O₅. With cassiterite, bulk analysis may reveal much higher Ta levels than indicated here, as inclusions of other tantalum species are often found in this mineral.

Table 2 documents the mineral associations from the major groups of granites and pegmatites, highlighting the rarer occurrences. The Fe- and Mn-suites are based on columbite-tantalite compositions and are described more fully later.

The distribution of the various tantalum-bearing minerals within the Separation Rapids pegmatite group are shown in Figures 2 to 8.

The electron microprobe analyses are in Appendix B. All pertinent data are supplied in these tables, however, additional information is available only on the Miscellaneous Release-Data (i.e., the electronic version of Appendix B).

Experimental Methods and Presentation of Data

Mineral analyses were obtained in the Department of Earth Sciences at The Open University over a period of 6 years. Initially, a Cambridge Instruments Microscan 9 (M9) electron microprobe equipped with two wavelength dispersive spectrometers was used. Data correction was achieved with proprietary ZAF correction software. Calibration standards and X-ray lines measured were: synthetic LiF (F K α), jadeite (Na and Al K α), forsterite (Mg K α), wollastonite (Si and Ca K α), synthetic KCl (K K α), rutile (Ti K α), Mn metal (Mn K α), fayalite (Fe K α), cassiterite (Sn L α), synthetic FeNb₂O₆ (Nb L α), synthetic NaTaO₃ (Ta M α), synthetic WO₃ (W M β), galena (Pb M α), synthetic ThO₂ (Th M α) and UO₂ (U M β). Sc (K α), Sb (L α) and Bi (L α) were measured in some samples and calibrated against pure metal standards. Although the W M β line has a potential interference from a second-order Sn line, the interference was shown to be insignificant at concentrations of less than 12% SnO₂. An operating voltage of 20kV and probe current of 30nA (measured on a Faraday cage) were used. Count times varied from 20 to 50 seconds per element. In 1996, the M9 microprobe was replaced with a Cameca SX100 microprobe fitted with four wavelength spectrometers and the analytical conditions were revised to an operating voltage of 20kV and probe current of 20nA. A "PAP" correction procedure was used (Pouchou and Pichoir 1985). New standards were also obtained at this time (mainly from Astimex Ltd.) and replaced some of those previously used, for example, feldspar (Al, Si and K K α), ScPO₄ (Sc K β), bustamite (Mn and Ca K α), hematite (Fe K α), YPO₄ (Y L α), stibnite (Sb L α), Bi₂Se₃ (Bi L α), Ta metal (Ta M α) and crocoite (Cr K α and Pb M α). Synthetic WO₃ continued to be used, but now with the W M α line. Approximately 85% of all data presented here were obtained using the Cameca SX100 microprobe. Data obtained on the M9 microprobe were mainly from eastern subgroup pegmatites. All backscattered electron images were obtained on the SX100 microprobe.

Li, Fe²⁺ and Fe³⁺ contents of wodginites were estimated using the method of Ercit et al. (1992b). Further details are published in Tindle, Breaks and Webb (1998). Microsoft Excel™ spreadsheets that perform this calculation and structural formulae calculations for columbite–tantalite and pyrochlore species are available from the following web address:

http://exodus.open.ac.uk/earth/indiv_home_pages/A_Tindle/Probe/ProbeLab.html

Coloured backscattered electron images of some tantalum minerals from the Separation Rapids pegmatites are also on this site under “Mineral Chemistry” at

http://exodus.open.ac.uk/earth/indiv_home_pages/A_Tindle/AGTWebPages/AGTHome.html

Columbite-Tantalite Group Minerals

Minerals of the columbite–tantalite group are the most common Nb–Ta species in rare–element pegmatites and have the general formula of AB₂O₆ in which the A position is occupied mostly by Fe²⁺ and Mn²⁺ and the B position mostly by Nb⁵⁺ and Ta⁵⁺. The end–members ferrocolumbite (FeNb₂O₆), manganocolumbite (MnNb₂O₆) and manganotantalite (MnTa₂O₆) are all orthorhombic minerals as is ferrotantalite ((Fe>Mn)(Ta>Nb)₂O₆). This latter species, however, is not an end–member. The end–member composition FeTa₂O₆ belongs to ferrotapiolite, a tetragonal species of the tapiolite series. All these species can be represented on the columbite–tantalite quadrilateral (*see* Figures 9 to 13).

The columbite–tantalite quadrilateral is now used extensively to illustrate fractionation trends in the rare–element class of pegmatites (summary in Černý and Ercit 1985). A preliminary generalized summary (Černý 1989a, 1992) indicates that the evolution of individual types of rare–element pegmatites follow different paths when their compositions are plotted on the columbite–tantalite quadrilateral (Figure 9). This fractionation behaviour may be strongly influenced by the activity of fluorine (Černý 1992; Uher et al. 1994; Abella, Corbella and Melgarejo 1995; Spilde and Shearer 1992). Beryl–type pegmatites from Yellowknife, Northwest Territories, Canada represent one such fluorine–poor system, where the fluorine–rich minerals microlite and lepidolite are either scarce or absent and where fractionation progressed from ferrocolumbite to niobian ferrotantalite, ixiolite and ferrotapiolite (Wise, Meintzer and Černý 1986). Throughout the following discussion of the columbite–tantalite group, the abbreviations $X_{Mn} = Mn/(Mn+Fe)$ and $X_{Ta} = Ta/(Ta+Nb)$ are used.

Complex–type pegmatites, characterized by the presence of substantial quantities of lithium aluminosilicates, represent the other major group of rare–element class pegmatites. These span a wide range of compositions with the spodumene subtype (e.g., Tin Mountain pegmatite, South Dakota: Walker et al. 1986) perhaps the most common variety. Changing bulk chemistry and *P–T* conditions (increasing temperature and decreasing pressure) results in the formation of petalite, lepidolite and amblygonite subtypes—all noted for reflecting a high activity of fluorine. This seems to be a prerequisite for effective Fe–Mn fractionation to high Mn compositions (Figure 9; Černý 1989a, 1992)—a particularly pronounced feature of lepidolite subtype pegmatites (e.g., Brown Derby, Colorado: Heinrich 1967). The high fluoride salinity ± increased μHF in lepidolite subtype pegmatites modifies the mineralogy of Nb, Ta oxides strongly in favour of microlite and also leads to the crystallization of extremely manganese–rich garnets and phosphates (Černý 1989a).

The Separation Rapids pegmatites are beryl type and complex type (petalite subtype), although a few pegmatites (such as the Swamp pegmatite and part of the Big Whopper pegmatite) have characteristics similar to complex type, lepidolite–subtype pegmatites (e.g., $X_{Mn} \approx 1$). The entire columbite–tantalite dataset from the Separation Lake area (1758 analyses) is plotted on Figure 10a and indicates a much more complex situation than that described previously by Tindle and Breaks (1998). Also shown on Figure 10a is the entire ferrotapiolite dataset.

Tindle and Breaks (1998) describe ferrocolumbite from the Separation Rapids pluton as being the most primitive in the complex (open squares on Figure 10b). The larger dataset illustrated in Figure 10b shows a broader range of predominantly ferrocolumbite compositions and includes samples from near the southern margin (filled diamonds) which has been shown to be the most evolved part of the intrusion (Breaks and Tindle 1994). Also in close proximity to the southern margin of the pluton, at locality 93-260, Li mica-cleavelandite pods (3 samples: open triangles, diamonds and circles on Figure 10b) containing alluaudite $\text{NaCaFe}_{2+}(\text{Mn,Fe,Mg})_2(\text{PO}_4)_3$ are found in a pegmatitic mass within the pluton. The data crossing the ferrotantalite-manganotantalite boundary (open triangles) are from inclusions in large cassiterite grains (2 to 6 mm in length), whereas the other two samples are from discrete manganocolumbite and manganotantalite grains.

Figure 10b also shows data from the Treelined Lake granitic complex, which, if Breaks and Tindle's (1997) contention that this was the source of the Separation Rapids pluton is correct, might be expected to be of very primitive ferrocolumbite composition. The data are, however, from a miarolitic cavity within an *in situ* cassiterite-topaz, sodic pegmatite segregation and is mainly of manganocolumbite composition. No columbite-tantalite was found elsewhere in the Treelined Lake granite itself.

The above primitive columbite-tantalite compositions suggest that the Separation Rapids pluton may indeed have been the source of the pegmatites, but that it also fractionated internally and, in a similar way to the miarolitic cavities from the Treelined Lake granitic complex, the Li mica-cleavelandite pods are interpreted as fluid-enriched "pockets" within the magma, the exact nature of which are not fully understood.

The beryl pegmatites (Figure 11) are the next group in the peraluminous fractionation sequence of Breaks and Tindle (1997). It has previously been established that they divide into two main groups termed the Fe-suite and Mn-suite by Tindle and Breaks (1998). In Figures 11a and 11b, the eastern and southwestern (SW) pegmatite subgroups are shown with Fe-suite samples on the left of the diagrams and Mn-suite samples on the right. For the Fe-suite eastern subgroup pegmatites there is a gradual increase in X_{Mn} with increasing X_{Ta} , but this is less well defined in the SW subgroup pegmatites. A subset of the Fe-suite SW subgroup samples define a cluster on Figure 11b (open triangles) with low X_{Mn} (0.05 to 0.10). These samples (96-9 and 96-81) are spatially associated with a Cs anomaly in adjacent host rocks (Figure 2) and co-exist with ferrotapiolite.

Mn-suite beryl pegmatites have a more restricted occurrence than their Fe-suite counterparts, but potentially are of more interest, as they have been shown to concentrate Ta to a greater extent (Ta_2O_5 reaches 82.99 wt % in manganotantalite from sample 93-265AM).

In the eastern subgroup (Figure 11a), three Mn-suite pegmatites or aplites have been found: an internal (to the Separation Rapids pluton) garnet-muscovite-quartz-albite aplite (location 93-263); an external pegmatite, proximal to the pluton, at location 93-265; and a more distal topaz-garnet-muscovite aplite at location 94-304. Metasomatic selvages, which developed in mafic metavolcanic host-rocks around the aplites (in particular at location 94-304), contain excessively high fluorine levels (5 to 8.5 wt % F in bulk samples) and indicate crystallization of the aplites was from a fluorine-rich source. Of these three samples, it is only the pegmatite at location 93-265 that is a sizeable intrusion, and of further interest because of its zonation and development of Li mica-cleavelandite pods (host to manganotantalite with the extreme Ta content described above).

In the SW subgroup, Mn-suite pegmatites are also uncommon. Two occurrences are of minor importance: 97-10A, a 1 m thick garnet-fluorapatite-muscovite-chrysoberyl aplite, and 96-86A from a Li mica-fluorapatite-cleavelandite pod in a 250 by 300 m small stock of pegmatitic leucogranite and potassic

pegmatite. A third occurrence of Mn-suite pegmatite at the Wolf zone (discovered by A. Pryslak and S. Sears of Champion Bear Resources in the summer of 1999) appears to be more substantial.

In comparison with beryl-type pegmatites from elsewhere in the world (Figure 9), it is the columbite-tantalite compositions of the Fe-suite beryl samples that appear to be most typical. Mn-suite beryl pegmatites from Separation Rapids appear to be unusual, however, the presence of ferrocolumbite and ferrotantalite inclusions in topaz from sample 94-304, a Mn-suite aplite, provides a crucial link between Fe-suite and Mn-suite pegmatites (two solid circles on left side of Figure 11a). It is likely that the inclusions crystallized early, possibly before intrusion of the pegmatite magma, and were protected from further change during late-stage melt evolution by being encased in topaz. Other columbite-tantalite grains in this sample appear to have crystallized directly from the increasingly fluorine-rich melt and have manganocolumbite compositions (right side of Figure 11a).

The eastern subgroup petalite pegmatites were shown to be the most evolved members of the peraluminous fractionation sequence as defined by Breaks and Tindle (1997) on the basis of potassium-feldspar data. Columbite-tantalite data from the eastern subgroup Fe-suite and Mn-suite petalite pegmatites (Tindle and Breaks 1998) have been supplemented with new data and three distinct groupings have now emerged (Figures 12a and 12b). The first group, represented by Pegmatites 9 and 10, have X_{Mn} values around 0.15, similar to the Separation Rapids pluton and consistent with derivation from that pluton. The second group, comprising Lou's, James' and pegmatites 1, 5, 7, 8 and 11, are offset to higher X_{Mn} (0.30) and presumably were released from a similar source to that which produced the evolved pluton composition (as represented by sample 94-29). The third group of data (Figure 12b) is from Marko's pegmatite, the largest petalite pegmatite of the eastern subgroup, and the only one belonging to the Mn-suite. Marko's pegmatite is unusual in having two well-defined trends in which variation in X_{Ta} is initially suppressed and varies from $X_{Mn} = 0.40$, $X_{Ta} = 0.15$ to $X_{Mn} = 0.8$, $X_{Ta} = 0.25$ and from which a second trend continues "almost vertically" (relatively static X_{Mn}) upward to $X_{Ta} = 0.70$. An initial melt of relatively primitive composition similar to that from the second group of Fe-suite petalite pegmatites is indicated for Marko's pegmatite on the evidence of the columbite-tantalite data. The flat trend (constant X_{Ta}) is defined by samples from the layered pegmatite-aplite unit of Marko's pegmatite (i.e., one of the outer, earlier crystallizing units of the pegmatite) and could reflect the fact that garnet (the principal iron-bearing and manganese-bearing mineral in these rocks) crystallized contemporaneously with the ferrocolumbite-manganocolumbite. When garnet crystallization terminated, there was a local decoupling of Fe and Mn from Nb and Ta, and fractionation continued to produce the vertical (constant X_{Mn}) manganotantalite trend—a trend defined by samples from the inner, petalite-rich core zone of the pegmatite. Marko's pegmatite follows a trend of enrichment similar to other pollucite-bearing pegmatites worldwide (Černý 1989a), and clearly indicates Mn-suite pegmatites are the most likely candidates to be associated with anomalously high concentrations of cesium (and rubidium).

A factor that may have played a role in increasing the Fe content of the early crystallized columbite-tantalite at Marko's pegmatite is interaction with metavolcanic and banded iron formation host rocks. Tindle, Breaks and Webb (1998) concluded that the exotic mineralogy (including titanowodginite, ferrotitanowodginite and stibiobetafite) of the wall zone of Marko's pegmatite could not be explained by normal crystal fractionation processes and suggested there had been influx of Fe and Ti from the host rocks into the pegmatite melt. This is the likely cause for some of the scatter in the ferrocolumbite data and iron-rich manganotantalite compositions in the more evolved samples from Marko's pegmatite (Figure 12b). In comparison with petalite pegmatites from other locations worldwide, it is Marko's pegmatite that appears to be most typical (Figure 9).

Data from the SW subgroup petalite pegmatites are more difficult to interpret as they have a wide compositional range and little obvious systematic behaviour (Figures 13a and 13b). This is somewhat unfortunate as the two giant Separation Rapids pegmatites, the Big Mack and Big Whopper pegmatites,

both belong to this group. Of the two, the Big Mack pegmatite (and close neighbour, the Zone 11 pegmatites) appear to have crystallized from a more primitive, relatively fluorine-poor, parental composition and like most Separation Rapids pegmatites, fractionation within individual samples produced limited X_{Mn} , but broad X_{Ta} variations. There does, however, appear to be a continuum from Big Mack compositions into those from the Big Whopper pegmatite and it is not inconceivable that the Big Mack is a precursor to the Big Whopper pegmatite. Columbite-tantalite variation in the Big Whopper pegmatite is discussed further in Tindle and Breaks (in press). In summary, the most primitive compositions are from a ferrocolumbite-eucryptite ($LiAlSiO_4$)-bearing sodic pegmatite sample (97-185A) collected near the northern contact of the Big Whopper pegmatite and from a borehole sample (DC97-8-57) belonging to Unit 4 of Avalon Ventures Ltd ($X_{Mn} = 0.25-0.35$; $X_{Ta} = 0.05-0.10$). The bulk of the Big Whopper pegmatite progressively evolved from manganese-rich ferrocolumbite ($X_{Mn} = 0.40$; $X_{Ta} = 0.15$) to manganocolumbite ($X_{Mn} = 0.90$; $X_{Ta} = 0.50$) compositions and variation continued to manganotantalite compositions ($X_{Mn} = 0.90$; $X_{Ta} = 0.75$). This was followed with the intrusion of a lepidolite-quartz-albite-topaz unit (Unit 6D of Avalon Ventures Ltd.) which has manganocolumbite-manganotantalite compositions with extreme Mn-enrichment ($X_{Mn} = 0.97$; $X_{Ta} = 0.40-0.75$) characteristic of complex-type, lepidolite-subtype pegmatites (Černý 1991, 1992). Sample 97-BW5 (solid squares on Figure 12a) was collected from a loose block over the Big Whopper and its anomalous position on Figure 12a raises doubts to its parentage. Interestingly, at location EFR-6059, halfway between the Big Mack and Big Whopper pegmatites and on Emerald Fields Resource Corporation property, an outcrop of petalite pegmatite containing manganotantalite with relatively high Ta_2O_5 contents (60 to 69 wt %) has been found. With further sampling, this area should help to establish more fully any link between the two giant pegmatites.

The remaining SW subgroup petalite pegmatites form a disparate group that cross the Fe-suite and Mn-suite boundary (Figure 13b). Perhaps most important of these is the Glitter pegmatite that currently defines the western extension of the Big Mack system and has similar ferrocolumbite-ferrotantalite compositions to the Big Mack and Zone 11 pegmatites. It occurs 5 km away from the Separation Rapids pluton and 14 km away from the most distal eastern petalite pegmatites. The Glitter pegmatite is highly deformed, exhibiting isoclinal folding similar in style to that of the Big Mack and Big Whopper pegmatites (Breaks and Tindle 1997; Breaks, Tindle and Smith 1999b).

High Ta concentrations in columbite-tantalite are further reported from the Great White North and Swamp pegmatites, both of which belong to the Big Whopper system. The latter pegmatite has chemical affinities with the lepidolite unit of the Big Whopper and its manganocolumbite-manganotantalite has the highest mean Ta_2O_5 content of all pegmatites from the Separation Lake area (mean 60.19 wt %).

A summary of mean Ta_2O_5 contents of columbite-tantalite group minerals from all samples analyzed in this work is presented in Table 3. This summary (and others) should be examined with a little caution as the data coverage is not systematic or directly comparable from one pegmatite to another. Marko's pegmatite, for instance, has been examined in more detail than any other pegmatite for reasons other than its columbite-tantalite content (i.e., because it is the only Separation Rapids pegmatite to contain the Cs mineral pollucite, and because it hosts extremely rare Ta species—ferrotitanowodginite, titanowodginite, tungsteniferous wodginite and stibiobetafite). Another important consideration is that, whereas most columbite-tantalite occurs as discrete grains, it can also occur as inclusions in other minerals. In many cases, cassiterite is the host mineral, where beneficiation may be problematical (e.g. some of the data from 93-260C, 94-15A, 94-304C, 94-Peg7B, 96-13B, 96-29D, 96-53A, 96-AT5, 97-1, 97-BW5, 97-BW7B, 97-P10-3, 97-WP3, 99-ATZ11, 99-GZ4 and 99-GZ5).

Another variable to consider is that columbite-tantalite invariably forms zoned crystals (Photos 1, 2 and 3) and this can have a marked effect on Ta content. A range of 20.7 to 40.7 wt % Ta_2O_5 is recorded in a single crystal of ferrocolumbite from a Zone 11, SW subgroup, Fe-suite petalite pegmatite (99-ATZ11;

Photo 1d). An even greater range of 23.7 to 69.0 wt % Ta₂O₅ is recorded in SW subgroup, Mn-suite petalite pegmatite (EFR-6059). The origins of zonation are complex and are covered in considerable detail in Tindle and Breaks (in press). In summary, there are two basic types of zonation:

1. Oscillatory zonation is caused by fluctuating magmatic conditions in which Ta (and other elements) become more or less available for precipitation on a cyclical basis and this leads to the formation of crystals with a striped pattern when observed with backscattered electrons (BSE). Differences in mean atomic number are highlighted by varying grey levels in a BSE image and Photo 1 illustrates a few examples. For columbite-tantalite minerals, bright regions correspond to relatively high Ta contents. This zonation is considered to be a primary magmatic phenomenon. In many cases, oscillatory zonation produces crystals with a niobium-rich core and a tantalum-rich rim (e.g., Photos 1a, 1e and 1f), but reverse zonation can also occur (e.g., Photo 1b).
2. Patchy zonation produces much more irregular zonation patterns than oscillatory zonation and Photo 2 shows a few examples. Photo 2a is particularly revealing, as it shows an unzoned tantalum-rich manganotantalite with a patchy zoned niobium-rich ferrocolumbite portion at one end. This zonation is interpreted as a late-stage (but probably still dominantly magmatic) alteration phenomena and is very common throughout the Separation Rapids pegmatites. Patchy zonation may completely overprint an earlier zonation pattern, particularly in those samples from late-stage Li mica-cleavelandite pods (e.g., 96-86A and 94-44Mu5(2); Photos 2b and 2d, respectively). There is a correlation of patchy zonation with the passage of magmatic fluids and many affected grains are from albitized units where corrosive sodium-rich fluids have concentrated.

Photo 3 illustrates further complexities of columbite-tantalite crystallization with examples of multiple phases of crystallization (Photos 3a, 3b and 3c); patchy zonation, where X_{Mn} rather than X_{Ta} is the main variable; and overgrowths and reactions with microlite (Photos 3e and 3f).

FERROTAPIOLITE

Ferrotapiolite forms in rare-element pegmatites exhibiting moderate to high degrees of fractionation characterized by low levels of F (Wise and Černý 1996). Only rarely is ferrotapiolite the sole representative of Ta mineralization in a pegmatite (von Knorring and Fadipe 1981). The existence of a compositional gap between ferrotapiolite and ferrotantalite (Figures 11, 12 and 13) is a common feature and is controlled by temperature, $f(\text{O}_2)$, structural state of the co-existing phases, impurities and probably also by pressure (Černý, Ercit and Wise 1992).

Ferrotapiolite, Fe(Ta,Nb)₂O₆, is an uncommon oxide in the Separation Rapids pegmatites, but is of importance because of its consistently high Ta content (70 to 80 wt % Ta₂O₅), unlike any of the other Ta species described (Figure 1). Significant occurrences of ferrotapiolite are in SW subgroup pegmatites (96-9, Photo 4a; 96-81, Photo 4d; and 98-83F) and in the SW margin of the Separation Rapids pluton (96-72A; Photo 4c). Samples 96-9 and 96-81 are from beryl pegmatites that were intruded close to one another and around which metasomatic alteration of metavolcanic host rocks resulted in elevated Li contents up to 245 ppm compared to “background” levels of 16 ppm. Cs levels are also anomalously high in the metasomatic selvages, reaching 14 000 ppm in this small area of 200 m² (Breaks and Tindle 1997). In the two beryl pegmatites, the ferrotapiolite co-exists with ferrotantalite that has a distinctive composition characterized by low X_{Mn} (Figure 11b) consistent with derivation from a low F melt. Unusually, in the pluton, ferrotapiolite occurs with ferrowodginite. The most important occurrence of ferrotapiolite is found in the Big Mack pegmatite (98-83F), where it occurs with no other Ta species. Surprisingly, this is the only sample, to date, from this pegmatite to host ferrotapiolite, and other samples nearby contain (mainly) ferrocolumbite instead.

Minor occurrences of ferrotapiolite are predominantly from isolated inclusions in cassiterite (Table 4), where single 5 to 30 μm grains have been detected (e.g., in SW beryl pegmatite 96-11A and eastern petalite pegmatite 94-80P). Two examples, from a sodic SW beryl pegmatite (96-53) and from the SW petalite Glitter pegmatite are illustrated in Photos 4b and 10f. A further example from an Fe-suite eastern subgroup petalite pegmatite (Pegmatite 10, 97-P10-4) is illustrated in Photo 14, where ferrotapiolite forms trains of rounded blobs that are interpreted as exsolution products in the cassiterite.

Although ferrotapiolite is predominantly absent or insignificant in the eastern subgroup pegmatites, a notable ferrotapiolite-like phase occurs in the eastern end of the wall zone of Marko's pegmatite (94-44Z, Photo 5f). Its unusual composition is attributable to partial replacement of ferrotapiolite along cleavage planes by microlite (data is tabulated under pyrochlore group minerals). Only Pough (1945) and Eid and von Knorring (1976) appear to have reported this process previously. As with replacement of wodginite and manganocolumbite by microlite, replacement of ferrotapiolite by microlite requires interaction with a (Ca, Na, F)-rich fluid.

In summary, the scarcity and apparently random distribution of ferrotapiolite make it an unlikely ore mineral unless it can be found in greater quantities elsewhere in the region. The nature of this distribution is not consistent with it being a normal fractionating phase and influx of Fe from adjacent metavolcanic host rocks into the pegmatite melt was probably required for its formation. Its presence, however, can be indicative of pegmatite crystallization from very evolved magmas enriched in Li and Cs (but not F) and the pegmatites from which samples 96-9 and 96-81 were collected probably originated from the most volatile-poor parental magmas of all the Separation Rapids pegmatites.

IXIOLITE

Ixiolite is a complex Ta oxide with a formula $(\text{Ta}, \text{Nb}, \text{Sn}, \text{Fe}, \text{Mn}, \text{Ti})_4\text{O}_8$ and an orthorhombic unit cell corresponding to that of disordered columbite-tantalite. The bulk chemistry of ixiolite is similar to that of ferrotantalite, but differs in converting to a monoclinic structure (akin to wodginite) after heat treating at 1000°C (Mulja et al. 1996). As well as the tin- and tantalum-rich "type" ixiolite, other ixiolite varieties contain substantial Sc^{3+} , Fe^{3+} , Ti^{4+} , W^{6+} , U and Nb^{5+} . Such a range of cations with a broad range of ionic radius and valence requires that the ixiolite structure be extensively flexible. There is a need to rationalize the ixiolite group and to develop a crystallochemical classification and nomenclature as, in many cases, members have lower than orthorhombic symmetry (Černý and Ercit 1989) and can be confused with columbite-tantalite. Without structural information, it is often difficult to make a positive identification of ixiolite. If only chemical data are available (as here), then columbite-tantalite and ixiolite can best be represented on a diagram such as Figure 14. Columbite-tantalite, with ideal AB_2O_6 stoichiometry falls along a tie line between Nb and Ta = 2 atoms per formula unit (apfu), and ixiolite, with ideal ABO_4 stoichiometry, along a tie line between Nb and Ta = 1.5 (apfu). For the Separation Rapids pegmatites, a dividing line between the two has been defined at Nb and Ta = 1.8 (apfu), a similar position as that defined by Neiva (1996) for columbite-tantalite, ixiolite and wodginite from Portuguese tin and tungsten deposits.

The relative importance of ixiolite can be gauged by considering the combined columbite-tantalite and ixiolite dataset of 1779 analyses. Only 21 analyses, or 1.1% of the data are defined as ixiolite and its occurrence is restricted to six Separation Rapids pegmatites (Pegmatites 7, 9, 11, Marko's, Lou's and the Big Whopper, which are all petalite pegmatites) and one unusual graphite-rich pegmatite from the northern fringes of the Treelined Lake complex (96-2). Of these, only the data from the Big Whopper pegmatite and one analysis from Pegmatite 9 conform to ideal stoichiometry (Figure 14).

Two examples of ixiolite are illustrated in Photo 5: a scandium-, titanium-rich variety from Lou's pegmatite included within a large grain of cassiterite (Photo 5a) and a tungsten-, tin-rich variety from Pegmatite 9 that occurs as a discontinuous rim on an earlier formed crystal of ferrocolumbite-ferrotantalite (Photo 5b). Other examples are either found as inclusions in cassiterite or niobian rutile, or in close association with other tantalum species.

STRÜVERITE

Strüverite $(\text{Ti,Ta,Fe}^{3+})_3\text{O}_6$ and ilmenorutile (its Nb analog) are, respectively, the tantalum and niobium varieties of rutile TiO_2 . Compositionally, they are interpreted as solid solutions of rutile and "mono-tapiolite", $(\text{Fe,Mn})(\text{Nb,Ta})_2\text{O}_6$ and, invariably, they show a slight to considerable excess of (Fe+Mn) over (Nb+Ta) (as in Figure 15). Cation totals normalized to 4 oxygens frequently exceed the ideal value of 2.00, when all Fe is calculated as Fe^{2+} , suggesting that some (if not all) Fe is present as Fe^{3+} (Černý and Ercit 1989).

In the Separation Lake region, strüverite has only been found in nine samples: from four Separation Rapids pegmatites (beryl pegmatite 96-9, and three petalite pegmatites: Pegmatite 11, Marko's, Big Mack) and from a graphite-rich pegmatite from the northern fringes of the Treelined Lake complex (96-2). In this latter occurrence and for some data from Marko's and the Big Mack pegmatites, the Nb/Ta ratio more correctly defines the analyses as being ilmenorutile. Excluding these analyses from the strüverite average of Table 1 gives a revised average of 44.18 wt % Ta_2O_5 and a standard deviation of 11.36.

In the wall zone of Marko's pegmatite, strüverite occurs as an 0.3 mm anhedral inclusion in coarse-grained albite, where it appears to be replacing manganotantalite, and, in a second occurrence, a titanowodginite inclusion in a large cassiterite has been partially replaced by patchy zoned strüverite. The strüverite has continued growing out from the margin of the cassiterite and has developed both euhedral form and well-defined oscillatory zonation (Photo 5c).

In the Big Mack pegmatite, at location 98-83C, strüverite has been found in a border zone garnet-muscovite-quartz-albite unit. The presence of cordierite, holmquistite and associated selvage material within the pegmatite indicate local conditions where Ti and Fe were likely introduced from the host rocks. In sample 98-83Ciii, a chromian variety of strüverite has been found that could not possibly have crystallized directly from the pegmatite melt. Localized introduction of Cr into the pegmatite from adjacent mafic intrusive rocks is the most plausible explanation.

A number of strüverite grains from the Big Mack pegmatite have an unusual skeletal form (Photo 5d) and/or show marginal replacement by an impure ferrowodginite approaching ixiolite in composition (Photo 5e). This relationship is unique to the Big Mack pegmatite.

Wodginite Group Minerals

Wodginite was first described by Nickel, Rowland and McAdam (1963) as a monoclinic mineral with a unit cell content of $(\text{Ta,Mn,Sn,Nb,Fe,Ti})_{16}\text{O}_{32}$. Progressive improvement of the structure refinement (summaries in Ercit, Hawthorne and Černý 1992a; Ercit et al. 1992b) confirms a general formula $\text{A}_4\text{C}_4\text{B}_8\text{O}_{32}$, where A = Mn, Fe^{2+} ; C = Sn, Ti, Fe^{3+} ; Ta and B = Ta, Nb. Based on the chemistry of A- and B-cation sites, Ercit, Černý and Hawthorne (1992c) were able to devise a classification scheme in which wodginite ($\text{MnSnTa}_2\text{O}_8$), ferrowodginite ($\text{Fe}^{2+}\text{SnTa}_2\text{O}_8$), titanowodginite ($\text{MnTiTa}_2\text{O}_8$) and lithiowodginite ($\text{LiTaTa}_2\text{O}_8$) were all defined. Both Ercit (1992c) and Tindle, Breaks and Webb (1998) presented data from a further species, "ferrotitanowodginite" ($\text{Fe}^{2+}\text{TiTa}_2\text{O}_8$), but it was Galleski et al. (1999) who formally characterized this as a new species (from the complex-type San Elías pegmatite, Argentina). Tindle, Breaks and Webb (1998) describe potentially new wodginite group species with excess Mn and W which, as yet, await formal recognition by the Commission on New Minerals and Mineral Names.

Excluding the lithian variety, the main wodginite species can be represented in a quadrilateral such as Figure 16a, where ideal compositions occur at the corners of the diagram and the four quadrants define the

boundaries between the four wodginite group minerals (Tindle, Breaks and Webb 1998). This diagram effectively summarizes the main A-site (Fe ↔ Mn) and B-site (Ti ↔ Sn) substitutions.

Wodginite, ferrowodginite, titanowodginite and ferrowodginite occurrences described by Tindle, Breaks and Webb (1998) are all from the Separation Lake area. They are first occurrences for Ontario and because of the economic implications of this mineral group are of major importance (wodginite is the main Ta ore mineral at Tanco mine, Manitoba). Worldwide, titanowodginite had only been described from one Separation Rapids pegmatite (Tindle, Breaks and Webb 1998) and the Tanco pegmatite (Ercit, Černý and Hawthorne 1992c). Wodginite has since been discovered elsewhere in Ontario in another complex type, petalite-subtype pegmatite at Pakeagama Lake, 160 km north of Red Lake (Breaks, Tindle and Smith 1999a, 1999c).

Wodginite group minerals are uncommon in beryl-type pegmatites. Three occurrences have been described previously (Tindle, Breaks and Webb 1998):

1. ferrowodginite from a Fe-suite garnetiferous aplite dike (location 94-15) close to the margin of the Separation Rapids pluton)
2. ferrowodginite from a Fe-suite fluorapatite-garnet-biotite-muscovite potassic pegmatite (Audrey's pegmatite) in close proximity to the petalite zone
3. wodginite from a Mn-suite layered 8 m thick fluorapatite-garnet-biotite-muscovite potassic pegmatite (location 93-265) containing cleavelandite-rich pods with purple lithian muscovite, white beryl, tourmaline, cassiterite, manganocolumbite and (almost end-member) manganotantalite. Wodginite, in appearance similar to cassiterite, forms anhedral or skeletal, dark brown translucent crystals and occurs as inclusions in muscovite. Wodginite crystals are either isolated or form clusters partially replaced by bismutomicrolite and exhibit extreme Mn-enrichment closely matching end-member wodginite in composition (Figure 16a). Many manganese-rich wodginite analyses are tungsteniferous and some have relatively high concentrations of Bi, Pb and U. Concentrations of these minor elements are high where alteration of wodginite to microlite occurs (particularly so if bismutomicrolite is the alteration product).

To these can be added a SW subgroup occurrence of ferrowodginite (inclusions in cassiterite) in a 1 m thick aplite dike (97-69). Two occurrences at the SW margin of the Separation Rapids pluton are also best grouped with these samples. At location 93-260C, a single wodginite inclusion was found in a large cassiterite crystal associated with manganotantalite from a 2 by 3 m cleavelandite rich pod, and, at location 96-72A, wodginite-ferrowodginite co-exists with later crystallizing ferrotapiolite in a quartz-rich garnet-muscovite-beryl potassic pegmatite patch. Perhaps surprisingly, the highest Ta contents in any wodginite species from the Separation Lake area are recorded from this last sample (up to 71.9 wt % Ta₂O₅).

Within the Separation Rapids pegmatites, wodginite group minerals appear to be more common in the complex-type, petalite-subtype pegmatites. Thirteen occurrences are documented (Table 5), and of these, eight are from within a 0.5 by 5 km elongate zone that marks the most compositionally evolved part of the eastern subgroup. Most data are of ferrowodginite composition (*see also* Photo 6a) and apart from Marko's pegmatite and one sample from the Big Mack pegmatite, the remaining data are of wodginite composition (Figure 16a). Cassiterite is the oxide most commonly found associated with wodginite and, in some samples, the wodginite occurs only as inclusions in cassiterite grains. Fe- and Mn-columbite and tantalite are also found in most wodginite-bearing samples (± microlite, uranmicrolite, bismutomicrolite, stibiomicrolite, strüverite). However, the oxide assemblages are abundant only in primary albite-rich units or secondary beryl-muscovite-albite assemblages that invariably replace the central petalite-rich cores of some pegmatites. In comparison with their size, wodginite group minerals in both the Big Mack and Big Whopper pegmatites contribute only a minor component to the Ta budget of these pegmatites, and in the SW pegmatite subgroup as a whole, wodginite species are uncommon.

Wodginite group minerals from Marko's pegmatite are described separately, not only because it is the largest petalite-bearing pegmatite of the eastern subgroup pegmatites, but also because it hosts the very

rare titaniferous wodginite species (Figure 16a). The cluster of wodginite data (solid diamonds) at the bottom right of Figure 16a represents 12 individual samples collected along the outcrop of Marko's pegmatite and comprise material from both the primary petalite core region and from the secondary muscovite-albite replacement unit of the pegmatite. Wodginite occurs either as translucent (dark brown) or opaque crystals which may be partially altered or rimmed with microlite (Photos 6b and 6c). The layered muscovite - potassium feldspar - quartz pegmatite - aplite units from Marko's pegmatite that crystallized early do not contain wodginite.

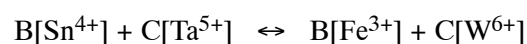
The margin of Marko's pegmatite comprises a beryl-muscovite-albite-quartz wall zone which contains metasomatized mica-rich mafic volcanic selvages. Within the albite, there are rare tabular (pseudo-cubic) crystals of wodginite up to 2 mm across. On Figure 16a, the diagonal trend of data is from a single compositionally zoned crystal with a manganese-rich, tin-rich wodginite core varying to a iron-, titanium-rich ferrotitanowodginite rim. The change in composition is not linear, and the crystal has indistinct core and rim features (Photo 6f) most typical of a replacement origin (Lahti 1987). Also in the wall zone of this pegmatite, there are large cassiterite crystals (up to 8.5 mm long) containing inclusions of strüverite, titanowodginite and ferrotitanowodginite. Photo 6d shows titanowodginite exhibiting oscillatory and truncated zonation, and Photo 6e ferrotitanowodginite with oscillatory zonation, both occurring as inclusions in the same grain of cassiterite. Isolated crystals of grey microlite and yellow-green stibiomicrolite (both considered primary) accompany the cassiterite. There appears to be a continuum of compositions from titanium-rich to iron-rich wodginite compositions (Figure 16a). Within the wall zone of Marko's pegmatite, columbite-tantalite is rarely found.

Tindle, Breaks and Webb (1998) suggest that in Marko's pegmatite, titanowodginite and ferrotitanowodginite owe their origin to a dynamic, disequilibrium process that allowed Ti to be introduced into the pegmatite magma as a result of a metasomatic exchange during or after emplacement, and not as a fundamental consequence of fractionation of an uncontaminated primary melt. The complex patchy zoning, porous nature of the wodginite-ferrotitanowodginite and a reversed fractionation trend (Sn → Ti enrichment) are all best explained by replacement of an earlier wodginite composition rather than by magmatic crystallization. This probably occurred by localized reaction with, or incorporation of, adjacent host rocks with the pegmatitic melt.

Tungsten substitution in wodginite group species was covered in some detail by Tindle, Breaks and Webb (1998), but it is worth revisiting the subject here as more data is now available and substitution schemes can be better defined. For most wodginite group minerals, variation in the A-site is dominated by the 1:1 substitution of Mn by Fe²⁺. Ercit et al. (1992b) report good 1:1 correlation of Mn and Fe, with full site occupancy. At the B-site, the major substitution is of Ti for Sn, but it is not simply a 1:1 substitution. In all data examined, constituents other than Sn and Ti are required to fill the B-site. At the C-site, Nb substitutes for Ta. However, on the basis of 32 oxygens, there is an apparent excess of up to 3.7 (Ta+Nb) cations per unit cell. Ercit et al. (1992b) showed that the excess was Ta occupying the B-site. W was thought to behave like Nb⁵⁺ and occupy the C-site. Mössbauer spectroscopy was used to show that Fe in the A-site was Fe²⁺ and that lesser amounts of Fe³⁺ reside in the B-site. Voloshin, Pakhomovskii and Bakhchisaraitsev (1990) were further able to show that Li can be incorporated into the A-site based on the coupled substitution of Mn²⁺ + Sn⁴⁺ ↔ Li⁺ + Ta⁵⁺.

The complexity of composition in tungsteniferous wodginite from Separation Rapids pegmatites can be illustrated by the backscattered electron and X-ray map (Ti, W and Ta) images of Photos 7, 8 and 9. This complexity and their relatively small grain size are the main reasons why these potentially new species have not been fully characterized.

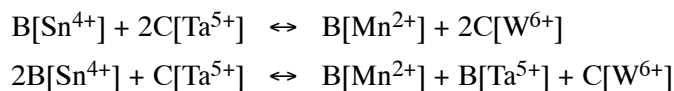
Most of the A-site variation in wodginite group minerals at Separation Rapids is by Fe²⁺ substituting for Mn. However, data from most of the Separation Rapids pegmatites (open triangles on Figure 16b) show a good correlation between W and Fe³⁺ (estimated on stoichiometric criteria defined by Ercit et al. 1992b) and suggest W in the C site is balanced with Fe³⁺ in the B site according to



This new substitution scheme was described as the “wolframowodginite 1” trend by Tindle, Breaks and Webb (1998) and is particularly pronounced in tungsteniferous wodginite from Fe-suite eastern petalite Pegmatite 5, where WO₃ reaches 43.8 wt %. To maintain full charge balance, it is suggested that Li substitutes for Mn in the A site (Figure 16b), and again on stoichiometric criteria, a value of 0.63 wt % LiO₂ has been estimated for the extreme composition recorded from Pegmatite 5.

The extreme composition of the tungsteniferous wodginite from Pegmatite 5 has the ideal formula of (LiMn₃)(Fe³⁺₃Sn)(W₄Ta₄)O₃₂ and points toward an end-member composition of (Li₂Mn₂)(Fe³⁺₄)(W₆Ta₂)O₃₂. In Pegmatite 5, the effect of this substitution is to drop the Ta₂O₅ content from 66.0 wt % at the tungsten-poor end of the trend to 22.0 wt % at the tungsten-rich end (Figure 16b; see also Figure 17).

In one other pegmatite (eastern subgroup Mn-suite beryl pegmatite from location 93–265), tungsteniferous varieties of wodginite contain very high Mn and require two further mechanisms of substitution be proposed. They produce trends referred to as “wolframowodginite 2” and “wolframowodginite 3” by Tindle, Breaks and Webb (1998). These wodginites have an excess of Mn²⁺ from the A-site, and the excess positive charge due to W at the C-site is balanced by introduction of Mn²⁺ at the B-site through the mechanisms



These substitution operators result in hypothetical ideal compositions Mn²⁺₄(Mn²⁺₂Sn₂)(W₄Ta₄)O₃₂, and Mn²⁺₄(Mn²⁺Sn₂Ta)(WTa₇)O₃₂, respectively (Tindle, Breaks and Webb 1998). New data suggest (LiMn²⁺₃)(Fe³⁺₂Sn₂)(W₅Ta₃)O₃₂ and Mn²⁺₄(Mn²⁺₃Sn)(W₆Ta₂)O₃₂ can also be added to the this list (Figure 16b). This latter composition, as represented by an analysis from location 93–265, contains 60.8 wt % WO₃ and only 12.7 wt % Ta₂O₅ (Figure 17). These trends are poorly defined, but, if more data become available some of the manganese-rich wodginite compositions could define a continuum between “normal” wodginite and wolframite (hubnerite) Mn²⁺WO₄.

Pyrochlore Group Minerals

The pyrochlore group comprises a series of cubic oxides containing essential amounts of Nb, Ta or Ti and divide into three subgroups: pyrochlore, betafite and microlite (Figure 18). The general formula of the group is A_{1–2}B₂O₆(O,OH,F)•nH₂O (Mandarino 1999). There are currently 22 species in the group, defined on the basis of A site variation (where A = Na, K, Ca, Sr, Y, Zr, Sn, Sb, Cs, Ba, Ce, Pb, Bi, Th, U) and B site variation (where B = Fe, Nb, Sn, Ta, Ti, W). Nomenclature of the group is given in Hogarth (1977). According to Černý and Ercit (1985), members of this group are possibly the second most abundant phases concentrating Nb and Ta in granitic pegmatites, after columbite–tantalite.

Members of all of the three subgroups, and including 6 distinct species, are represented in the Separation Lake area. These include four members of the microlite subgroup: microlite (Ca,Na)₂Ta₂O₆(O,OH,F), stibiomicrolite (Sb,Ca,Na)₂(Ta,Nb)₂O₆(O,OH,F), uranmicrolite (U,Ca)₂(Ta,Nb)₂O₆(O,OH,F) and bismutomicrolite (Bi,Ca)₂(Ta,Nb)₂O₆(OH). Antimonian microlite intermediate in composition between microlite and stibiomicrolite is also found. Additionally, stibiobetafite (Sb,Ca)₂(Ti,Nb,Ta)₂(O,OH)₇ and ytropyrochlore (Y,Na,Ca,U)_{1–2}(Nb,Ta,Ti)₂(O,OH)₇ are also found. Uranmicrolite, bismutomicrolite, stibiobetafite and ytropyrochlore are all rare occurrences. The Ta₂O₅ contents of these species are listed in Table 6.

Pyrochlore group minerals do not occur in the Separation Rapids pluton (although microlite is reported from a miarolitic cavity in the Treelined Lake complex), or those pegmatites with ferrocolumbite and ferrotantalite compositions whose Mn/(Mn+Fe) ratios are less than 0.3. Furthermore, occurrence of microlite does not correlate with the presence of either beryl or petalite. Of all the microlite subgroup species, microlite is the one found most commonly, e.g., in four SW subgroup beryl pegmatites (Wolf pegmatite, and locations 96–9, 96–25A, EFR–6056B), an eastern subgroup beryl pegmatite (location

93-265), three SW petalite subgroup pegmatites (School of Fish, Zone 11 and Big Whopper pegmatites) and, more commonly, in two eastern subgroup petalite pegmatites (Pegmatite 7 and Marko's pegmatite). Stibiomicrolite is quite rare, being found in two eastern subgroup petalite pegmatites (Lou's and in the wall zone of Marko's pegmatite). Bismutomicrolite was only found in an eastern subgroup beryl pegmatite from location 93-265, whereas uranmicrolite and ytropyrochlore are restricted to Pegmatite 5 in the eastern subgroup and the Big Whopper pegmatite in the SW subgroup, respectively, both are petalite pegmatites. Stibiobetafite has the most restricted occurrence of all, being found in the wall zone of Marko's pegmatite at the actual contact with its host rock: a metasomatized garnet-biotite-plagioclase metavolcanic rock.

Microlite is a strongly associated with muscovite-lepidolite, with most microlite crystals being included within, in contact with, or adjacent to muscovite-lepidolite crystals. Microlite typically forms mottled, irregularly shaped, inclusion-rich crystals that partially or totally replace earlier ferrowodginite, or wodginite (rarely manganocolumbite). In Marko's pegmatite, the presence of microlite after wodginite (Photo 6c) and small inclusion-free cassiterite growing from within the microlite outward beyond the original margin of the wodginite suggests a reaction involving the following exchange

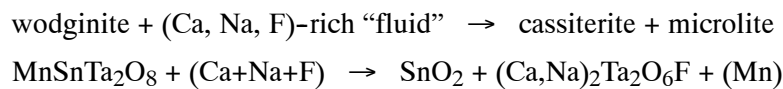


Photo 6b provides evidence that the Ca, Na and F components of this "fluid" became concentrated enough to react late in the crystallization sequence. Here, a euhedral wodginite crystal, mainly enclosed in a muscovite crystal has been totally replaced at one end by microlite prior to being partially included within albite (muscovite and albite are not visible in this backscattered electron image). One sample from a muscovite-albite replacement unit within the petalite core zone of Marko's pegmatite hosts abundant microlite with a particularly complex history. Large anhedral crystals of microlite up to 2.5 mm in length are found containing elongate inclusions of manganotantalite (the most manganiferous from this pegmatite) rimmed by a ferrocolumbite alteration rim (Photo 3e). Such microlite crystals often contain numerous oriented ferrocolumbite inclusions that form fan-shaped patterns or a myrmekitic texture. Certain zones of these crystals are either porous and rich in inclusions or non-porous with larger, more discrete inclusions. Most inclusions show some oscillatory zoning.

Whereas microlite is closely associated with Li mica, stibiomicrolite and antimonian microlite tend to occur associated with cassiterite and wodginite. Stibiomicrolite is pale yellow in colour and is usually found as inclusions in, or in contact with, cassiterite. Exceptions include a stibiomicrolite at the margin of a ferrotitanowodginite crystal and a stibiomicrolite partially replacing a wodginite crystal included in quartz. A stibiomicrolite inclusion in cassiterite from the wall zone of Marko's pegmatite clearly replaces ferrotitanowodginite (Photo 10a). However, in another sample from the same unit, a large (0.5 mm), oscillatory zoned antimonian microlite crystal has grown against an earlier cassiterite containing titanowodginite and ferrotitanowodginite inclusions and is most likely primary (Photo 10b). This crystal has an antimony-rich core ($\text{Sb}_2\text{O}_3 = 9.9 \text{ wt } \%$) and the Sb content decreases outwards to antimonian microlite compositions with $\text{Sb}_2\text{O}_3 = 3.6 \text{ wt } \%$. Other microlite subgroup crystals have much higher Sb contents (e.g., Marko's pegmatite with 20.91 wt % Sb_2O_3 , which exceeds the necessary 20 atomic% Sb in the A site required to name the mineral as true stibiomicrolite (Hogarth 1977; Groat, Černý and Ercit 1987). In Lou's pegmatite (an eastern subgroup Fe-suite petalite pegmatite), oscillatory zoned stibiomicrolite inclusions in cassiterite are near euhedral with a form reminiscent of wodginite. These, too, are most likely primary occurrences.

Microlite subgroup minerals show little systematic variation within an individual pegmatite, but there are differences between pegmatites, however, the wall zone of Marko's pegmatite hosts a suite with compositions ranging from microlite (0.2 to 4.6 wt % Sb_2O_3) to antimonian microlite (3.8 to 10.5 wt % Sb_2O_3) and stibiomicrolite (9.9 to 12.7 wt % Sb_2O_3). It is apparent from these data (and, to a lesser extent, the data from Lou's pegmatite) that there is a continuum of compositions from microlite to stibiomicrolite and that if Ti contents are high, so too is the Sb content. Even higher Sb contents are found in stibiobetafite. Most other pyrochlore group-bearing pegmatites have relatively low Sb contents and their data plot near the origin of Figure 19, a useful classification diagram for antimony- and titanium-rich

pyrochlore group minerals. Increasing Sb and Ti contents are at the expense of Ta, which drops to a mean value of 21.8 wt % Ta₂O₅ in stibiobetafite (Table 6), down from a mean value of 72.3 wt % Ta₂O₅ in microlite from Marko's pegmatite.

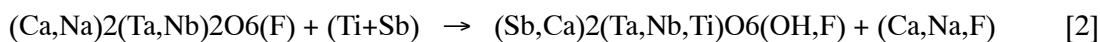
Stibiobetafite has the highest Sb concentrations (and one of the lowest Ta contents) of all the pyrochlore group minerals found at Separation Rapids (16.7 to 25.3 wt % Sb₂O₃), but is only found in the wall zone of Marko's pegmatite. Photo 11 illustrates stibiobetafite in which pyrochlore group mineral crystallization appears to have been a three-step process. Manganocolumbite has been replaced by microlite, which, in turn, is replaced by stibiomicrolite. The final step of the process is the crystallization of oscillatory zoned stibiobetafite on the stibiomicrolite. Perhaps because of a change in volume as manganocolumbite was replaced by microlite or because some stibiomicrolite was dissolved away first, much of the stibiobetafite was able to grow in open space to form partially euhedral crystals.

As with the wodginite to microlite transformation, the sequence of reactions leading to crystallization of stibiobetafite requires an initial influx of Ca, Na and F, that is followed later by an influx or exchange with a source rich in Ti and Sb

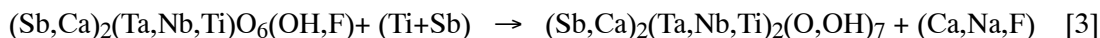
manganocolumbite + (Ca, Na, F)-rich "fluid" → microlite



microlite + Ti, Sb source → stibiomicrolite



stibiomicrolite + Ti, Sb source → stibiobetafite



A Ca, Na, F "fluid" is a likely constituent involved in albitization, which probably developed toward the end of the pegmatite crystallization. However, as the stibiobetafite only occurs at the actual margin of the wall zone of Marko's pegmatite, it is reasonable to assume the Ti and Sb came from the host rocks.

Uranmicrolite has been observed in two samples from an eastern subgroup Fe-suite petalite pegmatite (Pegmatite 5), where it occurs as small (approx. 50 μm), weakly zoned, inclusions in ferrowodginite (Photo 10c). Uranmicrolite has euhedral form, is yellowish brown in colour and appears to be an early crystallizing primary phase. Low analytical totals are thought to indicate a high water content and petrographic evidence in the form of radial fractures typical of radiation damage due to volume expansion indicate the crystal is metamict or nearly so. Other locations where U in microlite is relatively high include parts of Marko's pegmatite (2.4 to 7.1 wt % UO₂) and the Big Whopper pegmatite (5.2 to 8.6 wt % UO₂), this compares with 13.2 to 16.6 wt % UO₂ in uranmicrolite from Pegmatite 5.

Bismutomicrolite is a rare mineral that occurs in the most evolved, Mn-suite beryl pegmatite (location 93-265) in association with large cleavelandite-Li mica-enriched pods. It forms as a late-stage alteration product of tungsteniferous wodginite where it selectively replaces zone boundaries and individual zones of the wodginite. The mineral has a mottled appearance and is dissected by many cracks. Although the mineral contains much less U than uranmicrolite, it appears to be affected by metamictization. The very low analytical totals are thought to reflect a high water content.

Ytropyrochlore has only been found in one sample: a SW subgroup petalite pegmatite (96-29; Photo 10d). A 150 μm long relict core of ytropyrochlore composition (Y₂O₃ = 18.6 to 20.9 wt %) is mantled by an alteration rim with a much lower yttrium content (Y₂O₃ = 4.2 to 5.7 wt %) and high Si content (SiO₂ = 3.5 to 6.2 wt %). The source of Y is unknown, but possibilities include it being concentrated during magmatic fractionation to form primary ytropyrochlore or that some xenotime, which had crystallized out from the pegmatitic melt, was later dissolved by albitizing fluids and the mobilized Y was then available to form ytropyrochlore. Further discoveries are required before this can be unravelled.

Cassiterite

Cassiterite is common at Separation Rapids, occurring in all pegmatite types. Although its modal abundance is quite variable, it is frequently the most common oxide present. In much of the Separation Rapids pluton, it is either absent or rare, although crystals up to 3 mm across have been found in the more evolved southwestern part of the intrusion. Of 31 beryl pegmatites examined, 17 have been found to contain cassiterite, albeit in low abundance; the exception being Mn-suite beryl pegmatite from location 93-265, where cassiterite is more common and where crystals up to 2 cm in length have been found.

It is in the petalite pegmatites where cassiterite occurs in the greatest abundance. In the eastern subgroup, Pegmatite 7, a Fe-suite pegmatite is particularly enriched, with visual estimates of modal abundance reaching 3 to 5% in fluorapatite-zircon-rich zones. Notable enrichment also occurs in both Pegmatite 10, Lou's and Marko's pegmatites (also members of the eastern subgroup) and at the margin of a Zone 11 pegmatite (part of the Big Mack system in the SW subgroup). However, cassiterite was not found in Pegmatites 1 and 8, and abundances are quite low in Pegmatites 6, 9 and 11. In the SW subgroup, all the main pegmatites, that is, Pegmatites 12 and 14, Big Mack, Big Whopper (especially 97-BW7B), Glitter (especially 99-GZ4), Great White North, School of Fish, Swamp and West pegmatites, contain cassiterite (Table 7), but (with a few exceptions) never in great abundance.

Cassiterite commonly forms euhedral, diamond-shaped crystals up to 1.2 cm in length (but more commonly 0.2 to 0.4 mm in Pegmatites 6, 9 and 11) and exhibits a wide variety of colours in thin section from dark brown (almost black) through deep reddish brown, medium brown, pale brown, to a straw-yellow brown. In some samples, all these colours occur in a single crystal in a series of variably spaced concentric zones. Cassiterite from the Separation Rapids pluton and Fe-suite beryl pegmatites are relatively free of inclusions. However, in the Fe-suite petalite pegmatites, it is not unusual for the darker core regions to be relatively inclusion free and for a later, lighter brown zone to contain trains of small ferrocolumbite inclusions near the boundary between the two zones. Where multiple zones occur (e.g., beryl pegmatite from location 94-15), there is alternation between ferrocolumbite- and pore-rich zones and other zones lacking inclusions, but full of dark, needle-shaped exsolution products (possibly rutile; Photo 10e).

Cassiterite in the petalite pegmatites host many inclusions including; scandium-rich ixiolite (Photo 5a), ferrocolumbite (Photos 1d and 10e), ferrotantalite and ferrotapiolite (Photo 4b), ferrowodginite and strüverite (Photo 5c), tungsteniferous wodginite (Photo 7), microlite, stibiomicrolite (Photo 10a) and rarely löllingite and uraninite. In the wall zone of Marko's pegmatite, cassiterite hosts inclusions of titanowodginite (Photo 6d) and ferrotitanowodginite (Photo 6e). Cassiterite from the Glitter pegmatite, a SW subgroup beryl pegmatite, perhaps contains the highest inclusion density with, ferrocolumbite (mainly), ferrotantalite and ferrotapiolite all observed (Photo 10f). Cassiterite can also be inclusion free as in the petalite core zone of Marko's pegmatite, where it forms euhedral crystals often associated with manganocolumbite and microlite (Photos 3e and 3f). In this, and the majority of other occurrences, cassiterite is one of the last, if not the last, oxide minerals to crystallize.

Overall, cassiterite has a limited range of compositions and there is considerable overlap in FeO, MnO, Nb₂O₅ and Ta₂O₅ contents between rock types. Of these elements, Ta concentrations are highest and range from 0.3 to 2.3 wt % Ta₂O₅ in the evolved part of the pluton, 0-9.4 wt % in the beryl pegmatites (although only 5 out of 182 analyses have Ta₂O₅ > 5 wt %), and 0-11.0 wt % in the petalite pegmatites (64 out of 915 analyses have Ta₂O₅ > 5 wt %). The highest Ta₂O₅ contents are concentrated in three of the petalite pegmatites: Pegmatite 5 (max. 11.0 wt % Ta₂O₅), Pegmatite 6 (max. 9.1 wt % Ta₂O₅) and Pegmatite 10 (max. 10.3 wt % Ta₂O₅), all outcropping in close proximity to one another in the eastern subgroup. Other high values are recorded in Pegmatite 7, Marko's pegmatite, Great White North pegmatite, and the Big Whopper pegmatite.

Because of the problem of inclusions within the cassiterite, great care was taken in setting up analysis points, frequently using backscattered electron images in addition to conventional reflected and transmitted light optics. This investigation revealed common oscillatory zonation as well as sector zoning. In a few samples, Ta concentration could be related to structural features in the cassiterite (Photo 12) or to multiple

episodes of crystallization (Photo 13). In all cases, low Ta cassiterite was the final product. In Photo 14, an earlier generation of tantalum-rich cassiterite is being replaced by a low Ta cassiterite and, in the process, the excess Ta is ejected from the cassiterite structure to form blobs of ferrotapiolite (white spots in Photos 14a, 14c and 14d).

Chemical composition seems related to the colour of the cassiterite; in the petalite pegmatites, the darker zones typically have Ta₂O₅ contents of 4 to 10 wt %, whereas in the lighter zones they are nearer 1.5 wt %. There does not appear to be a systematic variation in cassiterite composition between rock types, but the bulk of the data fall along a linear array with Nb+Ta and Fe+Mn predominantly varying in the ratio of 2:1 corresponding to the coupled substitution: $3 \text{Sn}^{4+} \leftrightarrow 2(\text{Nb,Ta})^{5+} + (\text{Fe,Mn})^{2+}$ (Figure 20). This relationship is common to cassiterite from many rare-element granites and pegmatites worldwide and distinctly different to those from epithermal and hydrothermal vein deposits (Tindle and Breaks 1998). Additionally, cassiterite compositions approaching the 1:1 substitution line on Figure 20 suggest a $\text{Fe}^{3+}(\text{Nb,Ta})\text{O}_4$ component in a few of the cassiterite analyses, consistent with the substitution: $2\text{Sn}^{4+} \leftrightarrow \text{Fe}^{3+} + \text{Ta}^{5+}$ (Černý and Ercit 1989).

Commodity Importance of Oxide Minerals in Rare-Element Pegmatites

Many of the oxide minerals documented in this report represent potentially important ore minerals for tantalum, a metal of growing economic status. Furthermore, subordinate amounts of niobium and tin occur in many of the oxide minerals, which could add value to concentrates produced from future exploitation of pegmatite deposits from the Separation Lake area. At the Greenbushes Mine in Australia, tin ingots are produced which help defray mining and milling costs (Sons of Gwalia Limited website: www.sog.com.au). Concentrate produced at the Tanco Mine contains 5 to 8% Nb₂O₅ and 14 to 18% SnO₂ (Černý, Ercit and Vanstone 1996). Prices for various types of commodities for these metals are given below.

Commodity	Metal content (wt %)	Price (US\$/pound or kg)	Ref.
Tantalum-rich concentrate	Tanco Mine, Manitoba: 35-38% Ta ₂ O ₅ 14-18% SnO ₂ 5-8% Nb ₂ O ₅	Range of spot price from three published sources in 1999: \$28-45 per pound of Ta ₂ O ₅	1, 2
Capacitor-grade tantalum metal powder		\$135-260 per pound tantalum metal	2
Tantalum capacitor wire		\$180-270 per pound tantalum metal	2
Vacuum-grade tantalum metal for superalloys		\$75-100 per pound tantalum metal	2
Tantalum scrap clips		\$100-114 per pound tantalum metal (April 25, 2000)	3
Tantalum sheet metal		\$100-150 per pound tantalum metal	2
Niobium-rich concentrate		\$2.80-3.20 per pound of Nb ₂ O ₅	2
Steel-making grade ferrocolumbium		\$6.75-7.00 per pound niobium metal	2
High-purity ferrocolumbium		\$17.50-18.00 per pound niobium metal	2
Tin ingots		\$5.50 per kg	4

References: 1 Černý, Ercit and Vanstone (1996);

2 United States Geological Survey, Mineral Commodity Summaries, February 2000: www.mineral.usgs.gov/minerals/pubs/

3 <http://nickelalloy.com/newsletter1.htm>;

4 *The Northern Miner*, March 6, 2000, Section on Metal Prices.

New markets developed over the past two decades have elevated tantalum from a contaminant in the processing of tin ores to a valuable resource (*The Northern Miner* 1999). The main source of tantalum has

traditionally originated from tin-bearing slags as in Malaysia and Thailand. However, there has been an increasing shift of tantalum production to hard-rock ores (rare-element pegmatites and granites), which currently comprise about 40% of the annual global output of 4 million pounds (Solman 1999). Australia is the largest producer of tantalum, where Sons of Gwalia Limited recorded 929 000 pounds of tantalum from its Greenbushes and Wodgina Mines in 1999 (Solman 1999).

Industrial uses of tantalum are diverse and relate to important physical features of the metal: high resistance to corrosion, high melting temperature (3015°C, only exceeded by tungsten and rhenium) and exceptional electrical capacitance and alloying characteristics. The electronics industry accounts for the largest consumption (60%) where tantalum is used extensively for manufacture of high-quality capacitors for computers, mobile phones, automobile electronics, pagers and video cameras. Demand for tantalum capacitors has been growing at 10% per annum since 1992 and production is projected to reach a rate of 25 billion units per year in 2000 (Roskill Information Services 1999). Other important uses of tantalum are in the aerospace industry (super-alloys with nickel and copper), metal-cutting (tantalum carbide tools), and the chemical and pharmaceutical industries. Niobium is mainly used in the manufacture of stainless steel and improves resistance to corrosion.

Grades and Tonnages of Tantalum Deposits

Listed below are several important tantalum deposits currently being mined in addition to prospects that could represent future production of the metal. This section is intended to inform explorationists and prospectors in regards to grades and tonnages that typify tantalum deposits. One pound of Ta₂O₅ is equivalent to 0.05% Ta₂O₅.

1. Tanco Mine, southeastern Manitoba (Černý, Ercit and Vanstone 1996). This deposit represents one of the highest grade tantalum deposits ever mined, but is apparently now depleted of its high-grade reserves. Pre-production reserves: 2.07 million tonnes averaging 0.216% Ta₂O₅ or 2169 g/t = 9.8 million pounds. Up to 135 000 pounds of tantalum per year are produced mainly from reprocessing of tailings.
2. Greenbushes Mine, Western Australia (Sons of Gwalia Limited website: www.sog.com.au). This high-tonnage-low-grade tantalum deposit is currently the largest producer of tantalum in the world. Total 1999 production from Greenbushes and Wodgina mines: 929 000 pounds or approximately 1/3 world's supply. Resource size: 160 million tonnes averaging 0.0214% Ta₂O₅ or 214 g/t = 75 million pounds. High-purity spodumene concentrates also produced from this mine.
3. Wodgina Mine, Western Australia (Sons of Gwalia Limited website: www.sog.com.au). First primary tantalum-producing mine in Australia. Resource size: 35 million tonnes averaging 0.0402% Ta₂O₅ or 402 g/t = 31 million pounds.
4. Morrua deposit, Mozambique (Cabot Corporation website: www.cabot-corp.com). This deposit contains 4.57 million tonnes of tantalum ore and surface dump reserves of 1.4 million tonnes of unspecified grade. Potential production of 300 000 to 400 000 pounds of tantalum per year.
5. Big Whopper pegmatite, northwestern Ontario (Avalon Ventures Limited website: www.avalonventures.com). Resource: 7.087 million tonnes averaging 0.007% Ta₂O₅ or 70 g/t = 1.1 million pounds.
6. Pakeagama Lake pegmatite, northwestern Ontario (Breaks, Tindle and Smith 1999a, 1999c). Early stage exploration target with promising tantalum values on surface of highly evolved pegmatite with characteristics similar to Tanco pegmatite. Channel samples by Houston Lake Mining Inc. (Press release, November 29, 1999) revealed 285 g/t of Ta₂O₅ across 11 m and a maximum of 620 g/t in late-stage replacement units. Bulk samples by the Ontario Geological Survey revealed a similar range of 0.02 to 0.07% Ta₂O₅ (Breaks, Tindle and Smith 1999b).

Exploration for Tantalum Mineral-Bearing Pegmatite Deposits

The various tantalum-, niobium-, and tin-bearing oxide phases described in the report are commonly overlooked during exploration as they are virtually impossible to verify in the field. Identification requires refined X-ray diffraction work and/or electron microprobe analysis. Difficulty in recognition in the field is in part due to the following

1. fine grain size
2. low modal abundance (for example, an economic tantalum deposit could comprise 0.1 to 0.3 modal percent tantalite)
3. complex intergrowths that involve several tantalum-, niobium- and/or tin-bearing minerals can comprise a single oxide grain
4. general absence of characteristic colours; most oxide phases in the Separation Lake area are black.

In order to aid explorationists and prospectors in locating pegmatites that could host tantalum-bearing minerals, reference to Černý (1989a, 1989b) and Breaks and Tindle (1997, p.13-22) is recommended. Of specific importance is the chemistry of indicator minerals, potassium feldspar and muscovite.

POTASSIUM FELDSPAR CHEMISTRY

This mineral has been established as an important geochemical tool in the economic evaluation of pegmatite deposits (e.g., Černý 1989b, p.288-291). In particular, the Rb and Cs contents and the K/Rb ratio in potassium feldspar can discriminate between various types of rare-element pegmatites and those that are barren of rare elements. Such data are normally assessed in the Cs versus K/Rb plot devised by Černý et al. (1981), whose extensive work in the Cat Lake – Winnipeg River pegmatite field established boundaries between various geochemical assemblages of rare-element class pegmatites: Be-, Li-Be and Li-Cs-Rb-Ta. Application of this diagram to Ontario rare-element pegmatites can be found in Breaks and Tindle (1997, p. 16) and Breaks, Tindle and Smith (1999a, p.175).

MUSCOVITE CHEMISTRY

The Ta, Nb and Cs contents of primary muscovite are particularly useful in assessing the potential presence of tantalum- and niobium-bearing oxide minerals (Odikadze 1958; Heinrich 1962; Beus 1966; Gordiyenko 1971). Gordiyenko (1971) concluded that muscovite from tantalum-rich pegmatites typically exceeds 70 to 90 ppm, whereas columbite-bearing pegmatites are characterized by high Nb levels in the muscovite (200 ppm).

Pegmatites that contain evolved tantalum minerals such as wodginite and manganotantalite, are invariably of the complex-type (Černý 1989a). Such pegmatites would also likely be characterized by elevated bulk cesium levels which is most easily accommodated in the muscovite crystal structure. This observation led Morteani and Gaupp (1989) to advocate the Ta versus Cs diagram as a means of predicting which pegmatites contain tantalum-rich oxide phases. Muscovite from the Tanco pegmatite, for example, contains 900 to 9000 ppm Cs and 70 to 900 ppm Ta (Morteani and Gaupp 1989, p.306). Muscovite from complex-type pegmatites of the Separation Lake area reveal Cs and Ta concentration ranges of 70 to 300 ppm and 100 to 3000 ppm, respectively (A.G. Tindle and F.W. Breaks, unpublished data, 1999).

Summary

An investigation into the Ta mineralization of the Separation Lake area has revealed a wide range of Ta species which include: ferrocolumbite, ferrotantalite, manganocolumbite, manganotantalite, ferrotapiolite, ixiolite, strüverite, wodginite, ferrowodginite, titanowodginite, ferrotitanowodginite, microlite, bismutomicrolite, stibiomicrolite, stibiobetafite, uranmicrolite, yttropyrochlore, cassiterite and a potentially new species—a tungsteniferous variety of wodginite. Of these, the columbite-tantalite group and cassiterite represent the most widely distributed species, closely followed by wodginite group species (in the eastern subgroup pegmatites). Ixiolite, strüverite and most of the pyrochlore group species are of very restricted occurrence, but localized concentrations of ferrotapiolite or microlite could be of economic interest as these two minerals have high Ta₂O₅ contents. For example, a 30 cm thick albitite dike at location 96-9 contains a bulk Ta₂O₅ of 0.16% (Breaks and Tindle 1997, p.11) that is due to a relatively high tapiolite content.

Zonation and variation of Ta₂O₅ in individual species and between individual pegmatites is often pronounced and on the basis of columbite-tantalite compositions two distinct groupings have emerged: an Fe-suite and a less common Mn-suite. The difference is thought to be due to fluorine activity in the parental magmas of the pegmatites, with Mn-suite pegmatites, in particular those with lepidolite characteristics having the greatest fluorine activity. Columbite-tantalite compositions are also consistent with the model that the ultimate parent of the pegmatites (and the rare elements) is the Separation Rapids pluton.

A comparison of columbite-tantalite compositions in the two giant Separation Rapids pegmatites suggests the Big Mack pegmatite may be a precursor to the Big Whopper pegmatite. In both pegmatites, the Ta content of columbite-tantalite is elevated (to 63.5 wt % Ta₂O₅ in the Big Mack and 76.4 wt % Ta₂O₅ in the Big Whopper) due to protracted fractionation. Similar to other pegmatites of the SW subgroup, they contain a paucity of wodginite group minerals.

Most wodginite group minerals can be considered to be the highly evolved products of two distinct, but possibly related, rare-element oxide fractionation paths. The Separation Rapids granite and most eastern Fe-suite beryl and petalite pegmatites evolved through the sequence ferrocolumbite → ferrocolumbite + ferrowodginite → ferrotantalite + ferrowodginite → pyrochlore group minerals, whereas the Mn-suite pegmatites such as Marko's followed an evolutionary trend from manganocolumbite → manganocolumbite + wodginite → manganotantalite + wodginite → pyrochlore group minerals.

Wodginite group data from Marko's pegmatite include the extremely rare titanowodginite and ferrotitanowodginite species, whereas in Pegmatite 5 data has been collected on a potentially new tungsteniferous species of wodginite.

The field classification of the pegmatites into beryl-type and complex-type, petalite-subtype pegmatites is fully supported. In contrast to chemical data from Separation Rapids potassium feldspar samples (Breaks and Tindle 1997), chemical differences in columbite-tantalite do not produce distinct groupings as might be expected if the beryl pegmatites were early fractionates of a parental magma that went on to produce petalite pegmatites later in its history. Whatever the reason, fractionation of these two pegmatite types produced columbite-tantalite with essentially the same ranges of composition (with the exceptions of the low X_{Mn}, ferrotapiolite-bearing pegmatites). These include all beryl-type pegmatites and the Swamp pegmatite and the lepidolite unit of the Big Whopper pegmatite, the latter two of which span the gap between petalite-subtype pegmatites and lepidolite-subtype pegmatites). Petalite pegmatites do, however, have a greater propensity to crystallize wodginite and pyrochlore group minerals, which in this respect makes them more evolved than the beryl pegmatites.

Acknowledgments

Kay Green, Brian Ellis and John Watson are thanked for producing many polished thin sections and blocks for microprobe analysis. AGT thanks the Mineralogical Society for a Senior Travel Bursary awarded in 1994 and the Ontario Geological Survey for support in the field during the past six years. Avalon Ventures Ltd., Toronto, Ontario, and Emerald Fields Resource Corporation, Kenora, Ontario, are thanked for access to surface samples and for core material. Steve Smith is also thanked for access to samples.

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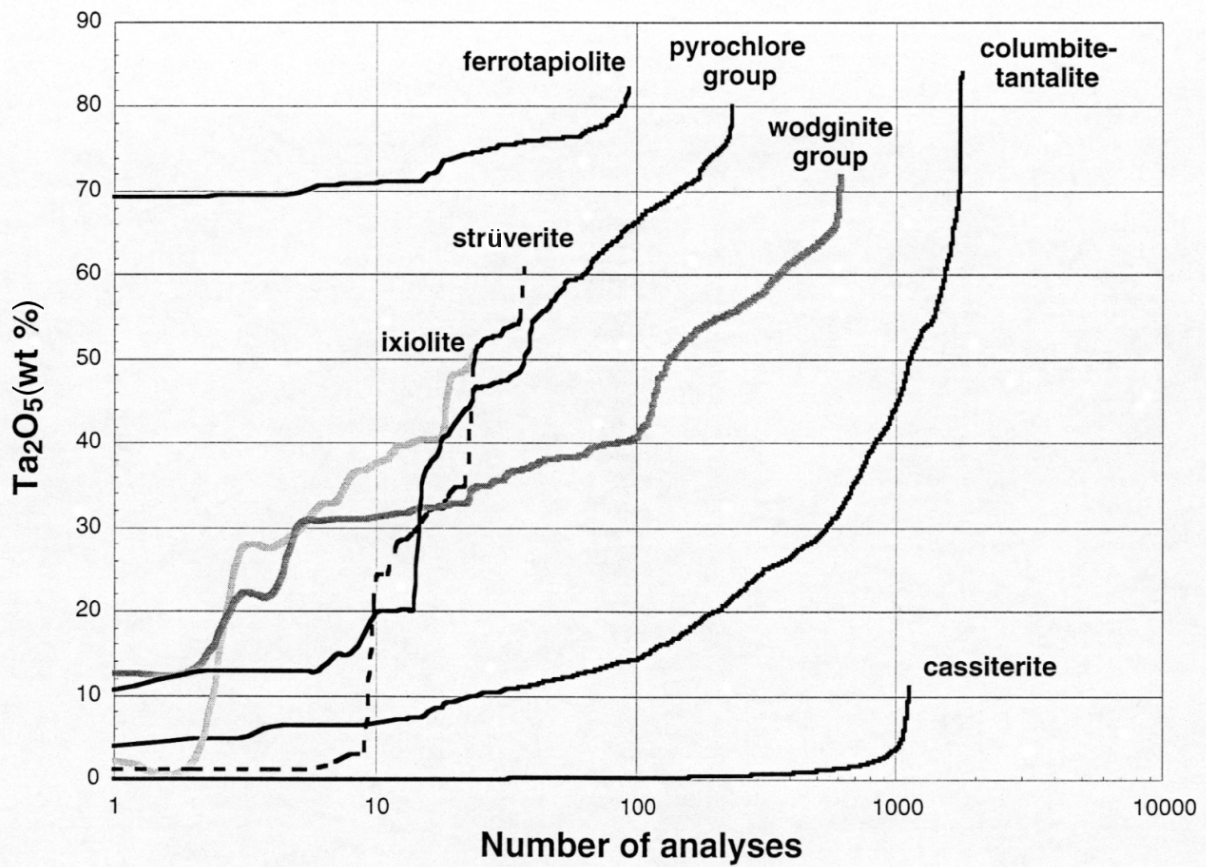


Figure 1. Number of analyses versus Ta₂O₅ illustrating the dominance of the columbite-tantalite group and cassiterite and the high Ta₂O₅ concentrations in the columbite-tantalite group, wodginite group, pyrochlore group and ferrotapiolite.

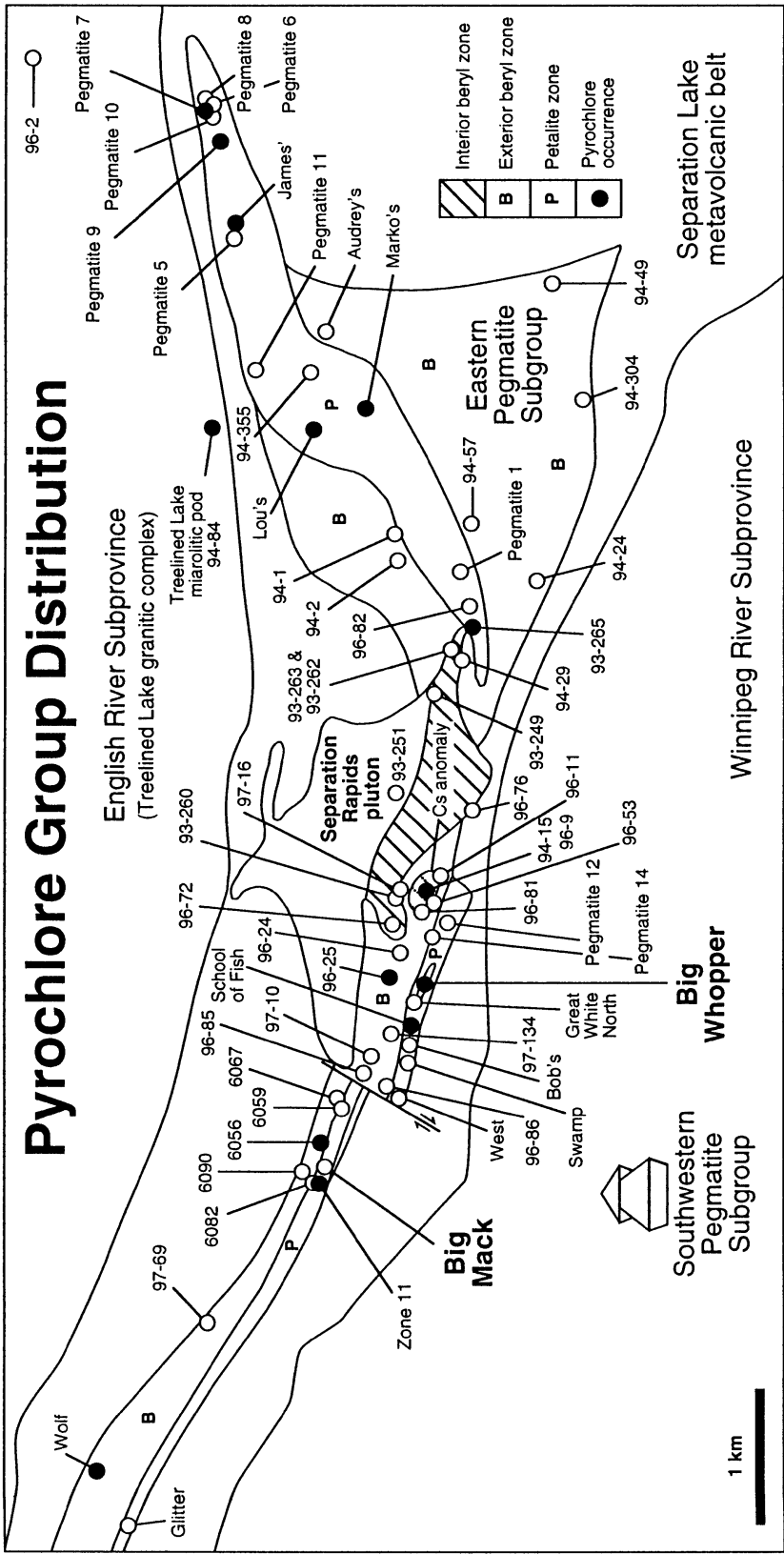


Figure 5. Pyrochlore group distribution map.

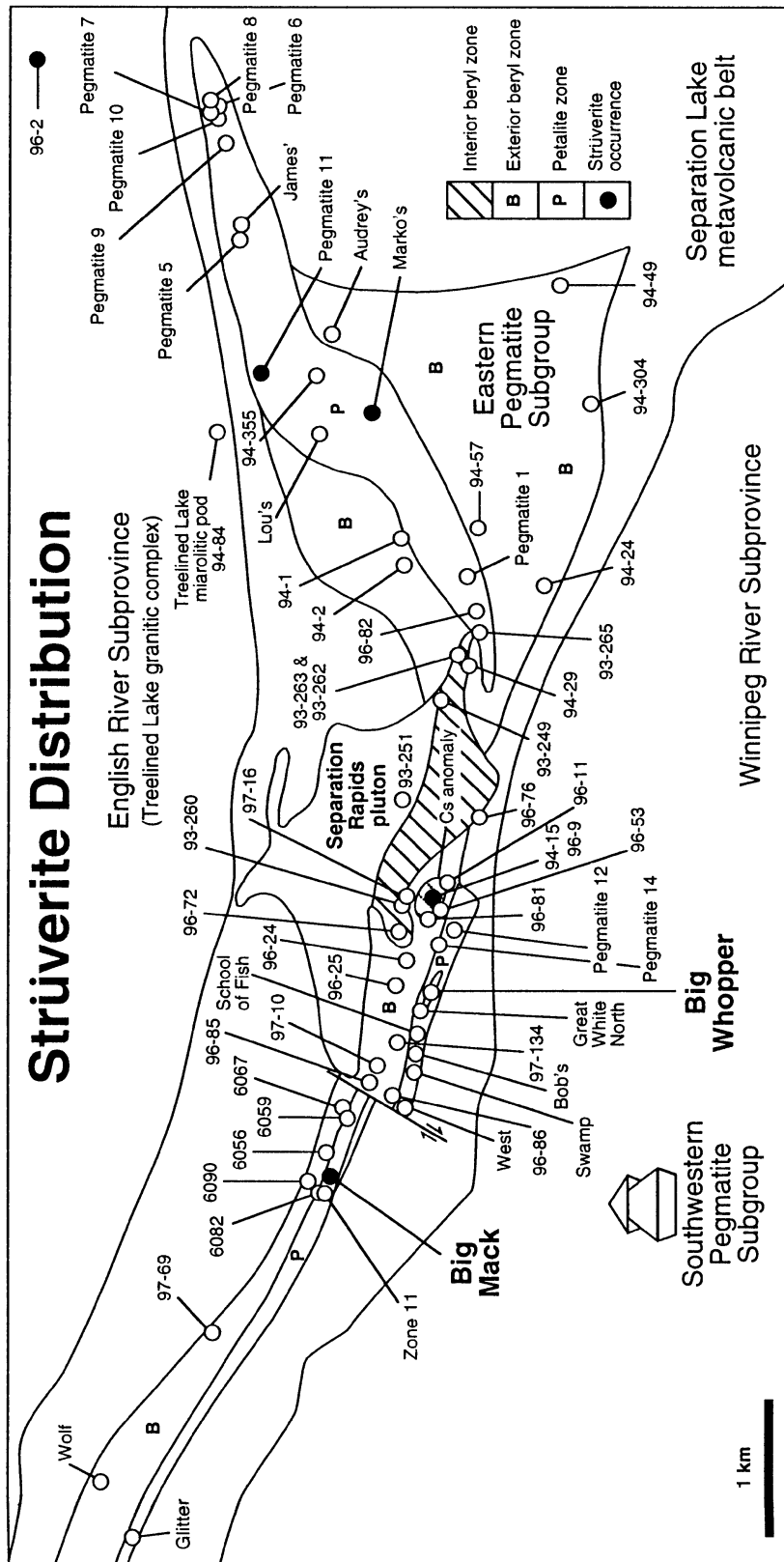


Figure 7. Strüverite distribution map.

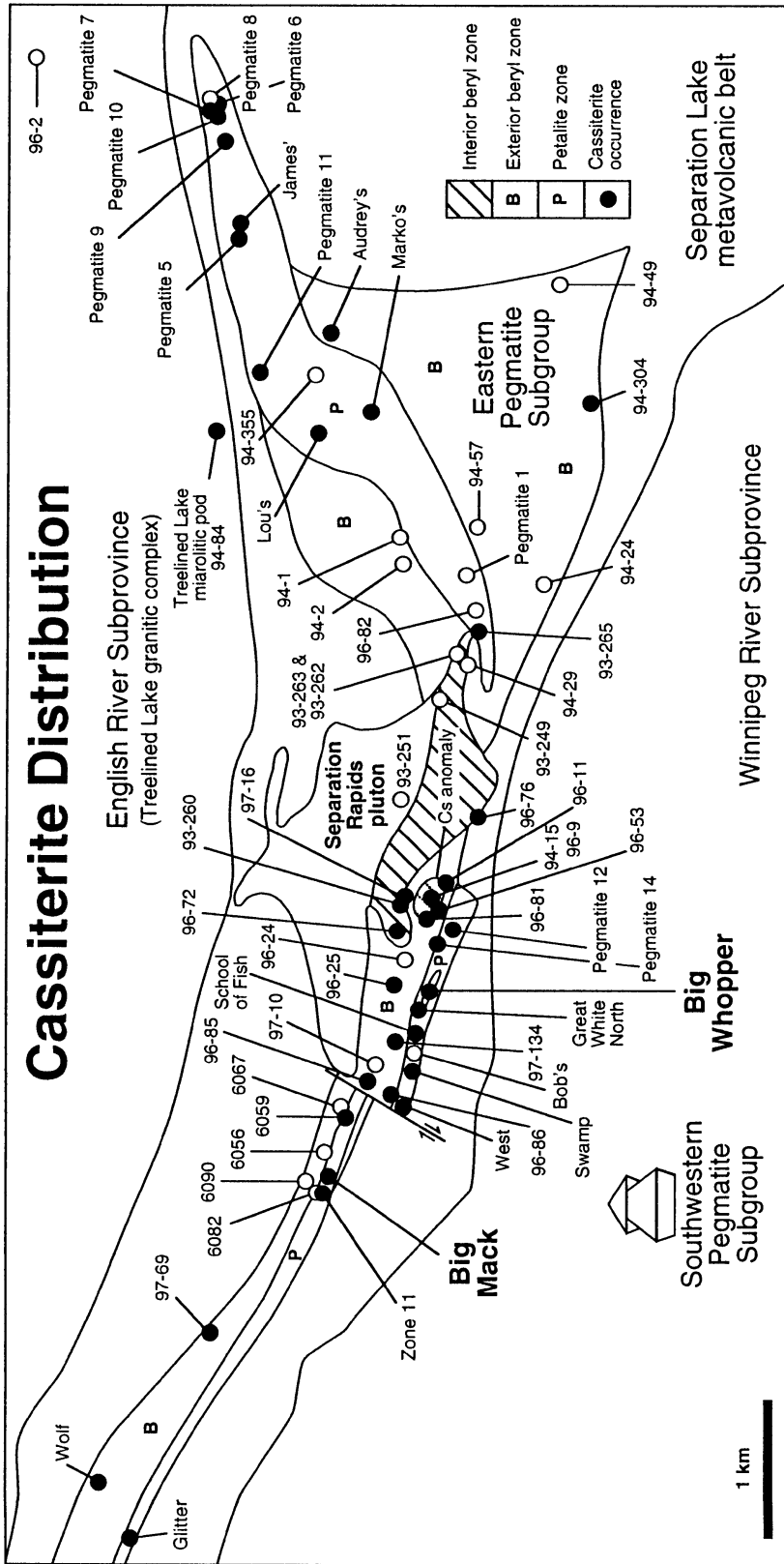


Figure 8. Cassiterite distribution map.

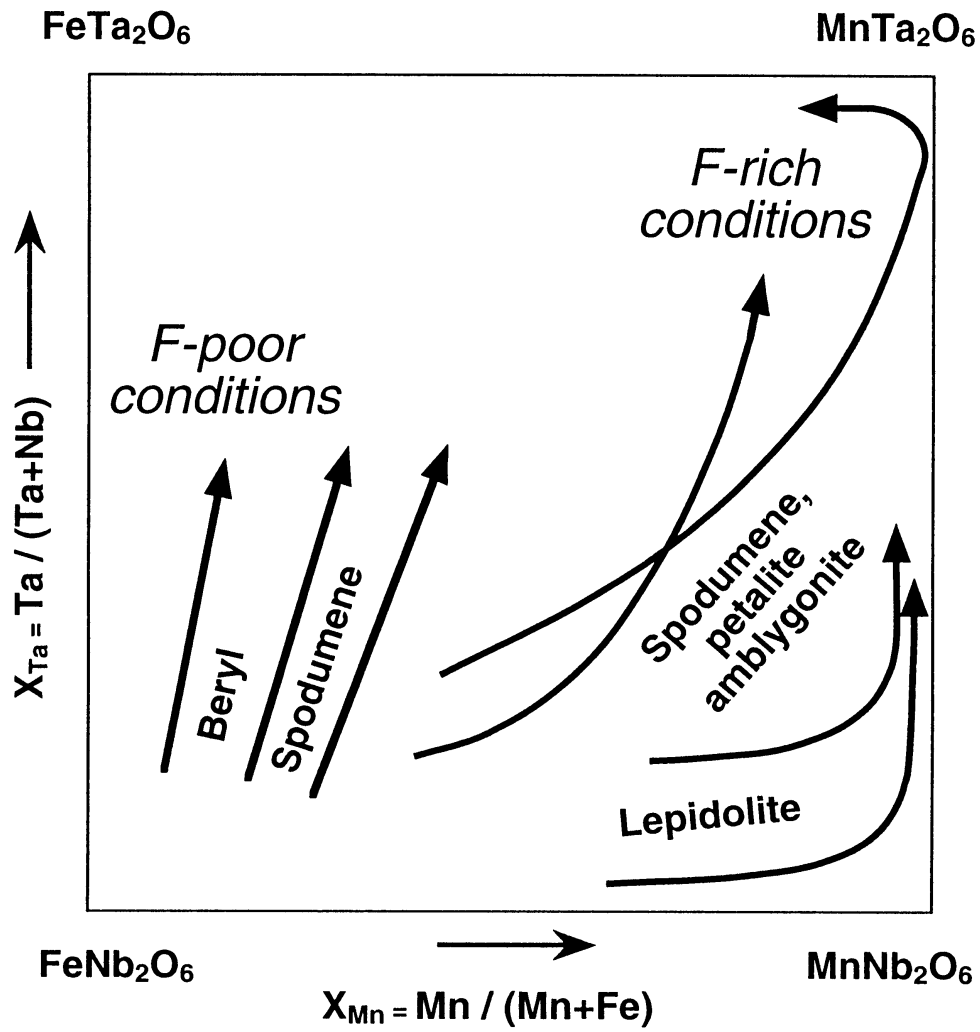


Figure 9. Columbite-tantalite quadrilateral based on Černý (1989a, 1992). Vectors describe variation trends in beryl-type and complex-type (spodumene-, petalite- amblygonite- and lepidolite-subtype) pegmatites.

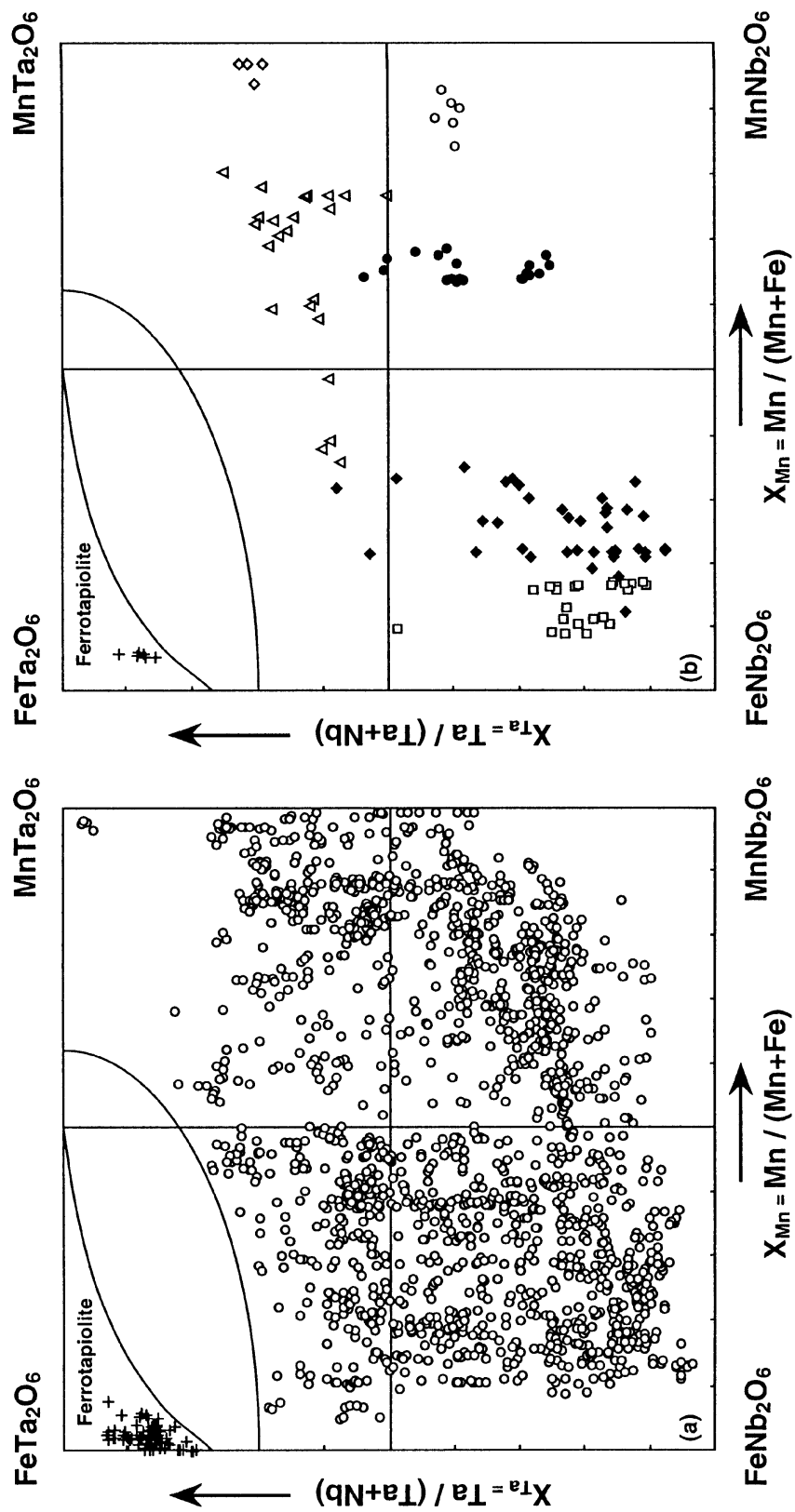


Figure 10. Columbite-tantalite quadrilateral. (a) Full Separation Rapids dataset for columbite-tantalite (open circles) and ferrotapiolite (open squares) are shown. (b) Columbite-tantalite from the Separation Rapids pluton and associated Li-mica-cleavelandite pods. Symbols: open squares, primitive pluton compositions; solid diamonds, evolved pluton compositions; open triangles, diamonds and circles, three samples from Li mica-cleavelandite pods at location 9-3-260; solid circles, Mn columbite-tantalite from a miarolitic cavity in the Tree-lined Lake Complex. Ferrotapiolite data from the southwestern margin of the Separation Rapids pluton are also plotted (plus symbols).

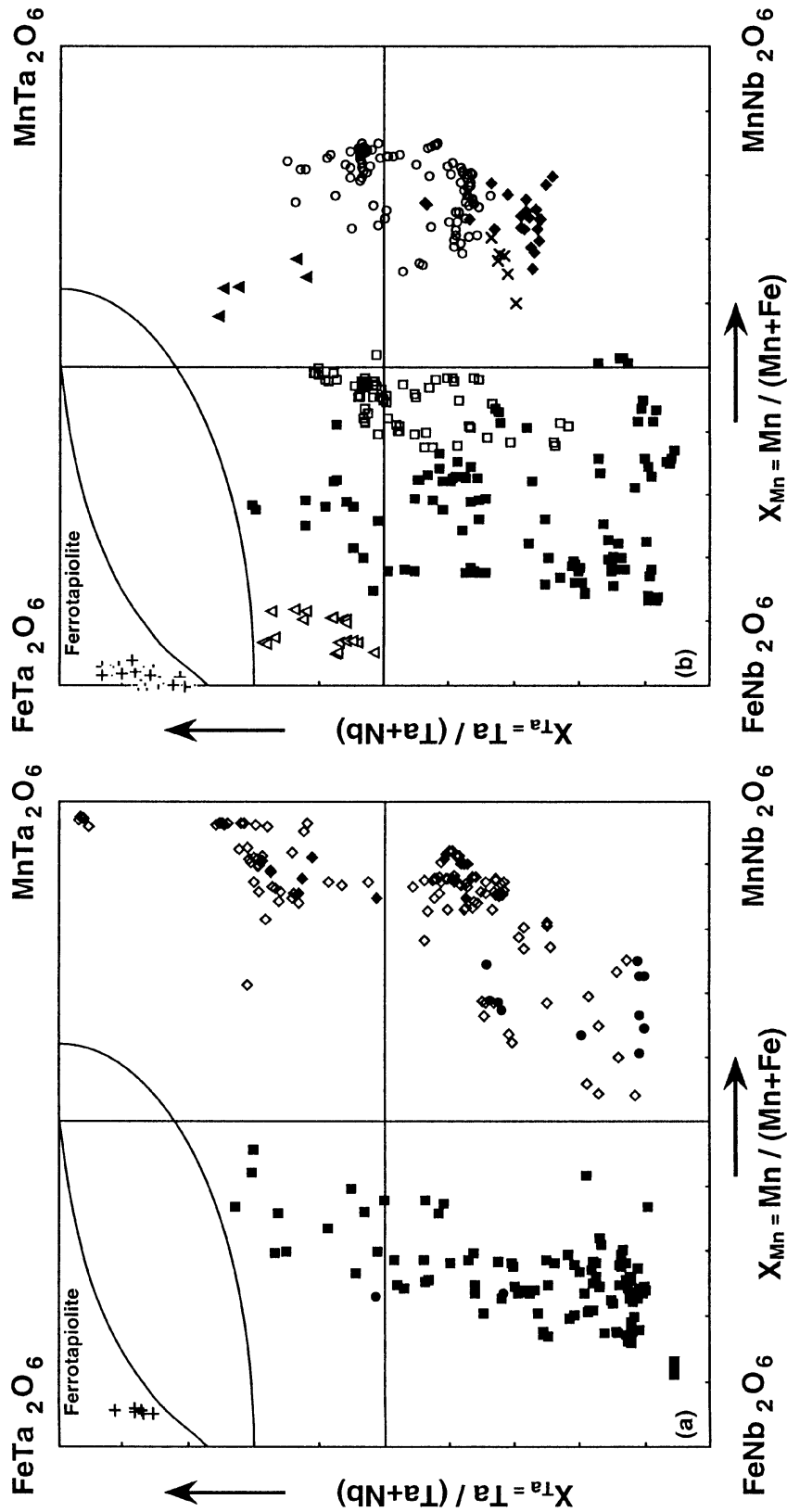


Figure 11. Columbite-tantalite quadrilateral. (a) Eastern subgroup beryl pegmatite data. Data for nine Fe-suite pegmatites are grouped together (solid squares), Mn-suite pegmatites 93-263 (solid diamonds), 93-265 (open diamonds) and 94-304 (solid circles) are plotted individually. (b) Southwestern subgroup beryl pegmatite data. Symbols: open triangles, primitive pegmatites associated with ferrotapiolite (96-9 and 96-81); solid squares, main group of Fe-suite pegmatites. Mn-suite pegmatites 97-10A (solid triangles), Wolf pegmatite (solid diamonds), 96-24 (plus symbols), 96-86A (open circles) are plotted individually. The last two samples are from Li mica-cleavelandite pods. Ferrotapiolite data from five Fe-suite pegmatites are also plotted (plus symbols).

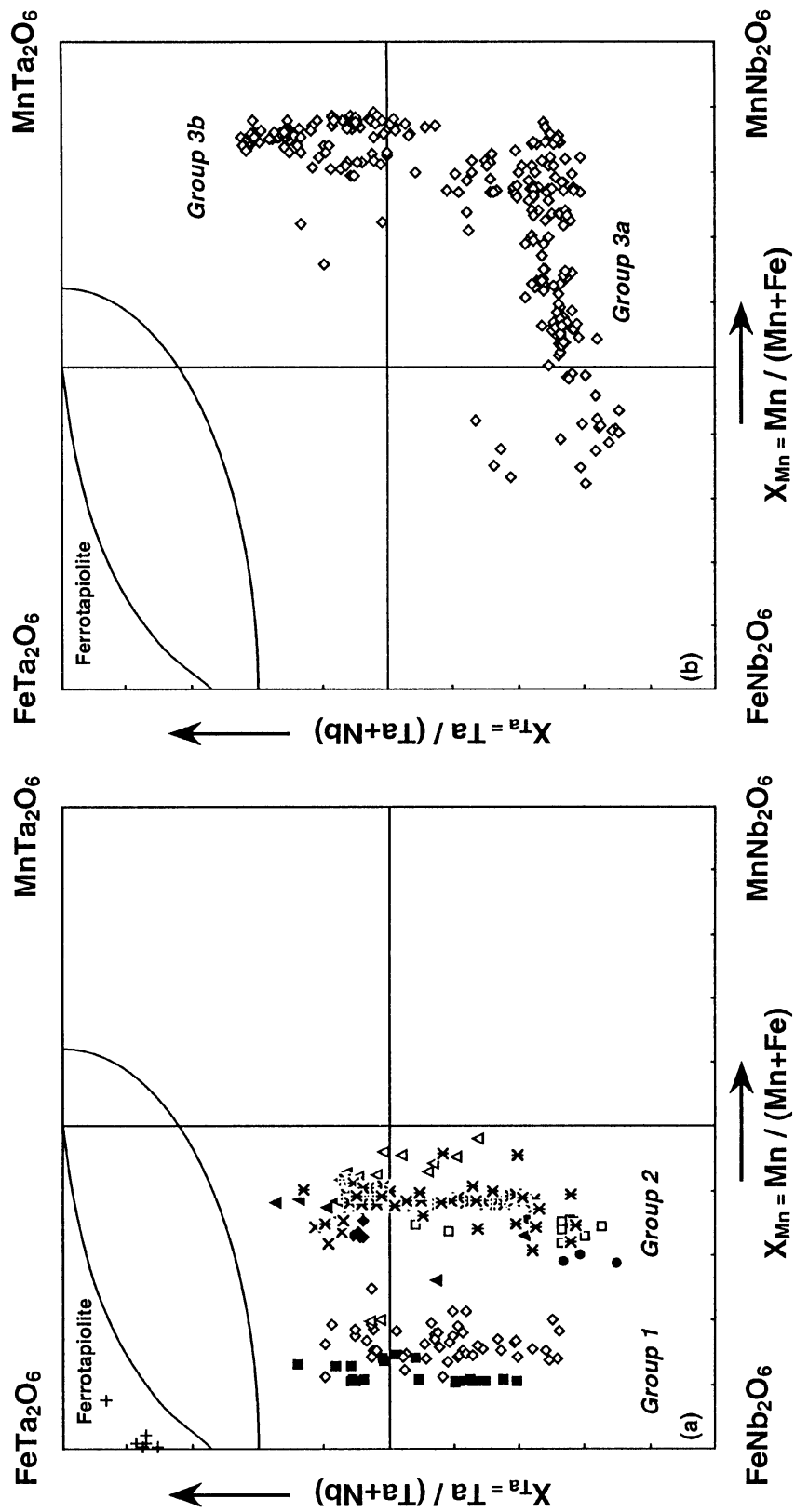


Figure 12. Columbite-tantalite quadrilateral. (a) Eastern subgroup Fe-suite petalite pegmatites. Group 1, is represented by Pegmatites 9 (solid squares) and 10 (open diamonds), and Group 2 by Pegmatites 1 (open squares), 5 (solid diamonds), 7 (open triangles), 8 (solid circles), 11 (solid triangles), James' pegmatite (crosses) and Lou's pegmatite (star symbols). Ferrotapiolite data from Pegmatites 5 and 10 are also plotted (plus symbols). (b) Marko's pegmatite, an eastern Mn-suite petalite pegmatite. The outer layered pegmatite-aplite unit is defined by the flat-lying (constant X_{Ta}) trend (3a) and the petalite core zone and associated muscovite-albite replacement unit are represented by the vertical (constant X_{Mn}) trend (3b).

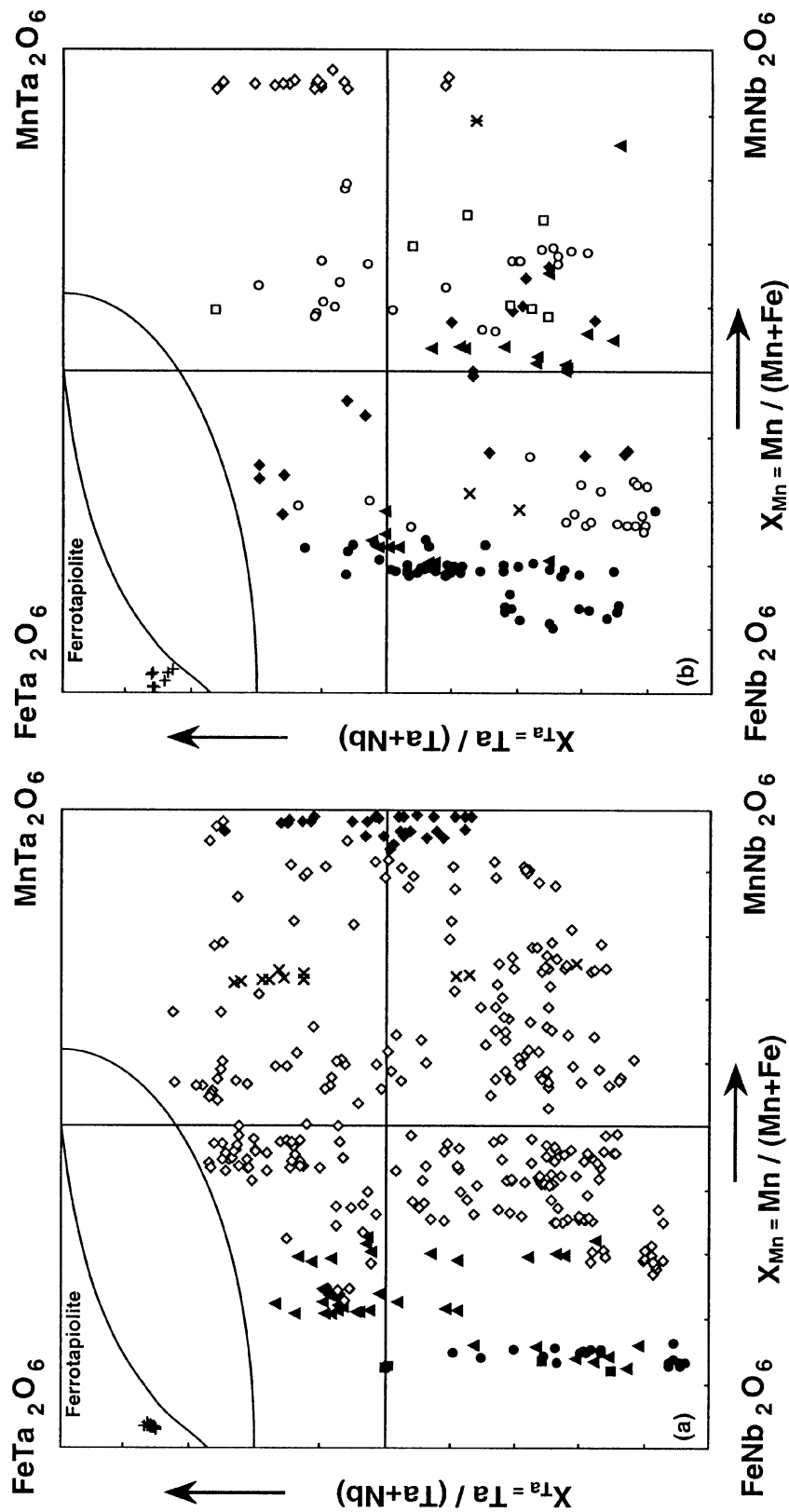


Figure 13. Columbite-tantalite quadrilateral. (a) Major SW subgroup petalite pegmatites. Samples from the Big Mack system are represented by the Big Mack pegmatite (solid triangles), Zone 11 pegmatites (solid circles) and the pegmatite from location EFR-6059 (crosses). The Big Whopper pegmatite and its associated lepidolite unit are represented by open and solid diamonds, respectively. The anomalous sample from the Big Whopper (97-BW5) is plotted with a solid square symbol. (b) Other SW subgroup petalite pegmatites include Pegmatite 12 (star symbols), Pegmatite 14 (crosses), Glitter (solid circles), Great White North (open circles), West (solid triangles), School of Fish (solid diamonds), Bob's (open squares), Swamp (open diamonds). The first three and last two pegmatites are exclusively Fe-suite and Mn-suite pegmatites, respectively. Ferrotapiolite data from a School of Fish pegmatite are also plotted (plus symbols).

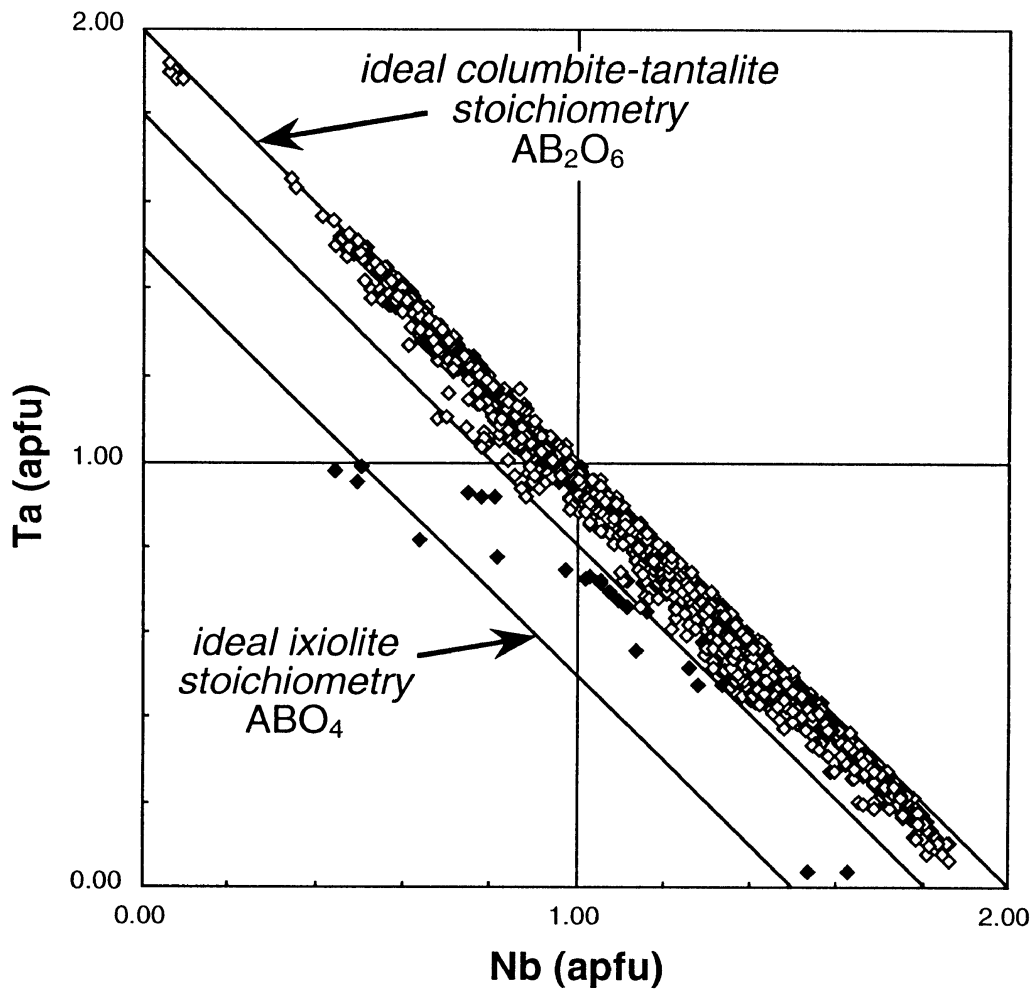


Figure 14. Nb versus Ta atoms per formula unit (apfu) for the entire columbite-tantalite and ixiolite dataset. Columbite-tantalite (open diamonds) with ideal AB₂O₆ stoichiometry should fall along a tie line between Nb and Ta = 2 atoms per formula unit (apfu), and ixiolite (solid diamonds) with ideal ABO₄ stoichiometry, along a tie line between Nb and Ta = 1.5 (apfu). For the Separation Rapids pegmatites, a dividing line between the two has been defined at Nb and Ta = 1.8 (apfu), a similar position as that defined by Neiva (1996).

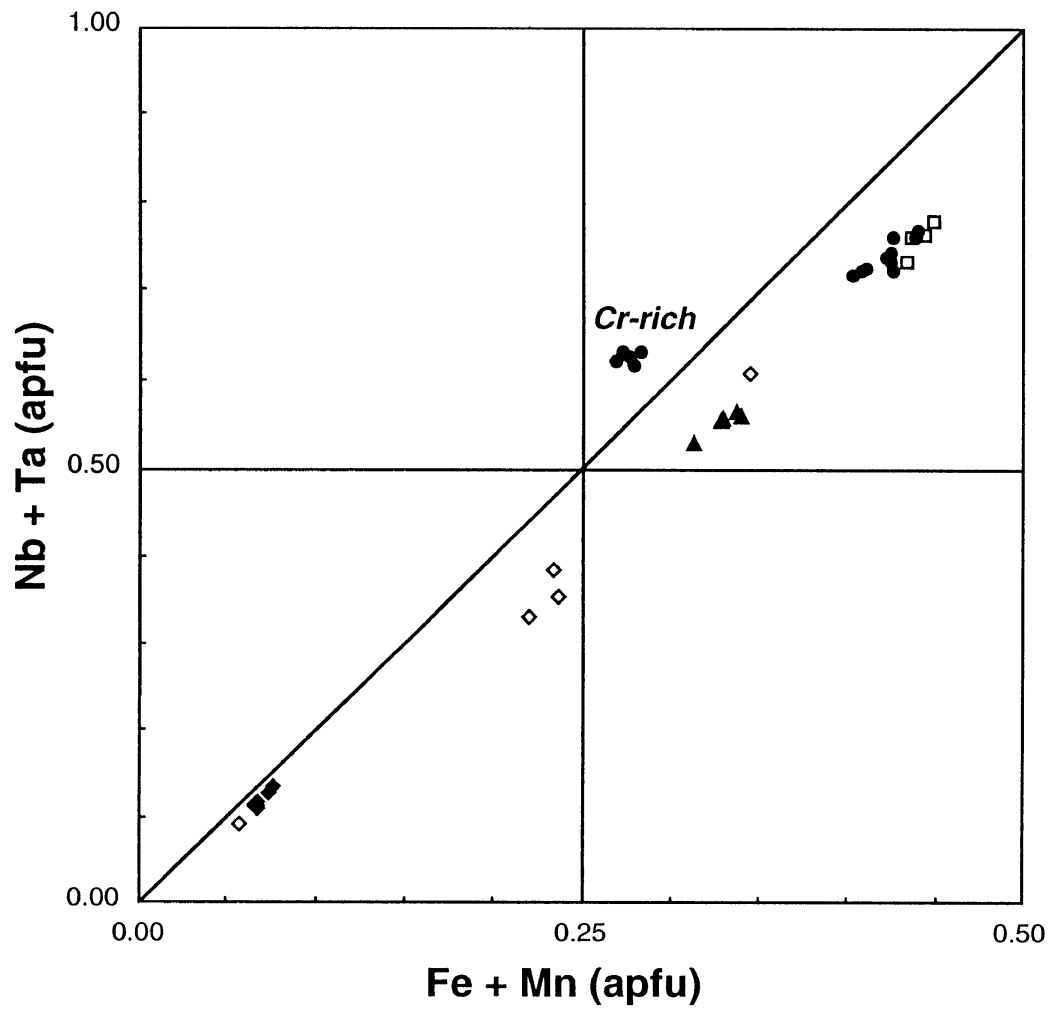


Figure 15. Fe+Mn versus Nb+Ta (apfu) for the strüverite dataset. Symbols: solid diamonds, Treelined Lake Complex; open squares, SW subgroup beryl pegmatite 96-9; solid triangles, Pegmatite 11; open diamonds, Marko's pegmatite; and solid circles, Big Mack pegmatite. Data approaching the origin of the graph are, in fact, ilmenorutile.

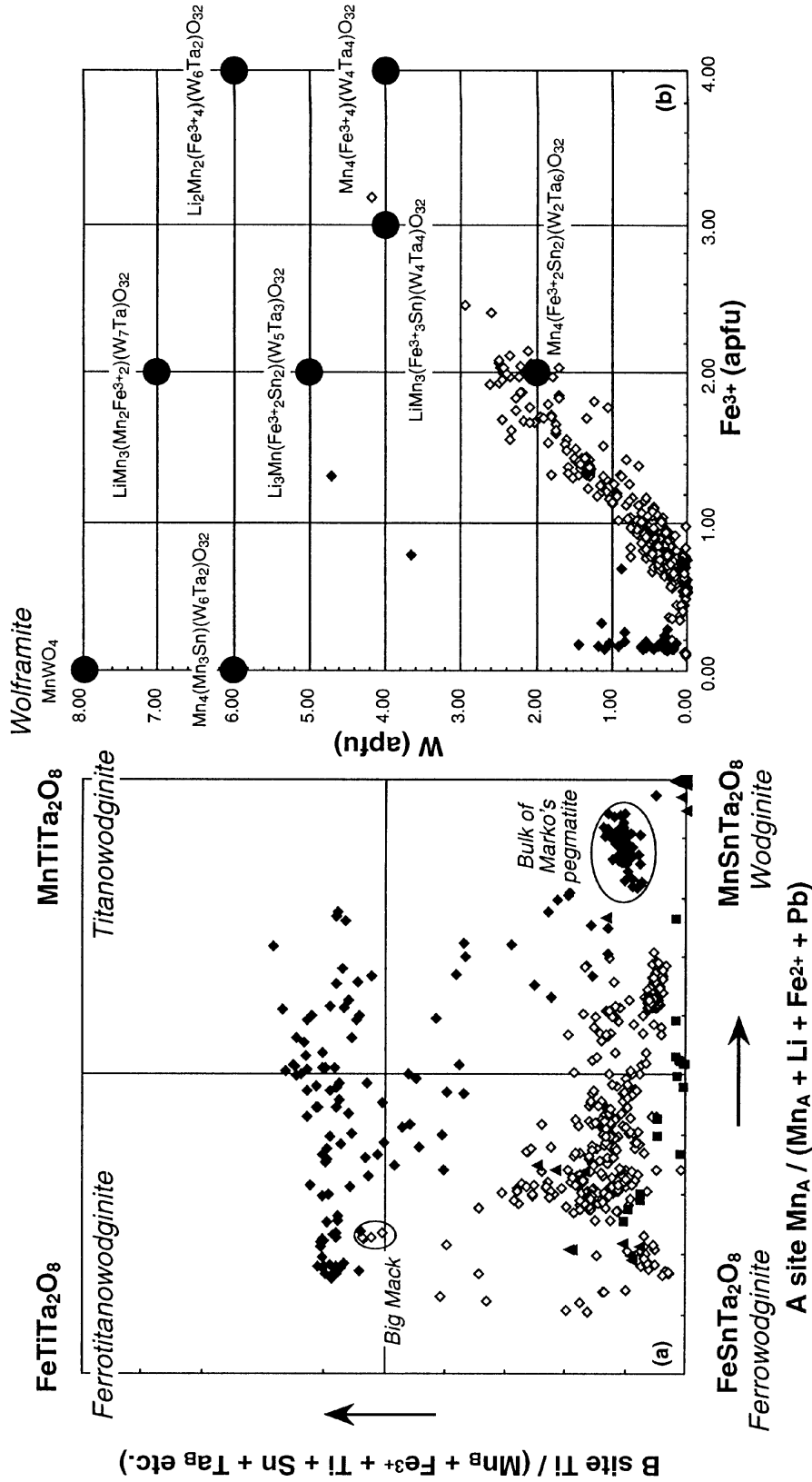


Figure 16. (a) Wodgite quadrilateral for the entire Separation Lake dataset. The data is divided into Separation Rapids pluton (solid squares), all beryl pegmatites (solid triangles), all petalite pegmatites, excluding Marko's (open diamonds) and Marko's pegmatite (solid diamonds) for most of the Separation Rapids wodgite group dataset, illustrating good correlation of these elements. Beryl pegmatite from location 93-265 is plotted separately (solid diamonds). For clarity, data Marko's pegmatite is not plotted.

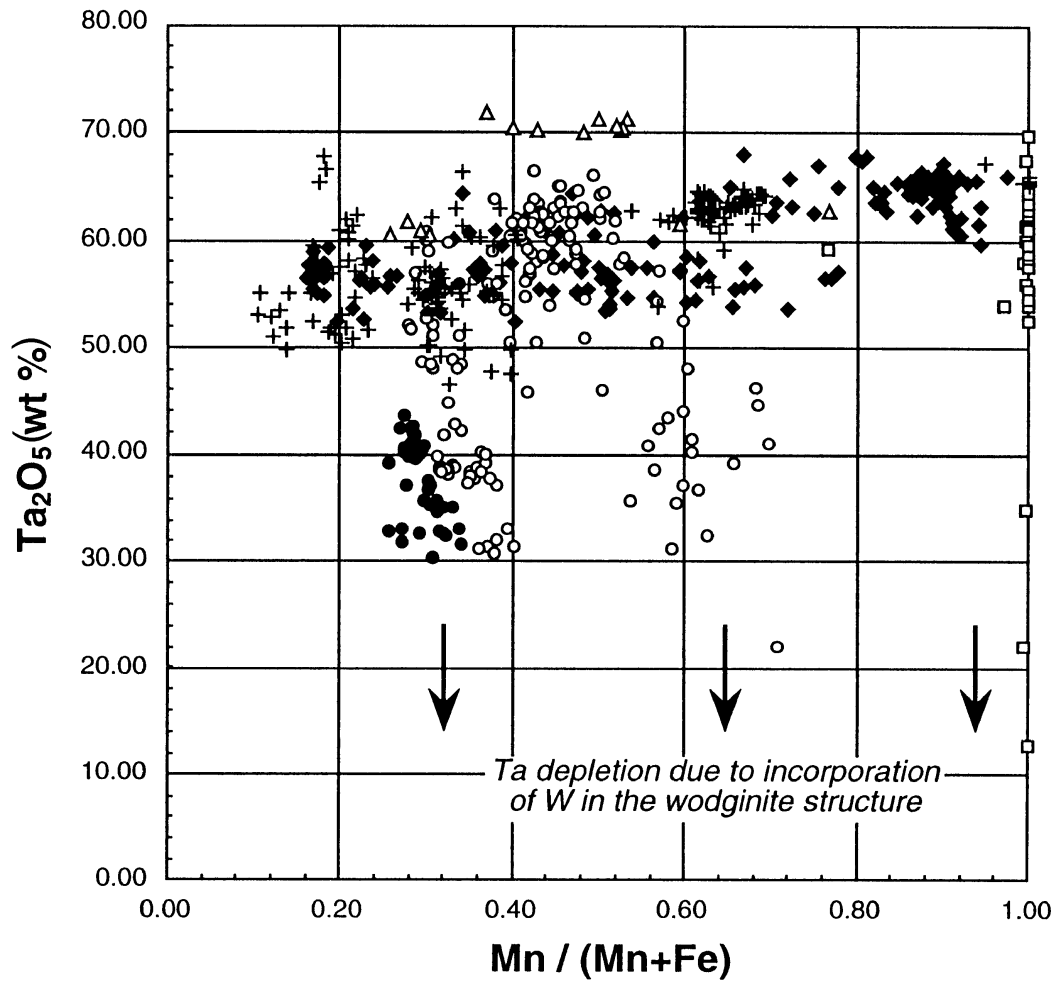


Figure 17. Mn/(Mn+Fe) versus Ta_2O_5 wt % for all wodginite group data from the Separation Rapids pluton and pegmatites. Much of the data (solid squares, pluton; solid diamonds, Marko's pegmatite; open diamonds, most beryl and petalite pegmatites) follow a general trend from 50 wt % toward 70 wt % Ta_2O_5 apart from those samples where W substitution for Ta has occurred; e.g., Pegmatite 5 (plus symbols), Pegmatite 6 (crosses) and at location 93-265 (solid triangles).

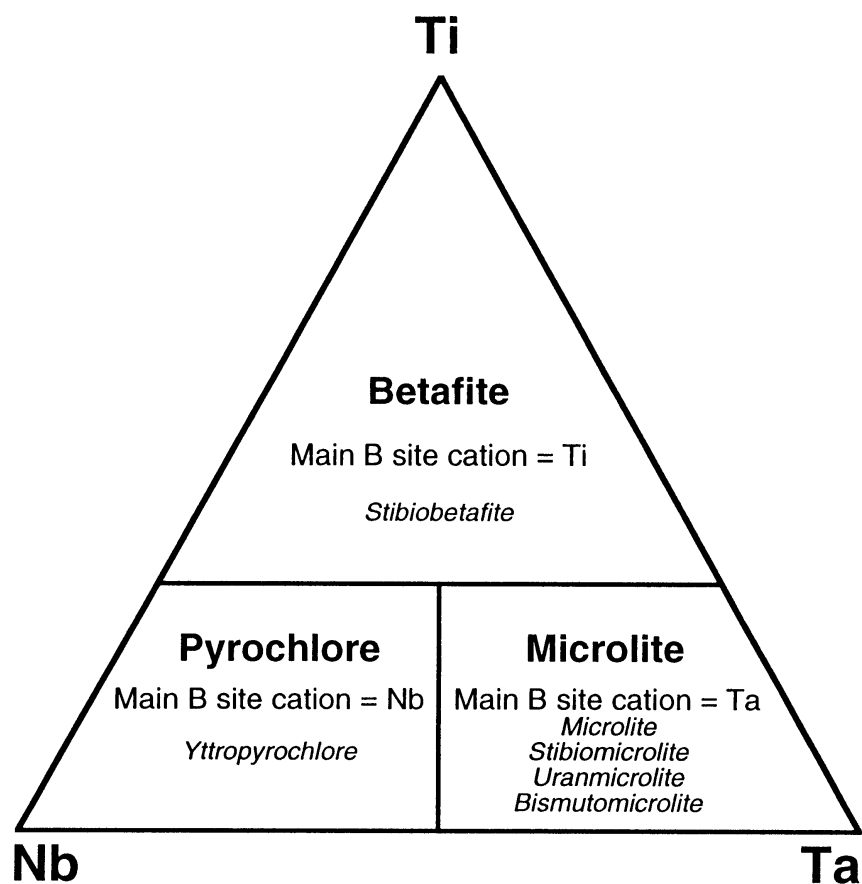


Figure 18. The three main subgroups (betafite, pyrochlore and microlite) of the pyrochlore group according to the classification scheme of Hogarth (1977). Names in italics are those species found in the Separation Lake area.

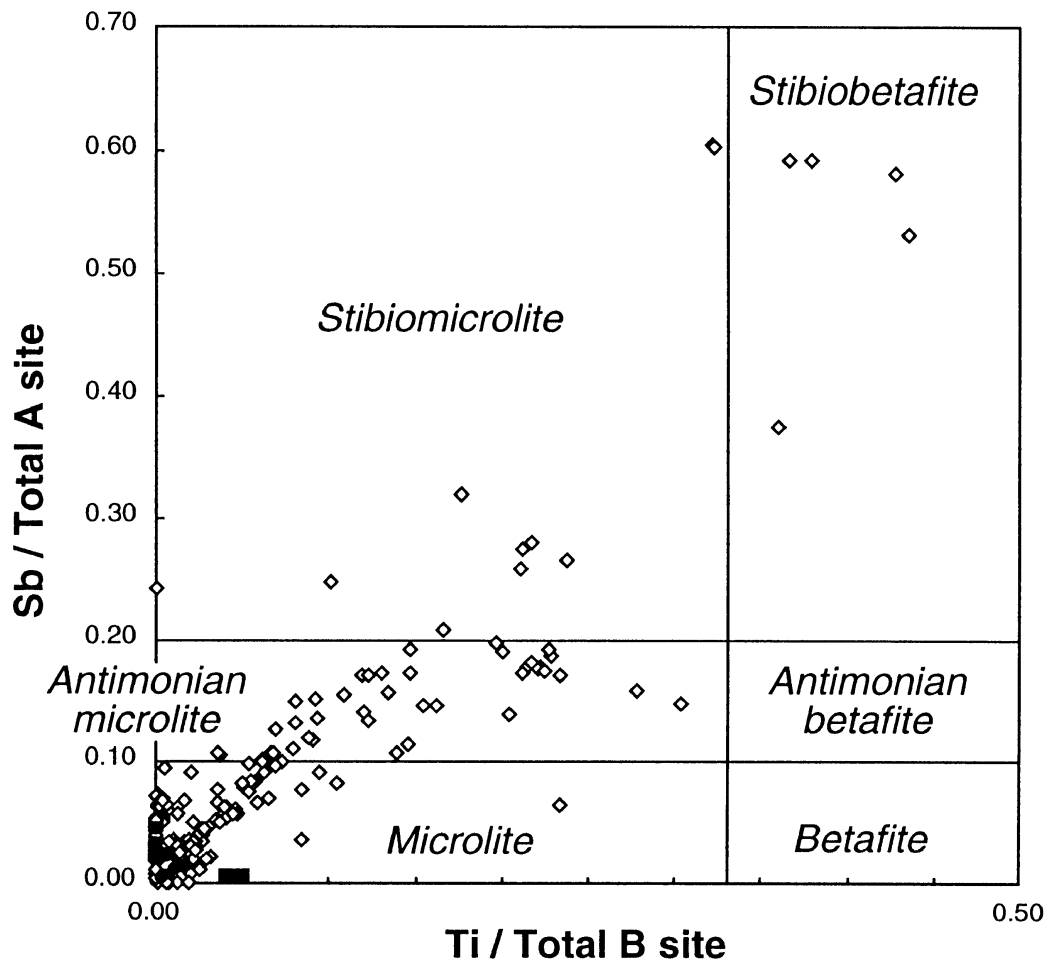


Figure 19. Ti/total B site versus Sb/total A site for pyrochlore group minerals from the Treelined Lake complex and Separation Rapids pegmatites.

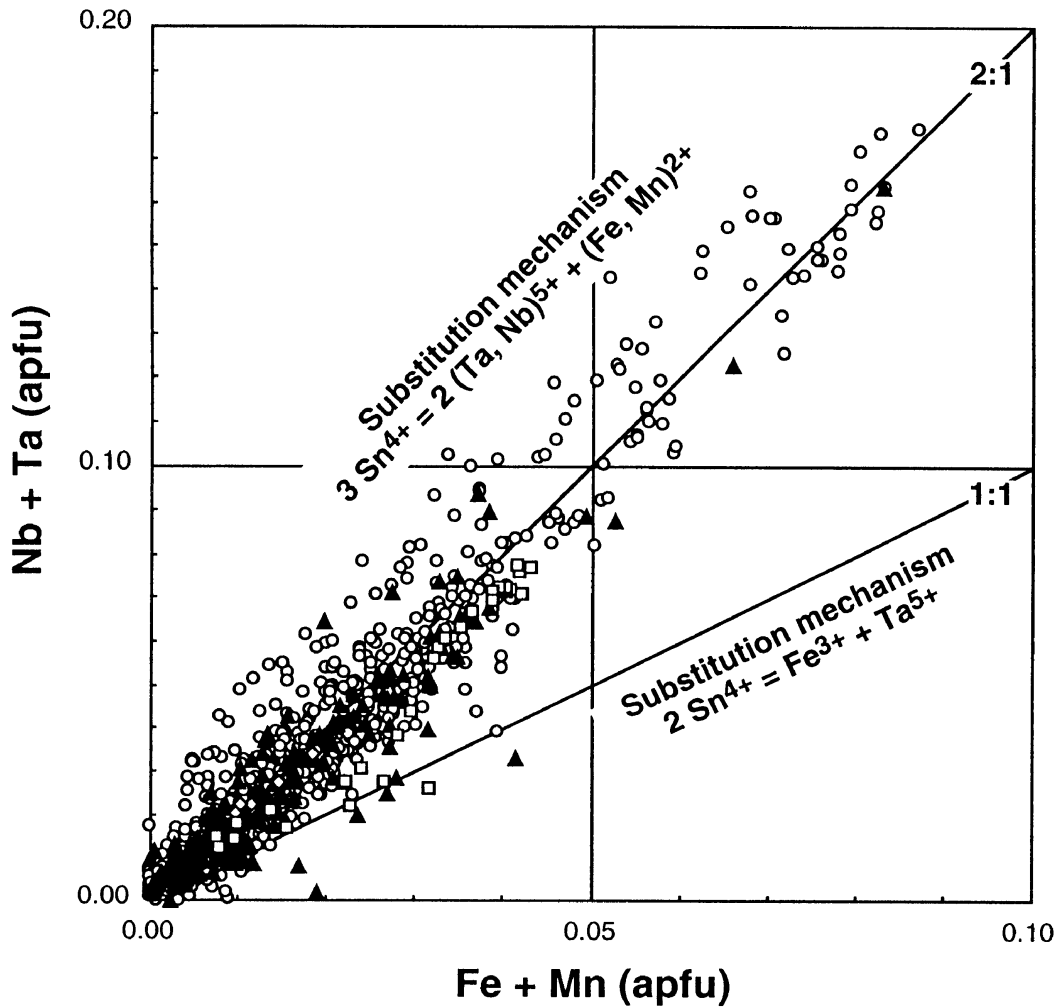


Figure 20. Fe+Mn versus Nb+Ta (apfu) for all cassiterite data from the Separation Lake area. Symbols: open diamonds, Treelined Lake Complex; open squares, Separation Rapids pluton; solid triangles, beryl pegmatites; open circles, petalite pegmatites. The bulk of the data fall along a linear array with Nb+Ta and Fe+Mn predominantly varying in the ratio of 2:1 corresponding to the coupled substitution: $3 \text{Sn}^{4+} \leftrightarrow 2(\text{Nb,Ta})^{5+} + (\text{Fe,Mn})^{2+}$. Additionally, cassiterite compositions approaching the 1:1 substitution line on suggest a $\text{Fe}^{3+}(\text{Nb,Ta})\text{O}_4$ component in a few of the cassiterite analyses, consistent with the substitution: $2\text{Sn}^{4+} \leftrightarrow \text{Fe}^{3+} + \text{Ta}^{5+}$ (Černý and Ercit 1989).

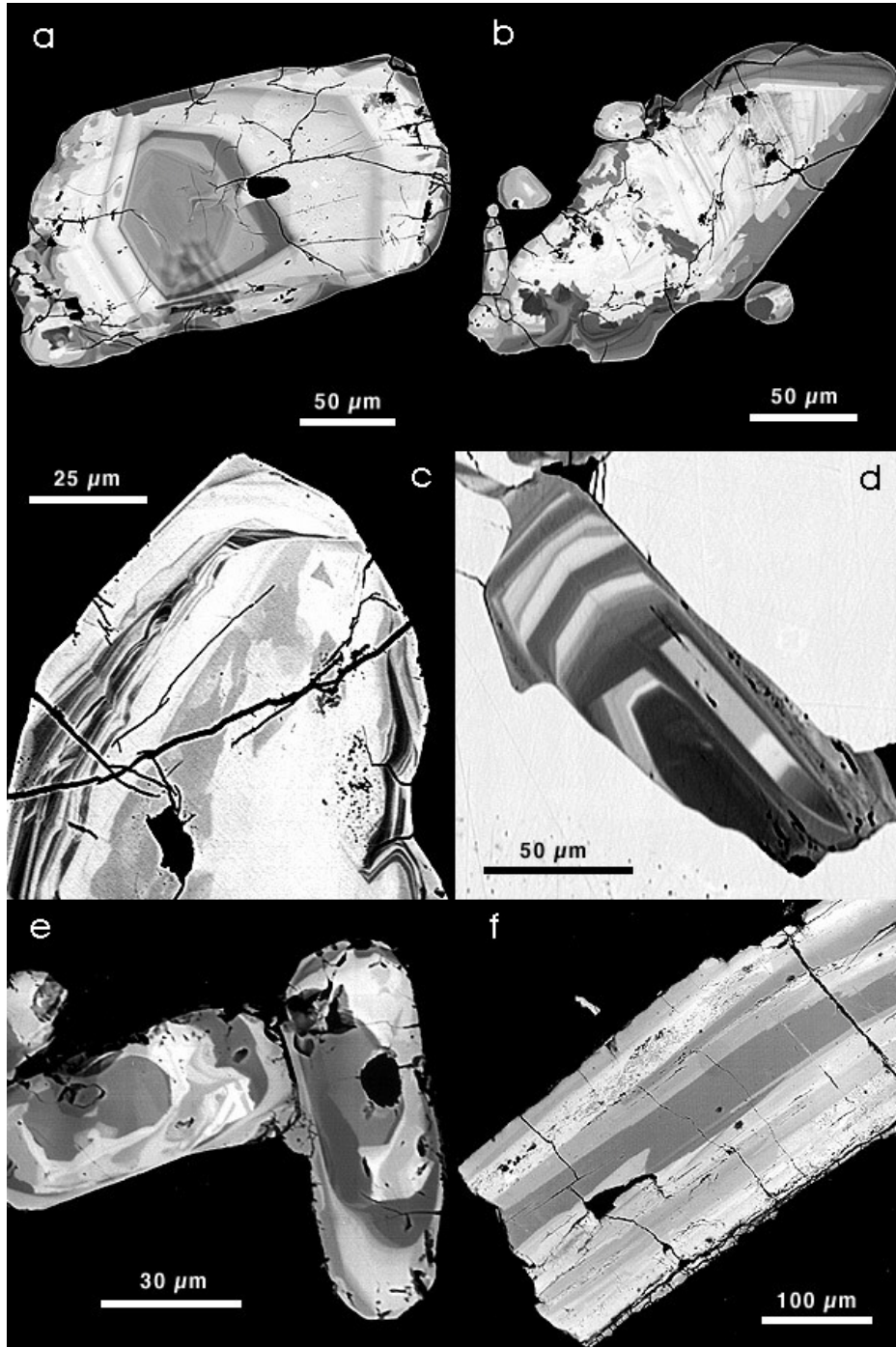


Photo 1. Backscattered electron images of columbite-tantalite exhibiting primary zonation. (a) Oscillatory zoned grain (manganocolumbite core to manganotantalite rim). Mn-suite eastern subgroup beryl pegmatite; 93-263. (b) Oscillatory zoned grain where niobium-rich rim truncates earlier, strongly zoned part of grain (manganotantalite core to manganocolumbite rim). Mn-suite eastern subgroup beryl pegmatite; 93-263. (c) Euhedral oscillatory zoned (mainly) ferrocolumbite exhibiting irregular and discontinuous zones indicating many episodes of dissolution that have led to truncated layers and angular unconformities. Fe-suite eastern subgroup petalite pegmatite; Lou's, 93-272B. (d) Oscillatory zoned ferrocolumbite inclusion in cassiterite. Fe-suite SW subgroup petalite pegmatite; Zone 11 (Big Mack system), 99-ATZ11. (e) Oscillatory zoned subhedral crystals with ferrocolumbite cores and ferrotantalite margins. Note the rounded corners, embayments and general discontinuity of the zonation. SW subgroup petalite pegmatite; Big Whopper, 97-186A. (f) Manganocolumbite core to manganotantalite rim. Tantalum-rich zones are porous and end of crystal has been broken away. Mirolitic cavity in Treelined Lake Complex; 94-84A. In this and all other figures of this type (a) top left, (b) top right, (c) middle left, (d) middle right, (e) bottom left, (f) bottom right.

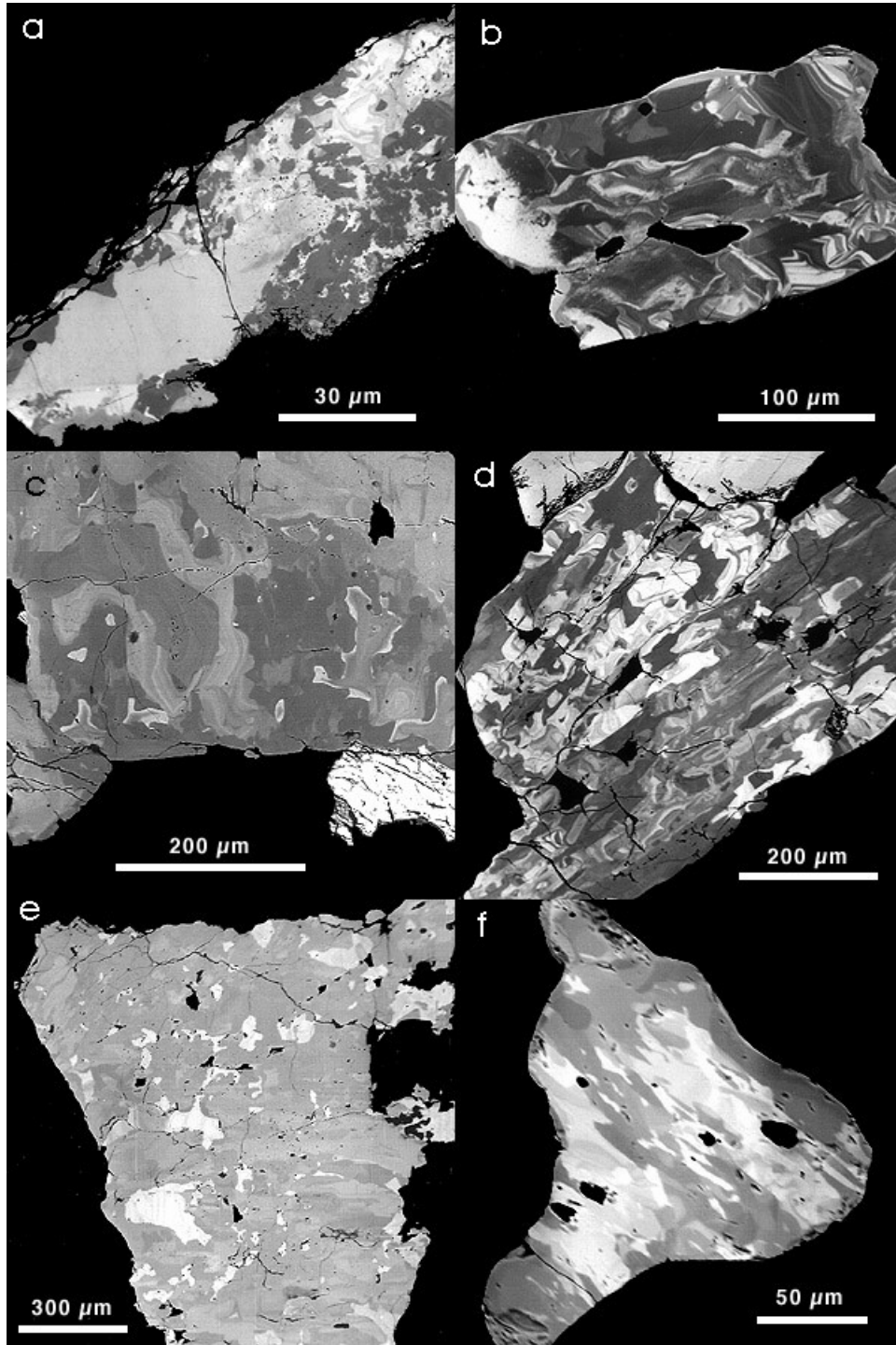


Photo 2. Backscattered electron images of columbite-tantalite exhibiting secondary zonation. (a) Unzoned manganotantalite (bottom left) partially replaced with patchy zoned (mainly) ferrocolumbite (dark regions, top right) and minor microlite (bright regions, top right). Apatite-Li mica-cleavelandite pod in SW subgroup beryl pegmatite; 96-86A. (b) Patchy zoned ferrocolumbite with marginal ferrotantalite (white region on left). Fe-suite eastern subgroup petalite pegmatite; Lou's, 93-272B. (c) Ferrocolumbite with particularly well-developed patchy zonation at the margin of the crystal. White grain is microlite. Fe-suite Separation Rapids pluton; 94-29. (d) Patchy zoned crystal with variable ferrocolumbite (dark) and manganocolumbite (light) composition. Inclusion in Li mica from wall-zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44Mu5(2). (e) Patchy zoned ferrocolumbite with microlite inclusions. Wall-zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 96-AT7. (f) Patchy zoned ferrocolumbite (with some of the brighter regions reaching ferrotantalite composition). SW subgroup petalite pegmatite; Big Mack, 98-83E.

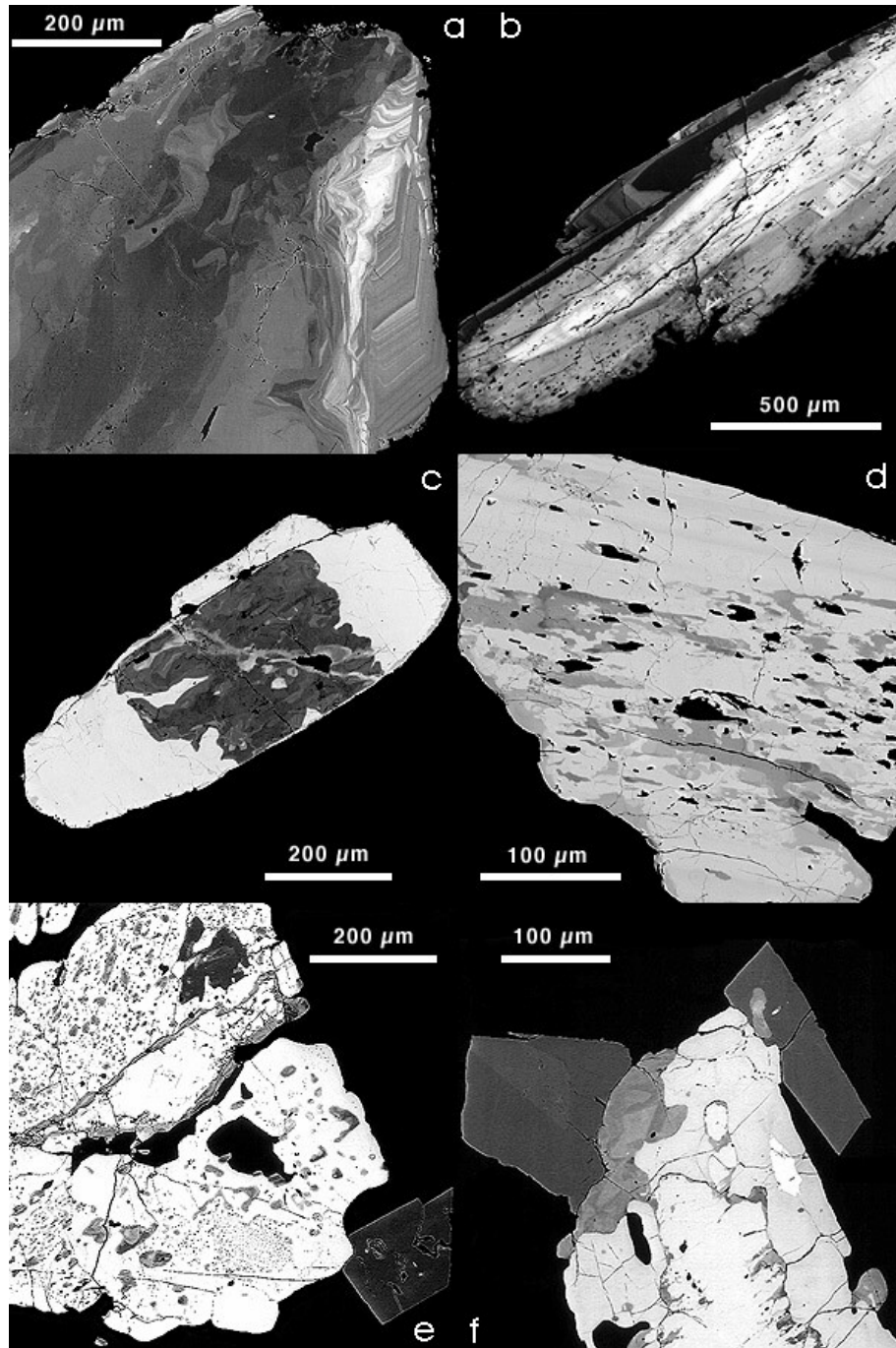


Photo 3. Backscattered electron images of columbite-tantalite exhibiting complex features. (a) Manganocolumbite with poorly defined oscillatory zonation disturbed by later patchy zonation towards the margins. The right hand margin of the crystal shows a second phase of unusually regular, oscillatory zoned manganocolumbite. Li mica-cleavelandite pod in Mn-suite eastern subgroup beryl pegmatite; 93-265J. (b) Reversely zoned, bladed crystal of ferrotantalite (core) with ferrocolumbite rim. Secondary, oscillatory growth of tantalum-poor ferrocolumbite occurs at top. Fe-suite eastern subgroup beryl pegmatite; 93-262B. (c) Patchy zoned manganocolumbite with overgrowth of unzoned manganotantalite. Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44E2. (d) Patchy zoned manganotantalite-ferrotantalite, unusual in showing variation in Mn/Fe rather than the more normal Ta/Nb. SW subgroup petalite pegmatite; Big Whopper, 96-29B. (e) Manganotantalite with thin manganocolumbite (alteration) rim included in microlite. The microlite also contains exsolved blebs of columbite-tantalite (possibly ixiolite), some with a myrmekitic texture. Euhedral cassiterite is attached to the microlite (bottom right). Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44E2. (f) Manganotantalite (core) mantled by microlite. The microlite partially includes a patchy zoned, tantalum-poor manganotantalite grain (top left) and attached are two euhedral crystals of cassiterite. The white inclusion in the microlite is wodginite. Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44E2.

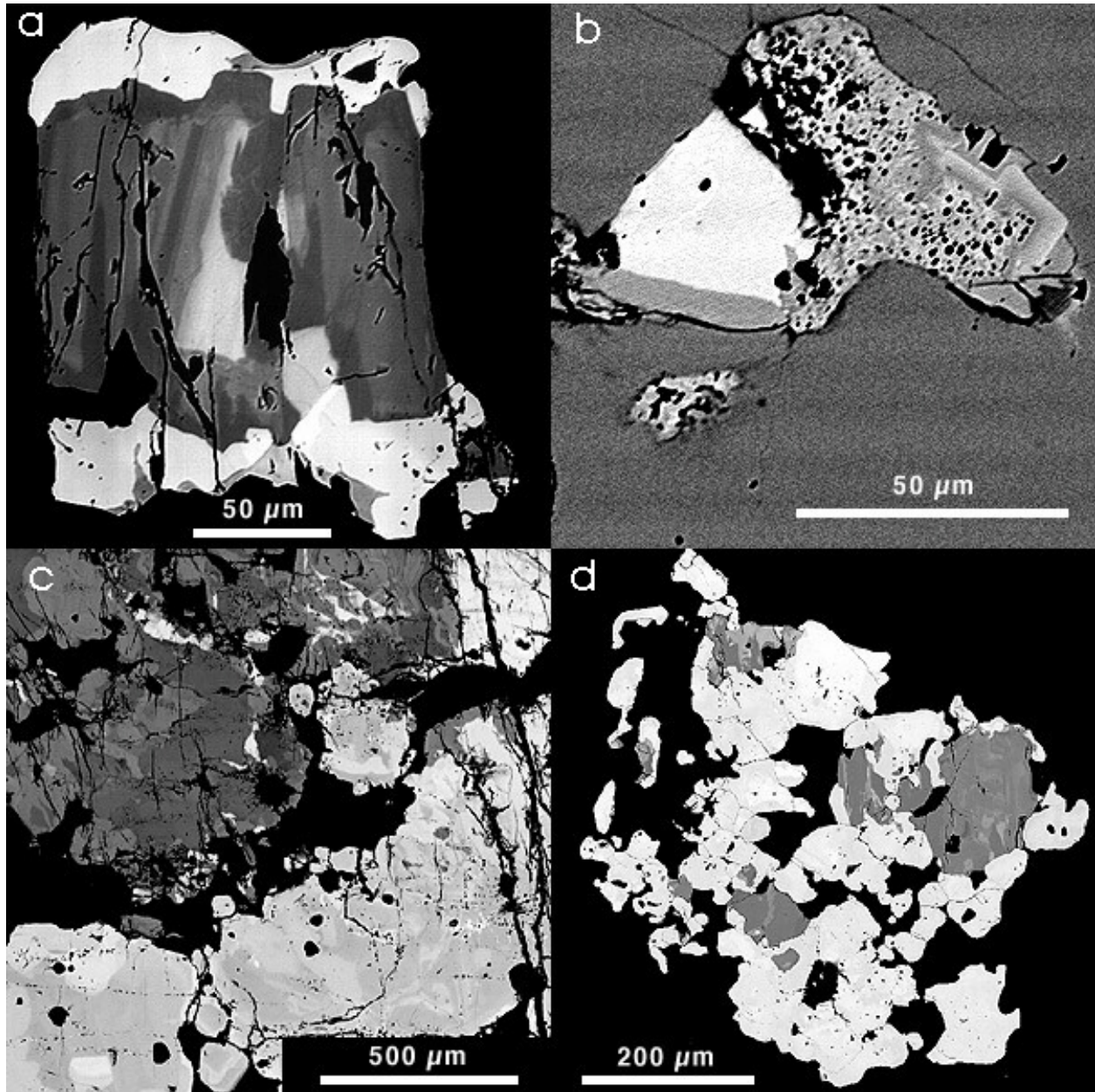


Photo 4. Backscattered electron images of ferrotapiolite and associated minerals. (a) Ferrotapiolite rims on vaguely zoned ferrotantalite. SW subgroup beryl pegmatite; 96-9. (b) Unzonated ferrotapiolite (white) partially mantled with porous ferrotantalite, both enclosed in cassiterite. SW subgroup beryl pegmatite; 96-53. (c) Co-existing patchy zoned ferrotapiolite (light) and ferrowodginite. Separation Rapids pluton; 96-72A. (d) Cluster of patchy zoned ferrotantalite (dark), partially mantled by ferrotapiolite. SW subgroup beryl pegmatite; 96-81.

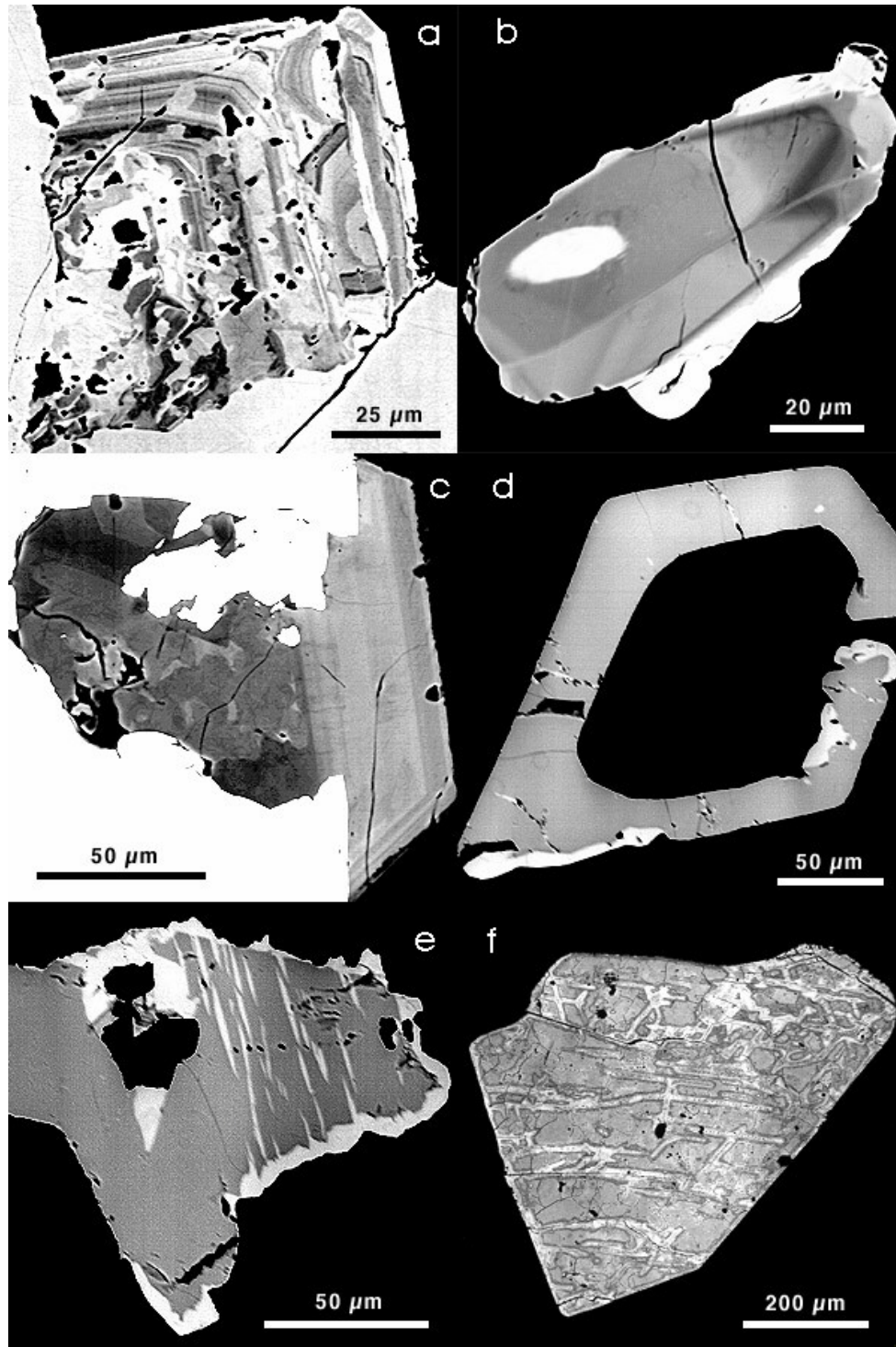


Photo 5. Backscattered electron images of ixiolite, strüverite and microlite-ferrotapiolite. (a) Oscillatory zoned ixiolite (enriched in titanium and scandium) in cassiterite. Fe-suite eastern subgroup petalite pegmatite; Lou's, 93-272B. Tungsten-rich ixiolite rim on ferrocolumbite, with ferrotantalite core (white spot). Fe-suite eastern subgroup petalite pegmatite; Pegmatite 9, 94-318. (c) Dark, patchy zoned strüverite with euhedral, oscillatory zoned overgrowth replacing ferrotitanowodginite (white irregular area) and partially enclosed in cassiterite (larger white area); Marko's pegmatite, 94-44J. (d) Euhedral, skeletal crystal of strüverite marginal replaced with ferrowodginite. SW subgroup petalite pegmatite; Big Mack, 98-83C. (e) Strüverite with marginal and ribbon-like replacement by ferrowodginite. SW subgroup petalite pegmatite; Big Mack, 98-83C. (f) Euhedral "microlite-ferrotapiolite" composition, partially replaced along cleavage with "microlite". Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44Z.

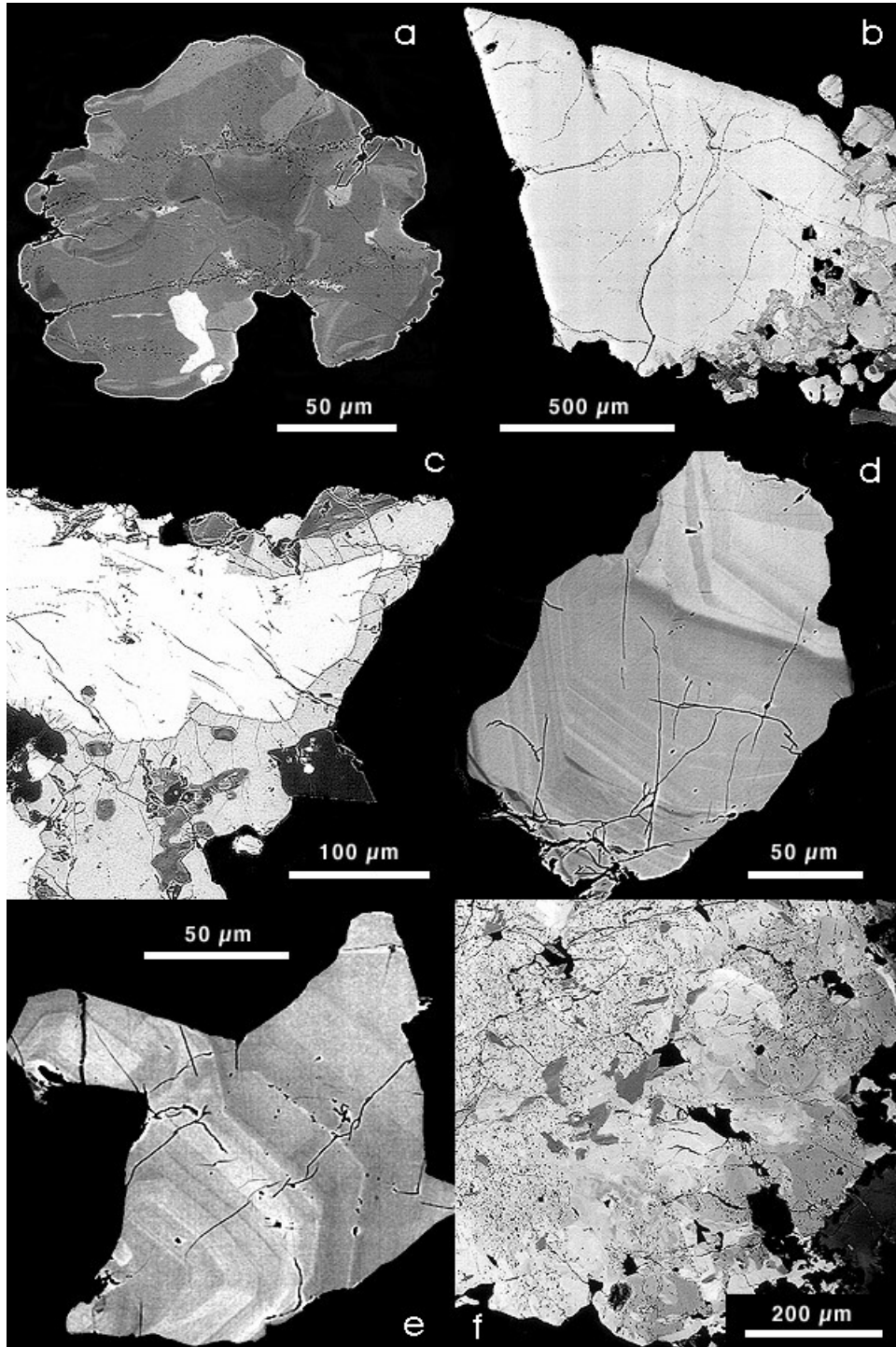


Photo 6. Backscattered electron images of wodginite group minerals. (a) Patchy zoned ferrowodginite. Fe-suite eastern subgroup petalite pegmatite; James', 93-276B. (b) Euhedral wodginite, replaced at one end by microlite. Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44D. (c) Wodginite core (white) mantled by microlite which partially encloses a euhedral cassiterite crystal (bottom right). Medium grey patches are columbite-tantalite. Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44R. (d) Oscillatory zoned titanowodginite inclusion in cassiterite. Wall zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44J. (e) Patchy zoned grain with wodginite core (off to top left) to ferrotitanowodginite rim. Wall zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44I. (f) Oscillatory zoned grain from ferrotitanowodginite core to titanowodginite rim. Inclusion in cassiterite. Wall zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44J.

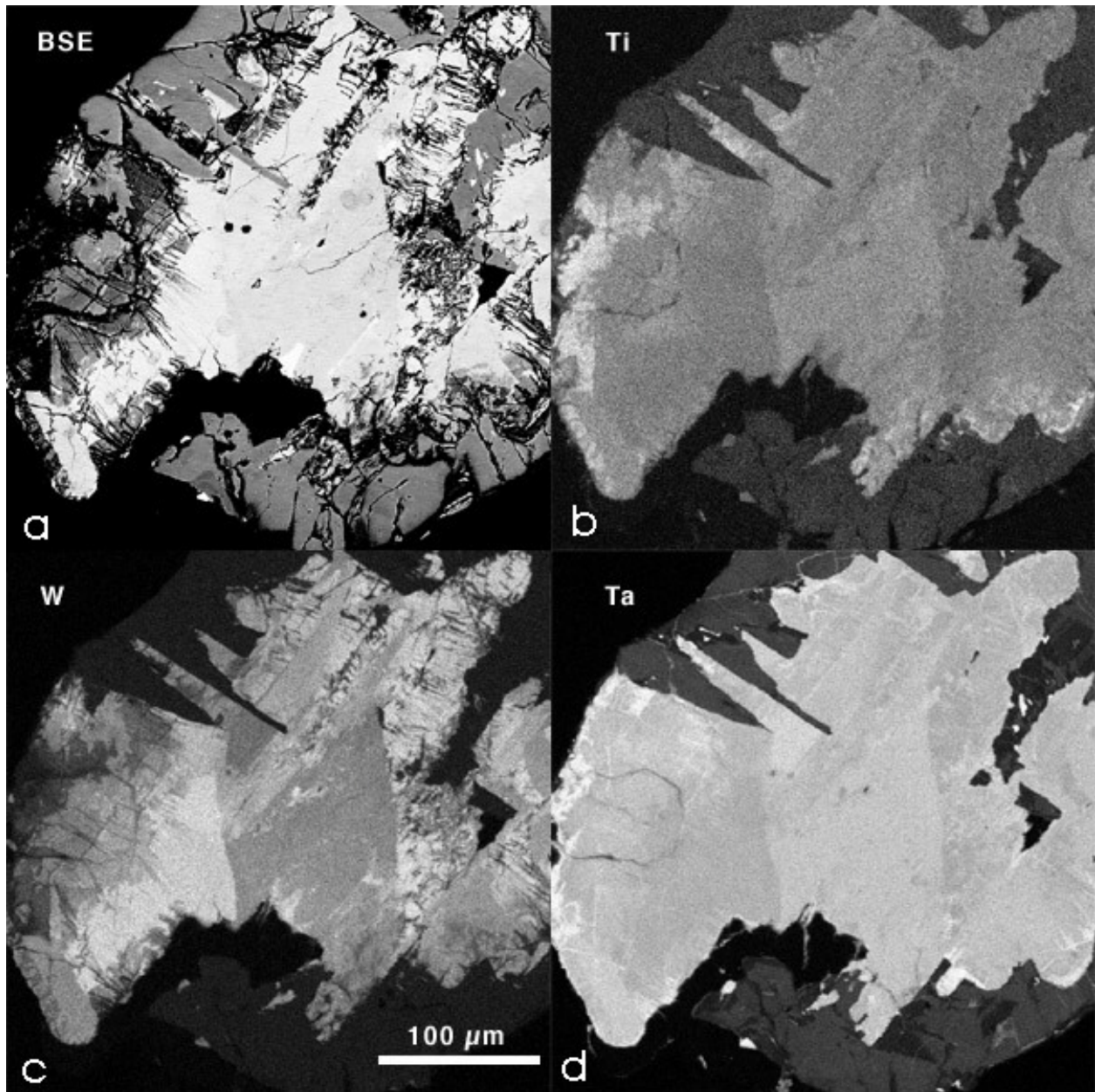


Photo 7. Backscattered electron and X-ray images of wodginite group minerals. (a) to (d) Ferrowodginite - tungsteniferous wodginite inclusion in cassiterite showing distinct regions with differing tungsten concentrations. Fe-suite eastern subgroup petalite pegmatite; Pegmatite 5, 94-80E. Tungsten concentration in parts of this grain is sufficiently high to warrant description as a potentially new wodginite species, tentatively referred to as “wolframowodginite 1” by Tindle, Breaks and Webb (1998).

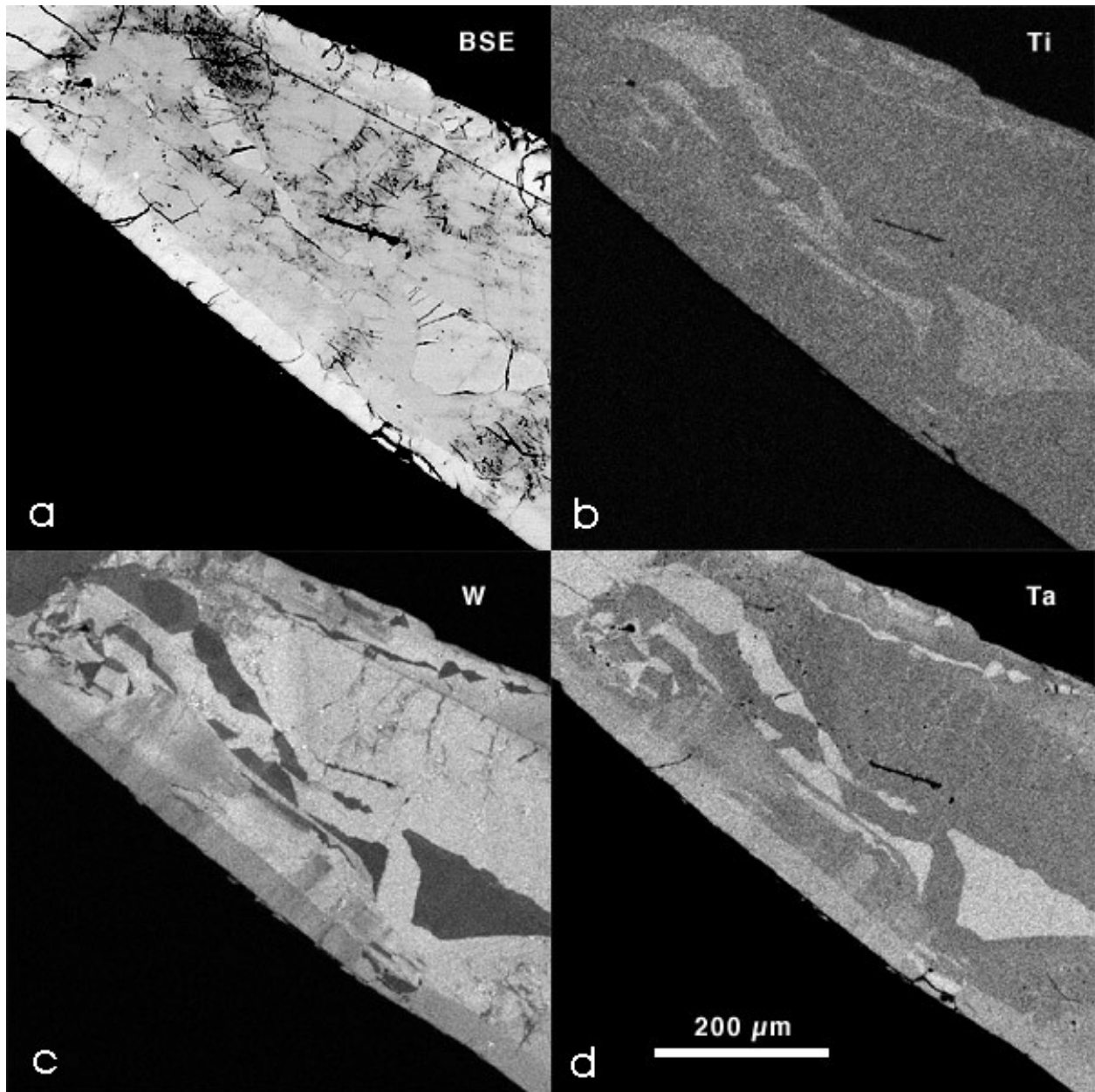


Photo 8. Backscattered electron and X-ray images of wodginite group minerals. (a) to (d) Wodginite - tungsteniferous wodginite with a thin, detached titanium-rich and tantalum-rich core (wodginite), mantled by tungsten-rich wodginite and a narrow rim containing less tungsten. Fe-suite eastern subgroup petalite pegmatite; Pegmatite 7, 94-Peg7E. Tungsten concentration in this grain is not sufficiently high to warrant description as a potentially new wodginite species.

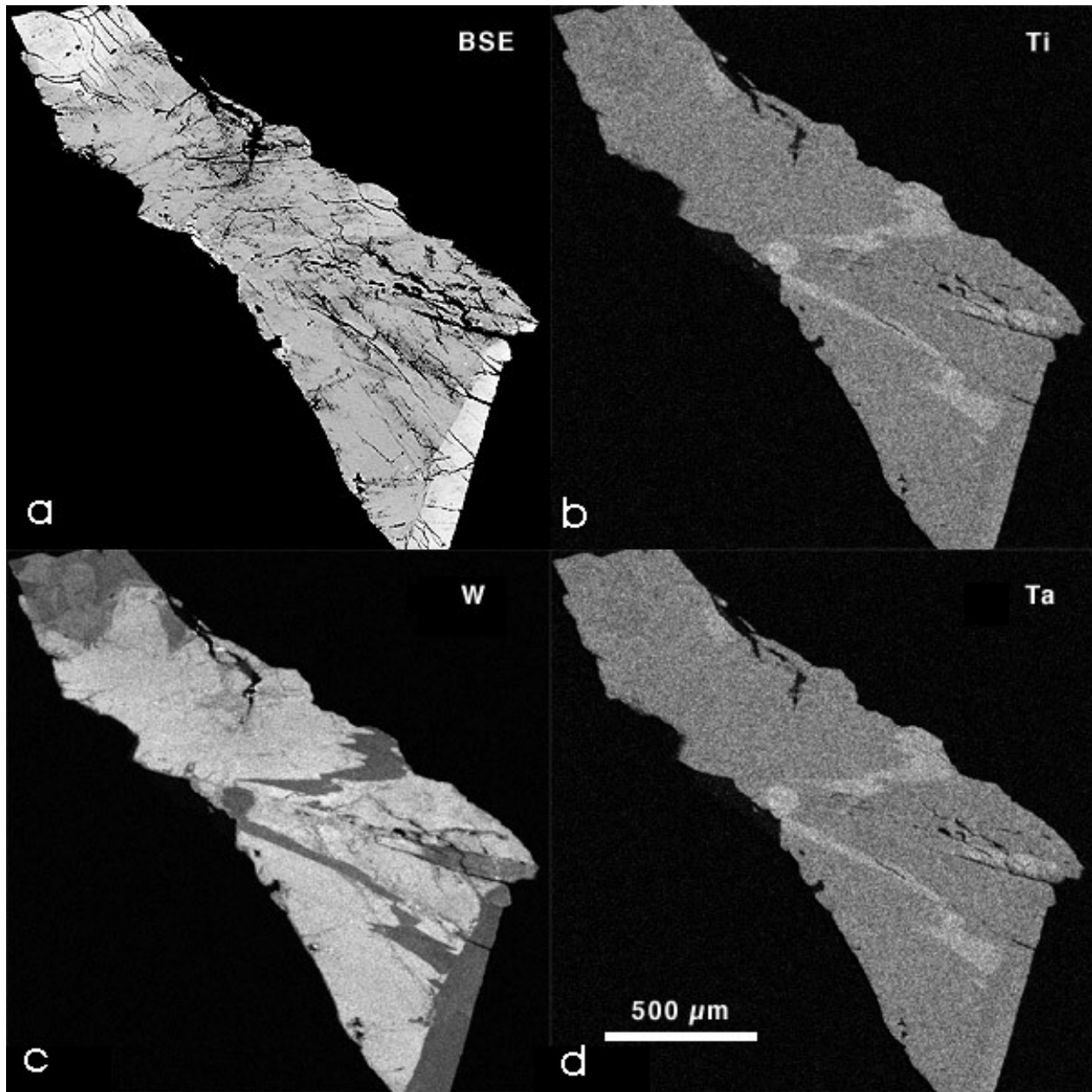


Photo 9. Backscattered electron and X-ray images of tungsteniferous wodginite. (a)-(d) Bulk of this grain is tungsteniferous wodginite through which a folded band of wodginite (low W) cuts. Ends of the grain are of a similar wodginite composition, but appear undeformed. Fe-suite eastern subgroup petalite pegmatite; Pegmatite 7, 94-Peg7E. Tungsten concentration in this grain is not sufficiently high to warrant description as a potentially new wodginite species, tentatively referred to as “wolframowodginite” by Tindle, Breaks and Webb (1998).

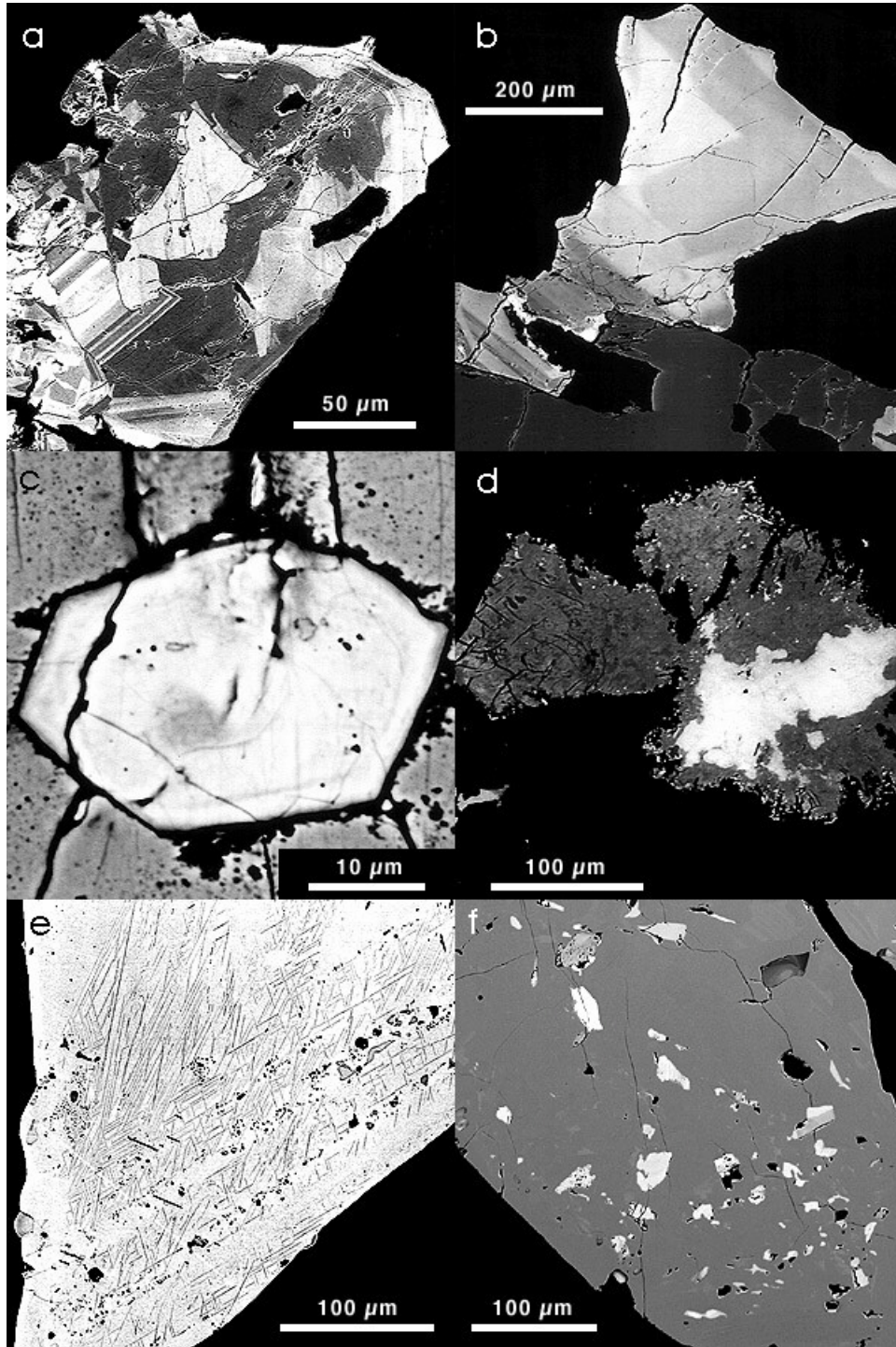


Photo 10. Backscattered electron images of pyrochlore group minerals. (a) Oscillatory zoned stibiomicrolite (dark region), partially mantled by microlite (top right). Core of grain is ferrotitanowodginite and all are included in cassiterite. Wall zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44K. (b) Zoned antimonian microlite growing along margin of large cassiterite. Wall zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 94-44J. (c) Euhedral uranmicrolite inclusion in large ferrowodginite. Fe-suite eastern subgroup petalite pegmatite; Pegmatite 5, 94-80D. (d) Yttrropyrochlore partially replaced by yttrian pyrochlore. SW subgroup petalite pegmatite; Big Whopper, 96-29. (e) Euhedral cassiterite containing ferrocolumbite- and pore-rich zones alternating with inclusion-free zones criss-crossed with needle-shaped exsolution products (rutile?). SW subgroup beryl pegmatite; 96-15A. (f) Inclusion-rich cassiterite. Most inclusions are ferrocolumbite or ferrotantalite, but ferrotapiolite occurs occasionally (white grain near top left). Western extension of the Big Mack petalite system; Glitter pegmatite, 99-GZ4.

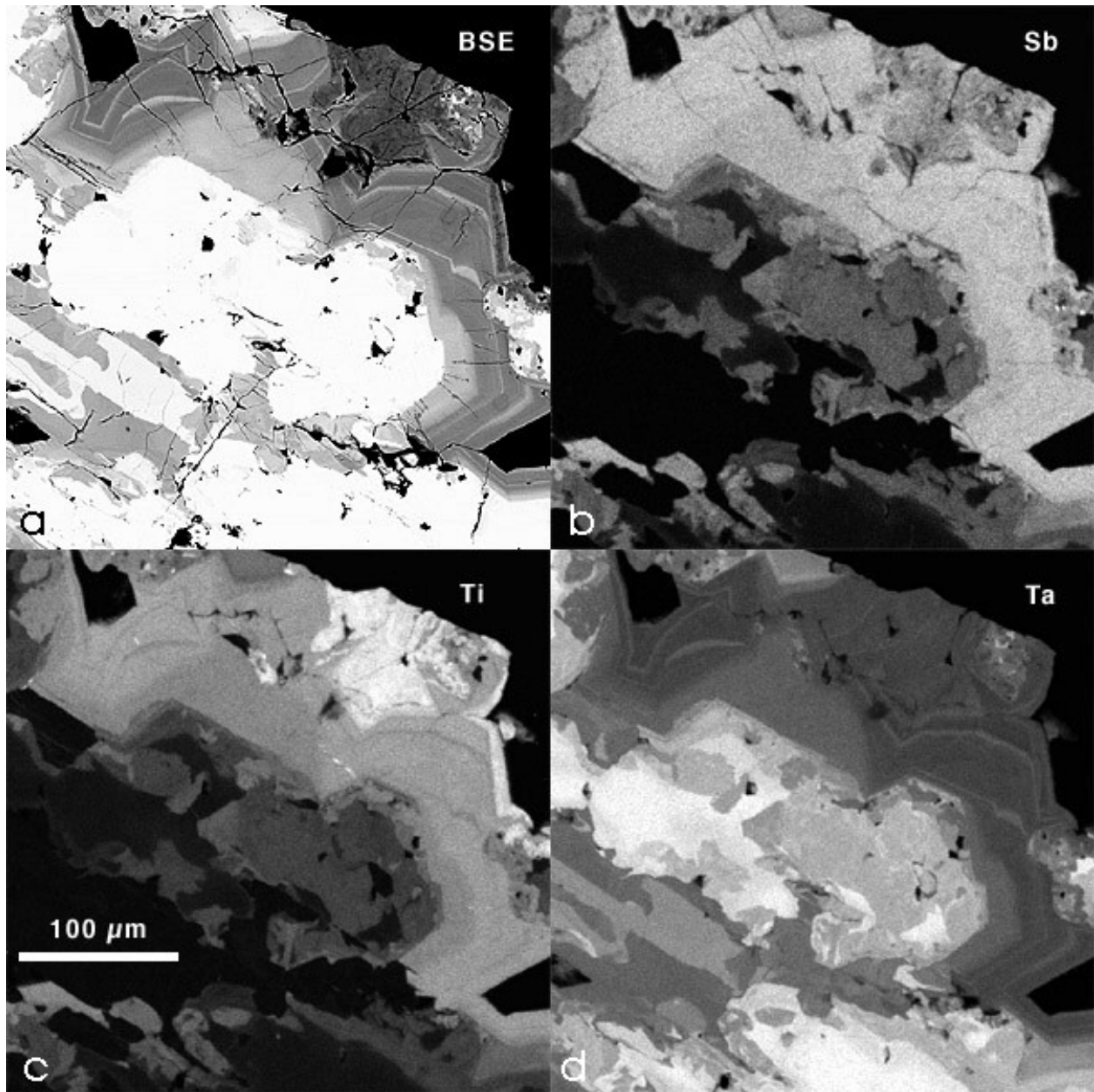


Photo 11. Backscattered electron and X-ray images of pyrochlore group minerals. (a) to (d) Stibiobetafite is the darker, oscillatory zoned mineral on the BSE image. It mantles earlier formed stibiomicrolite and microlite (bright regions on BSE image), which, in turn, partially replaces ferrocolumbite and ferrotantalite (bright regions on Ta map). Wall zone of Mn-suite eastern subgroup petalite pegmatite; Marko's, 96-AT1.

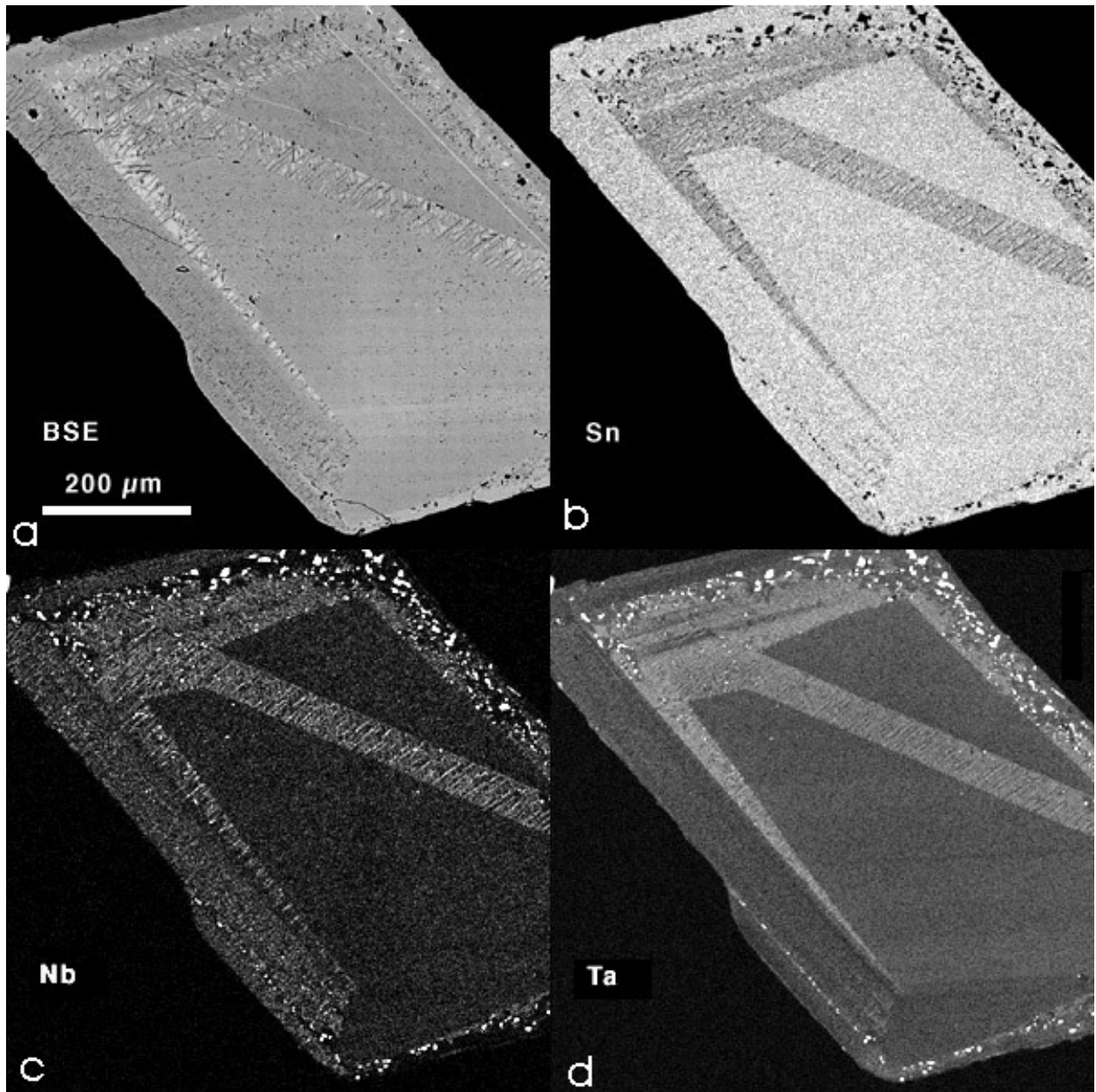


Photo 12. Backscattered electron and X-ray images of cassiterite. (a) to (d) Euhedral cassiterite containing ferrocolumbite inclusions (white spots on Nb and Ta maps) and with structurally controlled variation in minor element content. SW subgroup beryl pegmatite; 96-15A.

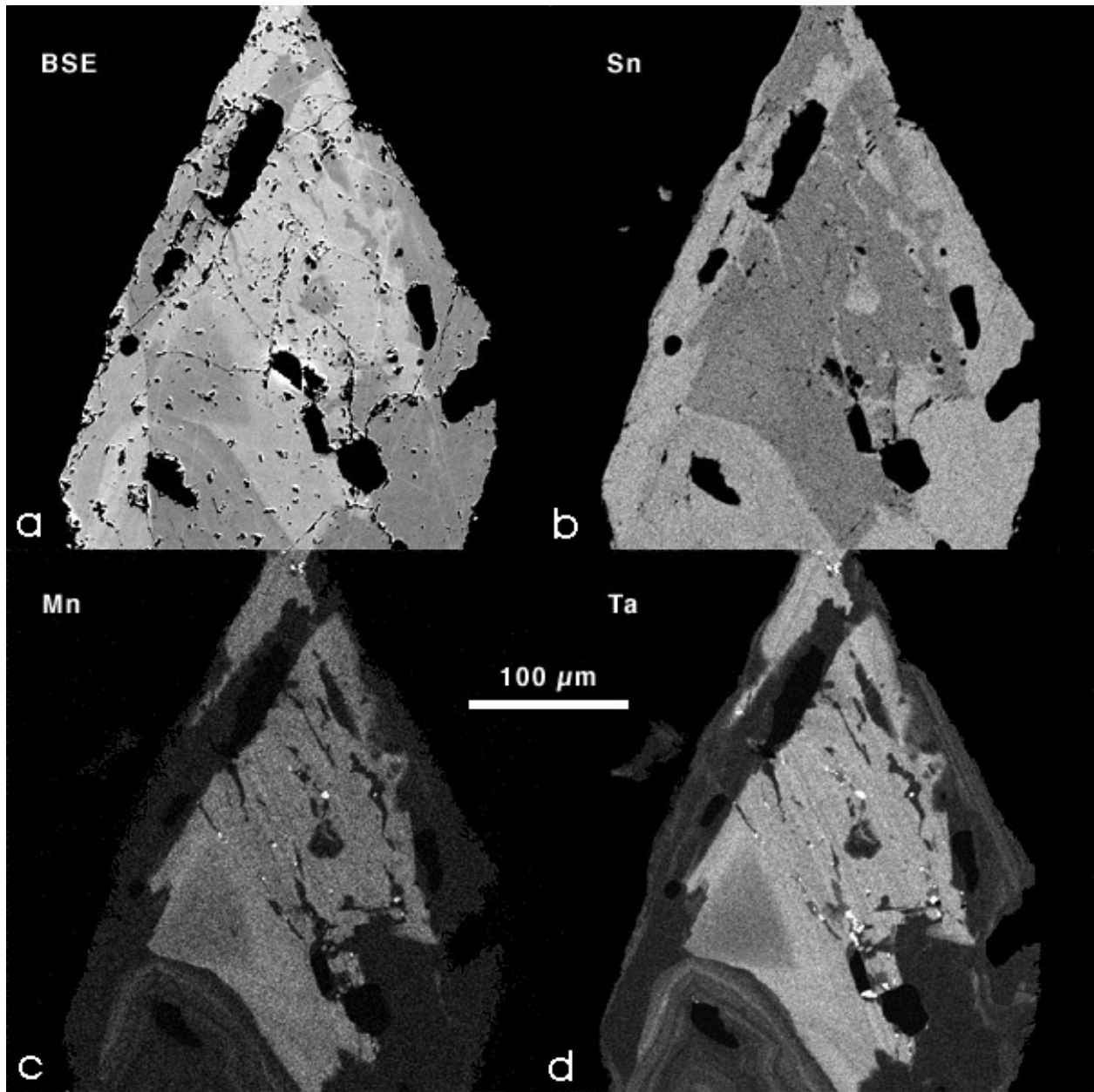


Photo 13. Backscattered electron and X-ray images of cassiterite. (a) to (d) Complex oscillatory zoned, euhedral cassiterite containing a niobium-tantalum-rich core region which appears to be in the process of being resorbed, recrystallized and overgrown by a more tin-rich variety. SW subgroup beryl pegmatite; 97-134A.

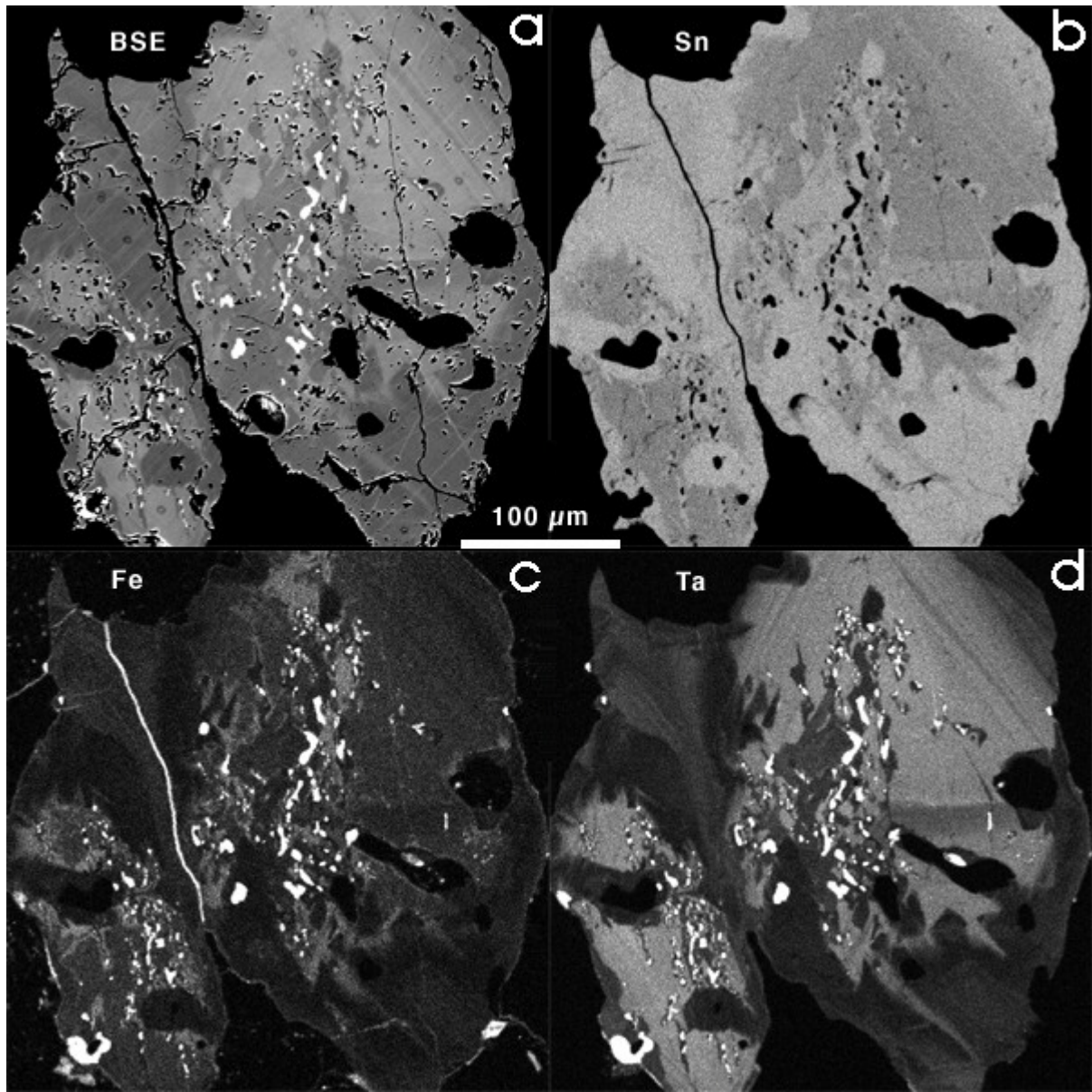


Photo 14. Backscattered electron and X-ray images of cassiterite. (a) to (d) Irregularly-shaped cassiterite comprising an earlier tantalum-rich variety that is being replaced by a more tin-rich variety. The white spots, visible in the Fe and Ta maps are ferrotapiolite and probably represent exsolved material rejected by the cassiterite structure (excess Fe and Ta) during the conversion of the early cassiterite to the later variety. Fe-suite eastern subgroup petalite pegmatite; Pegmatite 10, 97-P10-4.

Table 1. Means, ranges and standard deviations for all tantalum-bearing species from the Separation Lake area. In addition, details of those samples with minimum and maximum Ta₂O₅ values are included.

	No. of samples	No. of analyses	Mean Ta ₂ O ₅	Std. Dev.	Min. Ta ₂ O ₅		Max. Ta ₂ O ₅	
Columbite-tantalite group	180	1758	40.77	16.35	4.01	Zone 11 pegmatite: EFR-6082	84.06	East Beryl pegmatite: 93-265A
Ferrotapiolite	14	94	75.79	2.99	69.38	SW Beryl pegmatite: 96-9	82.14	SW Beryl pegmatite: 96-81
Ixiolite	8	21	36.66	12.57	2.19	Treelined Lake Complex: 96-2	51.06	Big Whopper pegmatite: 97-BW4
Strüverite	9	37	32.60	20.47	1.06	Treelined Lake Complex: 96-2	60.78	Big Mack pegmatite: 98-83Cii
Wodginite group	64	617	55.48	10.05	12.66	East Beryl pegmatite: 93-265A	71.90	Separation Rapids pluton: 96-72A
Pyrochlore group	50	237	63.01	14.87	10.64	Big Whopper pegmatite: 96-29G (Ytropyrochlore)	80.08	East Beryl pegmatite: 93-265Rii (Microlite)
Cassiterite	151	1133	1.79	1.91	0.00	SW Beryl pegmatite: 96-27	11.04	Pegmatite 5: 94-80E
Total		3897						

Table 2. Tantalum-bearing mineral associations from selected groups of samples from the Separation Lake area.

Locations:	1	2	3	4	5	6	7	8	9	10
Ferrocolumbite		•	•	•				•	•	•
Ferrotantalite	(•)	(•)		•				•	•	•
Manganocolumbite		(•)			•	•	•	•	(•)	
Manganotantalite	(•)	•			•	•	•	•	•	
Ferrotapiolite		(•)					(•)		(•)	•
Ferrowodginite		(•)	•	•			(•)		(•)	•
Wodginite				(•)	•	•	•	(•)	(•)	
Titanowodginite							•	(•)		
Ferrotitanowodginite									(•)	
Tungsteniferous wodginite				•	•	•				
Microlite	(•)			•	•	•	•	•	(•)	
Stibiomicrolite				•			•			
Bismutomicrolite					(•)					
Uranmicrolite				•						
Stibiobetafite							(•)			
Yttrpyrochlore								(•)		
Yttrian pyrochlore								(•)		
Ixiolite	(•)			•		(•)	(•)	(•)		
Strüverite	(•)			•			•		•	
Cassiterite	•	•	•	•	•	•	•	•	•	•

Notes: (•) implies only found in one sample. Locations are as listed below:

- 1, Treelined Lake granitic complex (miarolitic pod);
- 2, Separation Rapids pluton;
- 3, Eastern subgroup Fe-suite beryl pegmatites;
- 4, Eastern subgroup Fe-suite petalite pegmatites;
- 5, Eastern subgroup Mn-suite beryl pegmatite;
- 6, Eastern subgroup Mn-suite petalite pegmatites;
- 7, Wall zone of Marko's pegmatite - an Eastern subgroup Mn-suite petalite pegmatite;
- 8, Big Whopper pegmatite, SW subgroup;
- 9, Big Mack pegmatite, SW subgroup Fe-suite (includes satellitic dikes);
- 10, Glitter pegmatite SW subgroup Fe-suite (Big Mack system).

Table 3. Summary of columbite-tantalite data from selected groups of samples from the Separation Lake area.

	No. of samples	No. of analyses	Mean Ta ₂ O ₅	Std. Dev.
Treelined Lake Complex (miarolitic pod)	1	21	38.73	7.86
Separation Rapids pluton (primitive)	4	21	23.15	8.11
Separation Rapids pluton (evolved)	4	41	25.64	11.49
Separation Rapids pluton (Li mica pods)	3	33	59.15	8.26
Beryl Pegmatites				
Eastern Fe-suite pegmatites	15	114	26.09	15.43
SW Fe-suite pegmatites (main)	14	103	34.64	18.40
SW Fe-suite pegmatites (ferrotapiolite)	3	19	58.86	4.02
SW Fe-suite pegmatites (Big Mack system)	3	87	45.31	11.34
Eastern Mn-suite pegmatites (all)	13	151	46.07	17.35
Eastern Mn-suite pegmatite (93-265)	7	91	44.62	15.54
SW Mn-suite pegmatites (all)	6	139	46.84	9.68
SW Mn-suite Wolf pegmatite	4	23	32.09	4.99
Eastern Petalite Pegmatites				
Pegmatite 1	2	10	28.93	8.79
Pegmatite 5	1	6	53.90	0.26
Pegmatite 7	2	19	50.04	4.53
Pegmatite 8	1	3	22.41	4.33
Pegmatite 9	1	26	45.32	7.88
Pegmatite 10	5	51	42.98	8.51
Pegmatite 11	3	10	49.52	12.08
James' pegmatite	1	4	54.02	0.99
Lou's pegmatite	4	85	44.20	9.75
Marko's pegmatite (all samples)	27	284	39.02	15.36
Marko's pegmatite - wall zone	10	66	34.65	14.59
Marko's pegmatite - layered pegmatite-aplite	4	40	27.40	2.46
Marko's pegmatite - petalite core zone	7	118	49.45	14.45
SW Petalite Pegmatites				
Pegmatite 12	1	1	38.11	-
Pegmatite 14	1	2	36.06	5.22
Big Mack pegmatite	8	44	46.30	14.96
Zone 11 pegmatite (Big Mack system)	1	7	5.75	1.21
6059 pegmatite (Big Mack system)	1	11	56.57	14.63
Glitter pegmatite (Big Mack system)	6	51	37.92	12.00
Big Whopper pegmatite*	24	273	41.60	18.66
Big Whopper pegmatite (lepidolite unit)	4	31	51.57	7.30
Bob's pegmatite (Big Whopper system)	3	7	40.13	14.61
Great White North pegmatite (Big Whopper system)	5	42	34.82	17.16
School of Fish pegmatite (Big Whopper system)	3	18	40.65	17.21
Swamp pegmatite (Big Whopper system)	1	17	60.19	7.62
West pegmatite (Big Whopper system)	3	23	37.52	11.87

Note: * sample 97-BW5 excluded

Table 4. Summary of ferrotapiolite data from selected groups of samples from the Separation Rapids pluton and pegmatites.

Location	Sample No.		Abundance
Separation Rapids pluton	96-72A	associated with ferrowodginite	significant
Beryl Pegmatites			
SW Beryl pegmatite	96-9	associated with ferrotantalite	significant
SW Beryl pegmatite	96-11A	inclusion in cassiterite	very minor
SW Beryl pegmatite	96-53A	incl. in cassiterite, assoc. ferrotantalite	minor
SW Beryl pegmatite	96-81	associated with ferrotantalite	significant
SW Beryl pegmatite	96-81X	isolated grain	minor
SW Beryl pegmatite	97-69	inclusion in cassiterite	minor
Petalite Pegmatites			
Pegmatite 5	94-80P	associated with wodginite	very minor
Pegmatite 10	97-P10-1	inclusion in cassiterite	minor
Pegmatite 10	97-P10-4	exsolved blobs in cassiterite	minor
School of Fish pegmatite	97-71	many grains close to a tourmaline/microlite-rich veinlet	minor
Big Mack pegmatite	98-83F	clusters of large grains	most significant
Glitter pegmatite	99-GZ1	inclusion in cassiterite	minor
Glitter pegmatite	99-GZ4	inclusion in cassiterite	minor
Marko's pegmatite	94-44Z	"ferrotapiolite" partially replaced by "microlite"	significant

Table 5. Summary of wodginite group data from selected groups of samples from the Separation Rapids pluton and pegmatites.

	No. of samples	No. of analyses	Mean Ta₂O₅	Std. Dev.
Separation Rapids pluton (evolved)	1	14	67.92	4.64
Separation Rapids pluton (Li mica pods)	1	2	62.08	0.93
Beryl Pegmatites				
Eastern Fe-suite pegmatites	2	8	63.59	4.04
SW Fe-suite pegmatites	2	7	58.52	3.32
Eastern Mn-suite pegmatite (93-265)	3	38	56.91	10.96
Eastern Petalite Pegmatites				
Pegmatite 5	9	152	50.63	10.85
Pegmatite 6	1	60	39.08	5.08
Pegmatite 7	4	98	60.59	4.77
Pegmatite 9	1	1	55.08	-
Pegmatite 10	2	11	57.03	6.82
James' pegmatite	1	6	56.51	1.05
Lou's pegmatite	3	7	56.64	3.32
Marko's pegmatite (all samples)	24	175	60.36	4.33
Marko's pegmatite - wall zone Fe & Ti wodginite	11	119	58.51	3.89
Marko's pegmatite - bulk of pegmatite	13	56	64.31	1.88
SW Petalite Pegmatites				
Big Mack pegmatite	2	8	54.37	3.13
Glitter pegmatite (Big Mack system)	2	6	58.43	2.42
Big Whopper pegmatite	3	12	61.09	2.88
Great White North pegmatite (Big Whopper system)	1	1	58.27	-
West pegmatite (Big Whopper system)	1	10	52.67	2.66

Table 6. Summary of pyrochlore group data from selected groups of samples from the Separation Lake area.

	No. of samples	No. of analyses	Mean Ta ₂ O ₅	Std. Dev.
Microлите				
Treelined Lake Complex	1	5	71.46	2.06
Eastern Mn-suite beryl pegmatite (93-265)	1	3	78.93	1.01
SW Fe-suite beryl pegmatites	4	13	68.51	5.15
SW Mn-suite beryl pegmatite - Wolf pegmatite	1	2	68.92	1.44
Eastern Fe-suite petalite Pegmatite 5	1	3	62.81	9.43
Eastern Fe-suite petalite Pegmatite 7	2	5	59.36	10.76
SW petalite Big Whopper pegmatite	3	9	70.82	2.77
SW petalite School of Fish pegmatite	3	28	68.10	4.78
Eastern Mn-suite petalite Marko's pegmatite (all samples)	17	56	72.32	4.05
Antimonian microlite				
Eastern Mn-suite petalite Marko's pegmatite (wall zone)	3	20	59.81	2.62
Stibiomicrolite				
Eastern Fe-suite petalite - Lou's pegmatite	3	7	53.51	7.62
Eastern Mn-suite petalite Marko's pegmatite (mainly wall zone)	4	14	48.71	3.68
Stibiobetafite				
Eastern Mn-suite petalite Marko's pegmatite (wall zone)	1	1	21.82	5.91
Sb/U microlite				
Eastern Mn-suite petalite Marko's pegmatite (wall zone)	2	2	54.73	15.41
Uranoan microlite				
SW petalite pegmatite - Big Whopper pegmatite	2	2	67.89	0.49
Uranmicrolite				
Eastern Fe-suite petalite pegmatite - Pegmatite 5	2	4	65.71	1.53
Ytropyrochlore & yttrian pyrochlore				
SW petalite pegmatite - Big Whopper pegmatite	1	8	13.06	1.34
Bismutomicrolite				
Eastern Mn-suite Beryl pegmatite (93-265)	1	3	40.16	2.58
Microlite-like (after ferrotapiolite)				
Eastern Mn-suite petalite Marko's pegmatite	1	7	75.06	1.07

Table 7. Summary of cassiterite data from selected groups of samples from the Separation Rapids Lake area.

	No. of samples	No. of analyses	Mean Ta ₂ O ₅	Std. Dev.
Treelined Lake Complex	2	5	1.44	0.48
Separation Rapids pluton (evolved)	2	11	0.97	0.62
Separation Rapids pluton (Li mica pods)	2	19	3.06	1.31
Beryl Pegmatites				
Eastern Fe-suite pegmatite - Audrey's pegmatite	1	2	1.31	0.24
SW Fe-suite pegmatites (all)	20	177	1.25	1.20
Eastern Mn-suite pegmatites (all)	6	22	1.81	0.84
SW Mn-suite Wolf pegmatite	4	29	1.66	1.02
SW Mn-suite pegmatites (Li-mica pods)	2	12	1.52	1.49
Eastern Petalite Pegmatites				
Pegmatite 5	8	75	4.27	3.36
Pegmatite 6	2	10	5.33	3.74
Pegmatite 7	6	34	1.83	1.37
Pegmatite 9	1	5	0.81	0.57
Pegmatite 10	5	106	3.01	2.63
Pegmatite 11	2	4	0.74	0.24
James' pegmatite	6	31	1.72	1.10
Lou's pegmatite	2	18	2.24	0.92
Marko's pegmatite (all samples)	28	150	1.66	1.33
Marko's pegmatite - wall zone	14	83	1.53	1.23
Marko's pegmatite - layered pegmatite-aplite	4	16	1.47	1.52
Marko's pegmatite - petalite core zone	8	33	1.91	0.97
SW Petalite Pegmatites				
Pegmatite 12	2	9	0.39	0.58
Pegmatite 14	3	16	0.68	0.57
Big Mack pegmatite	2	16	2.15	1.15
Zone 11 pegmatites (Big Mack system)	1	50	1.28	0.83
6059 pegmatite (Big Mack system)	1	15	0.82	0.69
Glitter pegmatite (Big Mack system)	4	26	0.99	0.63
Big Whopper pegmatite*	25	218	1.28	2.46
Big Whopper pegmatite (lepidolite unit)	1	9	1.03	2.48
Bob's pegmatite (Big Whopper system)	3	19	1.57	1.36
Great White North pegmatite (Big Whopper system)	6	47	1.44	1.37
School of Fish pegmatite (Big Whopper system)	2	11	1.26	1.65
Swamp pegmatite (Big Whopper system)	1	14	0.92	1.25
West pegmatite (Big Whopper system)	2	22	0.88	0.59

Note: * sample 97-BW5 excluded

Appendix A: Sample Descriptions for Separation Rapids Rare-Element Pegmatite Group

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TREELINED LAKE GRANITIC COMPLEX

94-84A: Four, black mineral-bearing fragments from tourmaline-cassiterite-topaz-green muscovite-quartz-bearing miarolitic cavities. The three largest fragments are dominantly quartz with inclusions of possible oxide minerals (or tourmaline). Note that the intermediate size, quartz-rich fragment has a nice cluster of platy manganotantalite (X-ray diffraction indicated, and electron microprobe confirmed, some manganotantalite, but most is manganocolumbite) at least 8 mm in length. The fourth fragment contains a much smaller, platy oxide, possibly tantalite. Some of these black mineral inclusions are tourmaline (schörl-elbaite).

94-84B: Several fragments of dark brown cassiterite from same miarolitic cavity. It may be interesting to search for possible wodginite inclusions in the cassiterite. Ferrocolumbite was also reported by the X-ray diffraction scan and possibly represent small inclusions.

94-84C: A 4 by 5 mm grain of grey-black anatase, confirmed by X-ray diffraction, from a different part of the outcrop than that which contains the miarolitic cavities. The mineral is found in biotite-muscovite-quartz clots hosted in a medium-grained, muscovite-biotite granite.

94-84E: Two small fragments from a single dark brown crystal. This euhedral mineral occurs within a cleavelandite lath and partly contacts a fine-grained, mauve mica coating on the lath. The mica coating marks the edge of a miarolitic cavity. Mica sent in for X-ray diffraction (possible lepidolite alteration). Microlite, cassiterite and ferrotantalite found.

95-40A: Small piece from a 1 by 4 cm, muscovite-biotite-rich clot from garnet-biotite granite (Treelined Lake granitic complex). The light green mineral possibly is gahnite.

95-40B: Fragments from a dark brittle mineral enveloped by fibrolite in a muscovite-biotite-rich clot. A second clot from same granite as 95-40A. The dark mineral is gahnite.

96-2: South Harrison graphite occurrence (Trout Lake). Graphite-rich, muscovite pegmatite dike situated in metasedimentary migmatite terrain adjacent to the northeastern contact of the Treelined Lake granitic complex. Pegmatite also contains local black tourmaline, coarse muscovite books and sparse black, possible oxide minerals (niobian rutile with inclusions of manganocolumbite indicated by electron microprobe).

SEPARATION RAPIDS PLUTON

93-249A: Fine-grained biotite-muscovite-garnet leucogranite containing ferrocolumbite.

93-249B: Sample which contains part of an original megacryst, possibly after cordierite, now completely replaced by garnet-muscovite-biotite and local light blue beryl. The muscovite pegmatitic leucogranite host contains sporadic ferrocolumbite.

93-249C: Part of an euhedral crystal of ferrocolumbite, 2 by 8 mm in cross-section and mainly contained within quartz. Host rock is a fine-grained muscovite-biotite leucogranite which locally grades into patches of potassic pegmatite.

93-249i: Black oxides from beryl-garnet-biotite, mafic-rich segregations thought to be after primary cordierite. One plastic vial contains a complete euhedral crystal (1.5 by 2.5 by 4 mm). Hematite?

93-251: Garnet-muscovite granodiorite with perhaps a trace of biotite. Rock contains scarce, minute, rod-like and square-shaped black minerals (ferrocolumbite), the latter with red, secondary alteration halos. Local lime-green beryl occurs in same outcrop, but is not found in electron microprobe sample.

93-260: Fragments from large cassiterite from southwestern part of pluton.

93-260A: Several fragments of brown manganotantalite. Mineral comes from a green muscovite-cleavelandite mass (10 by 20 cm) in a large mass of potassic pegmatite. The oxide, intergrown with the cleavelandite, occurs as euhedral crystals up to 2 to 4 by 4 by 7 mm. Noteworthy is the rare phosphate mineral alluaudite in the muscovite-cleavelandite mass. Also noted is the overprint of adjacent potassium feldspar adjacent to white cleavelandite laths, hence the muscovite-cleavelandite assemblage may be of replacement origin.

93-260B: Pieces of a small platy, black manganocolumbite intergrown with cleavelandite in the same muscovite-cleavelandite mass as that hosting 93-260A.

93-260C: More oxide fragments from the 2 by 3 m cleavelandite-rich pod where Mn-tantalite was documented. The dark brown fragments of cassiterite, originate from a 2 by 6 cm tapered crystal. Inclusions of manganotantalite and ferrotantalite are present together with lesser wodginite. Note also that the dike at 94-15, with ferrowodginite and cassiterite, is situated 90 m south.

96-72: Two outcrops of pegmatitic granite of Separation Rapids pluton directly across the bay from 93-260. Two samples were collected:

96-72A: Possible cassiterite from garnet-muscovite potassic pegmatite outcrop on shoreline. The cassiterite coexists with beryl in a muscovite + quartz-rich pegmatite patch. No cassiterite found with electron microprobe, only large grains of wodginite and ferrowodginite associated with equally large ferrotapiolite grains.

96-72B: Outcrop 30 m in the bush and south of 96-72B. The south face of outcrop contains a 1 m thick zone rich in green beryl, and equant to platy oxides (cassiterite and ferrocolumbite).

98-248: Resample of locality 93-249, with rock units described under 93-249A, 93-249B, 93-249C and 93-249i, above. Ferrocolumbite (mainly) and ferrotantalite present.

EASTERN PEGMATITE SUBGROUP

Eastern Beryl Zone

PEGMATITES NEAR SOUTHEASTERN END OF SEPARATION RAPIDS PLUTON

93-262A: Evolved exocontact dike-like mass partly exposed on island and which could represent the eastern terminus of Separation Rapids pluton. Sample comprises a garnet-muscovite-quartz-plagioclase rock that contains sporadic ferrocolumbite and light green, 1 to 6 cm diameter beryl. Ragged potassium feldspar occurs in the hand specimen.

93-262B: Possible albitite, which grades into 93-262A. Scattered, sparse, fine-grained, equant to platy, oxide minerals (ferrocolumbite and ferrotantalite), up to 3 mm diameter, hosted in a beryl-garnet-muscovite-quartz-blocky potassium feldspar-plagioclase assemblage. Parts of the unit, which is situated within 2 m of the southern dike contact, contains up to 11.45% Na₂O and is classed as albitite. Small miarolitic cavities with projecting quartz crystals and goethite as infilling phases are sparsely evident. Pyrite, zircon, thorium-rich monazite and xenotime also found.

93-262C: Platy black ferrocolumbite, 1 by 5 mm, mainly contained in plagioclase and with a slight penetration into quartz.

93-262D: Platy black ferrocolumbite in garnet-muscovite-quartz-plagioclase unit that lies adjacent to beryl-potassium feldspar-quartz core unit.

93-263: Garnet-muscovite-quartz-plagioclase aplite dike situated 15 m south of 93-262 locality and hosted in amphibolite. The aplite contains very fine-grained oxides (manganotantalite) which tend to correspond to the rust halos. Several cut surfaces have intersected an unknown, red-brown, possibly altered mineral. Some grains contain a yellow-green core (at arrow ends). Channel sample over 113 cm (93FWB-263) gives bulk composition of the aplite.

93-264A: Cassiterite in muscovite-beryl-quartz-plagioclase rock from 8 m thick dike. Fine-grained, pseudomorphs of possible ephesite after a 0.5 to 2 cm diameter square-shaped, former primary phase occurs 0.3 m from sample location. Unit was sampled by channel cut over 160 cm (93FWB-264).

94-29: Near southern contact of Separation Rapids pluton and on island west of locality 93-265. Sample of vaguely foliated, biotite-muscovite-garnet granite with black oxides (ferrocolumbite) and dark green, subhedral to euhedral gahnite (confirmed by X-ray diffraction). Cadmium-rich sphalerite and microlite also present. The largest ferrocolumbite is included in sample sent and is a 2 by 6 mm, tabular euhedral crystal which slightly protrudes above surface. Note that it contacts a small grain of gahnite.

94-29A: Several pieces of a gahnite-biotite-garnet-muscovite-potassium feldspar-quartz-plagioclase rock that has also been sent in for bulk analysis. Sample located near previously sent material (94-29) with the cadmium-rich sphalerite. Specks of minute platy and equant, anhedral, black, ferrocolumbite have been circled on slabs. The potassium feldspar megacrysts are ductily deformed and generally enveloped by masses rich in fine-grained plagioclase, although it is not clear whether this represents incipient alteration of the potassium feldspar. The black oxide specks and the gahnite are not restricted to the plagioclase-rich masses alone as they also occur within quartz and more rarely in garnet.

PEGMATITE 93-265

93-265A: A section oriented roughly parallel to the c-axis of a 3 cm diameter book of muscovite. The muscovite exhibits marginal replacement by a purple mica mineral (lepidolite) and cleavelandite. The purple mica occurs in a rare-element-enriched pod (1 by 10 m) of a 6 m thick pegmatite dike near the eastern end of the Separation Rapids pluton. Associated phases include blocky potassium feldspar, quartz, white beryl, cleavelandite, fluorapatite, cassiterite, wodginite, manganotantalite and bismutomicrolite. This is the most evolved sample from the Eastern beryl zone.

93-265F: Part of a 3 cm wide, black cassiterite crystal just below the triangular oxide. The sample fragment contains one of the crystal faces, marked by white dot.

93-265J: 1 by 3 mm, platy manganocolumbite and manganotantalite (associated iron stains) which occurs in a muscovite-quartz-cleavelandite assemblage from largest pod near lake shore.

93-265K: 7 by 13 mm, euhedral, cassiterite (looks twinned) associated with muscovite-quartz-cleavelandite from loose boulder about midway along the pegmatite and near to locality with the spectacular triangular-shaped coarse brown cassiterite crystal.

93-265N: Manganocolumbite from a composite aplite-pegmatite sample that may be critical in better assessing the fractionation of Ta versus Nb in the most evolved part of the Separation Rapids pluton. Three areas that contain oxide minerals extend from the outermost part of an aplite layer, virtually depleted in mica minerals, inward to the pegmatite pod itself as detailed below:

93-265N(i): 1 mm black oxide grain (manganocolumbite) situated 4.5 cm from pegmatite contact. Cassiterite also present.

93-265N(ii): <1 mm black oxide grains (manganocolumbite) very near pegmatite contact.

93-265N(iii): fragments chipped from a 1 by 5 by 7 mm, tabular, black mineral located 1.5 cm into the pegmatite pod. There is a small amount of rusty alteration coating the mineral (metamict material?). The oxide lies mainly between cleavelandite laths, but is very close to dark green elbaite and an euhedral dark brown, probable cassiterite crystal. Electron microprobe work revealed elbaite tourmaline only.

93-265P: Two saw-cut pieces from same large block. Most of the sample is representative of the main unit of the pegmatite mass: a potassium feldspar-muscovite-plagioclase-quartz assemblage. A small mass rich in cleavelandite occurs at the edge of the largest piece. Fine-grained needle, platy and roughly equant black manganocolumbite and cassiterite are subtly present, some of which coincide with small rust halos. The acicular oxides occur mostly in quartz and rarely in starburst-like concentrations (labelled on specimen and best observed with binocular microscope).

93-265Q: Another sample from the main pegmatite unit, but considerably further from the mica-cleavelandite pods. Several minute manganocolumbite grains and a black monazite grain were found.

93-265R: Apatite-rich sample containing manganotantalite and microlite.

96-82: Oxide material from two narrow aplite dikes (96-82A and 96-82B, below) on same island as 93-265 and about 200 m to the east. This locality lies about midway between the nearest petalite occurrence (94-34: Pegmatite 1) and locality 93-265.

96-82A: Very rare black specks of zoned ferrocolumbite-ferrotantalite in pieces of biotite-muscovite aplite. One piece was taken next to contact and has a small remnant of the host-rock. Nigerite also present.

96-82B: Fragments from an euhedral, glossy black, rectangular mineral, most of which was extracted from the dike (about 1 by 3 by 8 mm). Indicated by electron microprobe work as a large oscillatory zoned ferrocolumbite core to ferrotantalite rimmed crystal.

97-1A: Muscovite-quartz-plagioclase assemblage situated about 15 m from the highly evolved core with tungsten-bearing wodginite. Sample comprises fragments and complete crystal sections of black, oxide minerals (ferrocolumbite, manganocolumbite, manganotantalite and wodginite). Elbaite tourmaline also present.

AUDREY'S PEGMATITE

93-271: Apatite-garnet-biotite granite with a 2 by 6 mm cassiterite crystal. Fine-grained oxides include ferrocolumbite, wodginite and cassiterite. Xenotime also present.

PEGMATITE 93-304

94-304: Muscovite-garnet aplite with numerous black manganocolumbite specks and scarcer, fine-grained, red-brown mineral (cassiterite?). The rock also contains possible topaz, at arrow end: this mineral was identified in the nearby, biotite-rich metasomatic reaction zone in the host amphibolite.

94-304A: Several cut pieces from topaz-garnet-muscovite aplite dike at west end of small island. Circled areas point out black oxide specks. This material is similar to that previously analyzed (94-304). Both are manganocolumbite.

94-304B: Several pieces from a garnet-potassium feldspar-topaz-muscovite-plagioclase-quartz unit from new topaz dikes found at opposite end of small island that also contains topaz-bearing aplite dikes (94-304A). A few black specks of possible oxide minerals are pointed by the arrows (94-304i, 94-304ii, and 94-304iii):

- 1 mm long grain mostly enveloped by fine-grained plagioclase, but also in contact with an altered crystal of topaz.
- 1 mm grain mostly in grey quartz, but also touching plagioclase.
- 0.5 mm grain completely in plagioclase.

The large slab cuts have revealed some nice textures involving a progressive replacement of citrine-coloured topaz megacrysts by fine-grained, green muscovite. Large primary muscovite and potassium feldspar also in same

assemblage and are also marginally replaced by the fine-grained muscovite. Also two types of plagioclase present and the odd small white beryl.

94-304C: Relatively coarse, black mass of cassiterite with ferrocolumbite and ferrotantalite inclusions (2 by 2 by 3 mm). The mass popped out of topaz-bearing, quartz-megacrystic aplite material being prepared for bulk analysis. One side of the mass reveals crystal faces under the binocular microscope. The grain was in contact with muscovite, quartz and plagioclase and appears to be primary. Rock chips contain more oxides.

MISCELLANEOUS PEGMATITE DIKES IN EASTERN BERYL ZONE

94-1A: Slab from a muscovite-garnet potassic pegmatite. Ragged remnants of light pink potassium feldspar are enveloped by garnet-muscovite plagioclase-rich replacement assemblage. Scant amounts of the following minerals occur in the albitized areas:

- (a) unknown, soft brown mineral.
- (b) black specks of possible columbite-tantalite.
- (c) green specks of possible gahnite.
- (d) partially weathered sulphides.

In all 4 samples only ferrocolumbite and garnet were found.

94-1B: Fragments from a relatively coarse (1 by 3 by 4.5 mm), platy black oxide crystal which is enclosed in a muscovite book (fragment also included). Could therefore be a primary oxide unrelated to the ensuing plagioclase replacement material, which hosts the finer grained black oxide specks. Only ferrocolumbite was found.

94-2: Pegmatite dike with mafic segregations similar to locality 93-249 in Separation Rapids pluton. Euhedral, 2 by 3 by 6 mm, black ferrocolumbite crystal, scattered in low amounts especially near mafic-rich segregations (possibly after cordierite). Similar to locality 93-249 in Separation Rapids pluton, these mica-rich domains contain euhedral beryl.

94-49: Specks of black oxide (ferrocolumbite) in a narrow, plagioclase-rich dike. The rust spots may be related to weathering of the black mineral that is likely a primary oxide mineral.

94-57: Biotite-garnet aplite unit from large dike of potassic pegmatite. Rock contains a scattered fine-grained, soft red-brown mineral (possibly hematite?) and rare gahnite. The areas circled in black contain tiny, black grains of possible columbite-tantalite. The columbite appear primary. No albitization can be seen. Electron microprobe analyses determined ferrocolumbite composition close to the ferrotantalite boundary.

Eastern Petalite Zone

PEGMATITE 1 (PETALITE ISLAND)

94-34: Garnet-muscovite aplite with a curious, locally colour-zoned (dark orange rims to green centre), unknown mineral (?monazite). Speck or two of glossy black ferrocolumbite present.

94-34B: Fragment of the largest ferrocolumbite crystal found in this pegmatite to date (2 by 3 by 4 mm). The mineral occurs at the contact of the pegmatite with mafic metavolcanic host rocks and specifically within a fine-grained, grey, 0.5 cm thick layer of probable plagioclase. The cross-section is roughly diamond-shaped, however, neither wodginite nor cassiterite was found with the electron microprobe. Negerite present.

94-34C: Small slab piece from large block collected at the eastern limit of exposure. Large pieces reveal some lovely textural relations that may shed light upon petalite-spodumene relations with further study. Minute black ferrocolumbite occurs on cut surface (red circles) and a larger grain (1 by 2 mm - cassiterite?) also occurs.

LOU'S PEGMATITE

93-272A: Green muscovite-quartz-plagioclase assemblage. A few minute needle-like grains of ferrocolumbite occur in quartz. Blue-black schörl tourmaline also present.

93-272B: Green muscovite-quartz-plagioclase assemblage. A 2 by 7 mm aggregate of cassiterite crystals lies in the quartz. In some parts of the hand specimen, slender muscovite clearly penetrates into plagioclase. Sample also contains garnet, stibiomicrocline, ferrocolumbite, ferrotantalite, wodginite, cassiterite and löllingite. Large euhedral zircon contains inclusions of probable xenotime.

93-272D: Small cut specimen contains pink garnet and a cluster of black oxide minerals (ferrocolumbite, ferrotantalite, ferrowodginite and stibiomicrocline) which contact a less abundant brown mineral with possible metamict alteration. Arsenopyrite present.

93-272E: Large cassiterite (with inclusions of antimonian microlite and ferrowodginite) at eastern end of pegmatite. Ferrocolumbite found in a second grain.

93-272E: Glossy black, platy euhedral oxides that occur as inclusions in plagioclase, quartz and light green beryl from east-end of pegmatite. Small fragments in plastic vial contain oxide inclusions within a plagioclase crystal in contact with beryl. Small cut piece contains a large euhedral cassiterite and on the reverse side several much smaller oxide grains. Cassiterite contains inclusions of ferrocolumbite, ferrowodginite and stibiomicrolite.

MARKO'S PEGMATITE

93-275C: Petalite-quartz-muscovite-plagioclase assemblage that lies marginal to very coarse petalite-potassium feldspar zone. Hand specimen contains 3.2 by 4 cm splintery crystal of ?petalite or possibly secondary spodumene (mineral was not specifically X-rayed here). The coarse, dark mica books (lithian muscovite and lepidolite) exhibit a slight curvature, somewhat reminiscent of zinnwaldite. Cassiterite also present.

93-275D: From pod rich in lilac mica (lithian muscovite and lepidolite) and containing cassiterite and löllingite.

Beryl-muscovite-plagioclase-quartz wall zone

94-44I: A black oxide grain, 2 by 4 mm, in primary plagioclase from beryl-muscovite-plagioclase-quartz wall zone. Actual contact with some adherence of biotite-rich metasomatic mafic metavolcanic material is included in sample. The grain is remarkable and characterized by patchy compositional variation that includes wodginite, ferrowodginite and ferrotitanowodginite. Also contains cassiterite, stibiomicrolite and strüverite.

94-44J: Black titanowodginite, ferrotitanowodginite and cassiterite found within a 12 by 12 mm area in beryl-muscovite-plagioclase-quartz wall zone. Stibiomicrolite and strüverite present too.

94-44K: Brown cassiterite, and black titanowodginite, ferrotitanowodginite, manganocolumbite and stibiomicrolite crystals from the wall zone. The same unit as 94-44I which produced the titanium-enriched wodginite analyses. The enclosed samples were cut from two blocks of material (bags numbered Block 1 and Block 2), which have been retained for any further work. Block 1 contains an unknown red-orange mineral cut out from one of the corners. Block 2 contains the rare wodginite species.

94-44MU-5: Fine, euhedral black manganocolumbite inclusions extracted from books of muscovite in wall zone at site MU-5. Monazite is present and partly occurs as smaller, yellow inclusions in some of the oxide crystals. The second vial is from same cluster of oxide inclusions in muscovite, but contain a greater amount of the yellow monazite.

Layered pegmatite – fine-grained granite unit in contact with east end of petalite-rich core

94-44N: Black cassiterite with manganocolumbite from layered pegmatite-aplite unit. The dark layer contains an abundant, soft, khaki-weathering unknown mineral (possibly some type of phosphate), which is intergrown with dark mica and garnet. Fine oxides are abundant in adjacent plagioclase-rich assemblage (circled on specimen). Also an unknown light brown mineral is part of the assemblage—probably the cesium-rich mica, nanpingite. A second piece contains a fine needle-like dark mineral as inclusions in plagioclase and elsewhere seen in beryl.

94-44W: Slab surface across orange garnet-rich layer and adjacent muscovite-quartz-plagioclase host. A large, 8 by 22 mm mass of a hard black mineral occurs in the garnet-rich layer whereas much finer grained, euhedral, commonly platy oxides (manganocolumbite) sporadically occur in the host. The latter are associated with a slight reddening, which may relate to radioactive damage(?). Thorium-rich monazite is notable in this sample. The coarse black mineral contains a small inclusion of garnet and partially envelops euhedral garnet at one end. Cassiterite and manganotantalite also present.

East end of Marko's Pegmatite

94-44G: Fine-grained, black manganocolumbite and cassiterite associated with abundant orange spessartine garnet within quartz-muscovite-pink plagioclase assemblage at eastern end of Marko's pegmatite. Near Champion Bear Resources diamond drill platform of early 1990s.

94-44H: Extreme eastern end of Marko's pegmatite. Vein rich in black oxides with garnet-pink plagioclase host. Local cleavelandite, apatite and blue green tourmaline about one metre away. Two samples examined by electron microprobe and only garnet found.

94-44U: Abundant platy to stubby manganocolumbite and cassiterite grains in a muscovite-quartz-plagioclase-orange garnet rock near the eastern end of Marko's pegmatite and specifically near old diamond drill platform (these may just be cassiterite). Some of the oxide grains occur as inclusions within the garnet. One small ferrowodginite grain also found.

94-44Y: Sample that exposes both contacts at eastern end of pegmatite. Note the high garnet concentration next to ironstone contact. Also some strange acicular minerals (ferrocolumbite and cassiterite) are notable on rough surface.

94-44Z: Fine-grained oxides (ferrotapiolite), in muscovite-cleavelandite-quartz assemblage from the east end of Marko's pegmatite. The assemblage, which looks primary with no sign of the cleavelandite involved in any replacement textures, resembles the muscovite-quartz-cleavelandite unit at Locality 93-265. A secondary, ochre-coloured mineral lies interstitially to the cleavelandite laths and represents altered microlite (confirmed by electron microprobe). No cassiterite found. Biotite + garnet metasomatic selvages at this locality are the thickest developed for the entire pegmatite.

BERYL-MUSCOVITE-PLAGIOCLASE REPLACEMENT UNIT THAT OVERPRINTS PETALITE-RICH CORE ZONE

94-44A: Manganotantalite intergrown with wodginite and a finer grained, green euhedral mineral (microlite). These occur in thin veins with mauve mica and plagioclase, typically <1.5 cm thick, hosted by large masses of petalite.

94-44C: 6 by 10 mm euhedral black cassiterite and manganotantalite associated with plagioclase-quartz-mica veinlet in altered petalite and near a mass of the quartz-muscovite-plagioclase replacement unit.

94-44D: Black oxides (manganocolumbite, manganotantalite, wodginite, microlite and cassiterite) in muscovite-plagioclase replacement unit. Elbaite tourmaline also present.

94-44E: A small platy oxide crystal from an aplite mass (E1) that is hosted by the muscovite-plagioclase replacement unit (E2). Manganocolumbite, manganotantalite, microlite (abundant in E2) and cassiterite present.

94-44M: Euhedral, 3 by 8 mm cassiterite crystals that are joined and hosted in a 2.5 by 4.5 cm splotch of plagioclase quartz-silver muscovite which is entirely hosted in petalite. In this case, the cassiterite is clearly secondary and relates to plagioclase alteration of the petalite core unit. A nearby 2 mm thick vein rich in white mica contains a 0.5 by 4 cm crystal of dark green tourmaline (quite possibly elbaite) and a single grain of pyrite. The plagioclase also contains subtle needle-like black mineral. No tourmaline found with electron microprobe, but ferrotitanowodginite present.

94-44P: Small sample from plagioclase-rich replacement unit. Abundant fine-grained, platy to equant, glossy black wodginite and a subordinate orange red unknown mineral, best seen on wetted surface using a binocular microscope. The euhedral oxides occur as inclusions in plagioclase and possibly beryl. Cassiterite and löllingite also found with electron microprobe.

94-44R: Euhedral, black cassiterite with manganotantalite, wodginite and large microlite crystals, abundantly present in a muscovite-plagioclase replacement unit. Microlite hosts large euhedral, zoned inclusions of zircon. Löllingite also found. Bulk analysis of rock registered 1% Ta₂O₅.

94-44S: Muscovite-plagioclase replacement unit with abundant black oxide (wodginite and cassiterite) grains.

94-44V: Another euhedral, black, composite grain of wodginite and microlite from muscovite-plagioclase replacement unit. The possibly same red-orange unknown mineral as in 94-44P also occurs in the hand specimen.

94-44ii: These oxide grains, present in two plastic vials, come from a loose sample of the muscovite-plagioclase replacement unit found downslope from the zone of highest oxide concentration at Marko's pegmatite, i.e., 94-44P, 94-44Q, 94-44R. Wodginite, microlite and cassiterite found.

94-44iii: Three plastic vials containing oxide minerals from large hand sample of muscovite-plagioclase replacement unit that contains a few corroded relics of petalite. Oxides are very abundant and occur as inclusions mainly in the plagioclase (Vial I) – all wodginite. The oxide crystal fragments in Vial II (wodginite and manganotantalite) originated as inclusions within a 0.5 by 2.8 cm apatite crystal. Oxide minerals were also noted in some of the euhedral white beryl and near the margins of former petalite crystals. A lovely white, partially clear, euhedral beryl crystal (4.5 cm diameter; 7.5 cm parallel to c-axis) occurs in sample. Greenish-yellow, soft alteration of petalite sent in for X-ray diffraction and scanning electron microscopy work. Also a splintery light yellow mineral which occurs in an irregular mass, 9 by 1 to 2 cm, sent in for X-ray diffraction and scanning electron microscopy work. This mass appears to overprint the end of one of the former petalite crystals. Vial III contains microlite as dark yellow-green, euhedral crystals, which for the first time, appear to co-exist with other phases that comprise the muscovite-plagioclase replacement unit. Other microlites have come from the Wall Unit (94-44J and 94-44K) or in thin veins which crosscut the petalite-rich Core Unit (94-44A). The sample gives a complete cross-section of a 3 mm wide crystal.

Aplite unit associated with sugary, fine-grained replacement pods

94-44T: White beryl-muscovite aplite with minute black platy oxides (wodginite and microlite). Also a coarse rectangular-shaped oxide crystal (3 by 12 mm) reveals an interesting brown and black internal zonation.

Detailed sampling of oxides from wall zone at Marko's pegmatite, as function of adjacent host-rock type and with variation in distance from external pegmatite contact

1. OXIDES ADJACENT TO MAFIC METAVOLCANIC HOST-ROCKS

96AT-1: 0.5 by 1.5 mm, rectangular, black grains in quartz and plagioclase with brown-green muscovite nearby. Situated at exact contact of wall zone with garnet-biotite-plagioclase-metasomatized mafic metavolcanic host rocks. Note that no oxide sample except 96AT-6 comes closer to the host rock contact than this one. Ferrocolumbite, manganocolumbite, microlite, stibiomicrolite and second world occurrence of stibiobetafite found in complex relationship with one another.

96AT-3: 3 by 7 mm brown-black euhedral cassiterite that contains ferrotitanowodginite and microlite inclusions. Mostly enclosed in plagioclase and partly in contact with quartz. Coarse muscovite is nearby. Located 30 cm from contact.

96AT-4: Euhedral to anhedral, black, cassiterite with microlite inclusions scattered through a plagioclase-rich mass and situated 66 cm from host-rock contact and 10 cm from inner contact of wall zone with highly altered part of the petalite-rich core.

96AT-5: Black cassiterite containing inclusions of manganotantalite, titanowodginite and microlite within internal contact zone between wall zone and petalite-rich core, 76 cm from host rock contact. Oxide appears to be associated with plagioclase-rich replacement veins within corroded petalite relics. The oxide is also associated with light orange, possible low albite. About 100 cm from mafic metavolcanic host rocks.

96AT-6: Black columbite grains scattered over 13 cm near contact of quartz-rich part of wall zone and metasomatized, mafic metavolcanic rocks. Size: 1 mm diameter to 3 by 4 mm. The sample comprises a single columbite crystal almost completely enclosed in garnet-biotite-plagioclase metasomatic selvage material. Equally of ferrocolumbite and manganocolumbite composition and containing unique antimony- and uranium-rich microlite inclusions.

96AT-7: Cluster of ferrocolumbite grains in muscovite-plagioclase-quartz wall zone situated about 1 cm from mafic metavolcanic contact and near 96AT-6. Grains have many microlite inclusions and a patchy zonation.

96AT-8: 0.5 by 1.5 cm euhedral, cassiterite with titanowodginite and ferrotitanowodginite inclusions all contained in plagioclase. Situated about 6 cm from contact of wall zone with petalite-rich core zone. In a separate polished thin section, manganocolumbite and manganotantalite also found.

2. OXIDES ADJACENT TO BANDED IRON FORMATION HOST-ROCKS

96AT-9: Coarse, black, euhedral ferrocolumbite situated 3.5 cm from a 7 by 36 cm foliated mafic metavolcanic enclave, which, in turn, is 15 cm from banded iron formation host rock. Ferrocolumbite mostly enclosed by plagioclase.

96AT-10: Several fine-grained, black, euhedral manganocolumbite crystals occurring as inclusions within a 3 by 5.5 cm beryl and situated 38 cm from host-rock contact. Monazite is common in this sample.

96AT-11: Two vials of oxide material:

A) Black, euhedral, 3 by 5 mm cassiterite containing ferrotitanowodginite and microlite inclusions with 7 crystal faces, almost completely enclosed by plagioclase. Situated 36 cm from host-rock contact.

B) Rectangular cassiterite (with one microlite inclusion), 5 by 9 mm, almost completely enveloped by plagioclase. Situated 40 cm from host-rock contact.

96AT-12: Euhedral, black cassiterite containing titanowodginite, ferrotitanowodginite and microlite inclusions, 1 by 3 mm and 3 by 5 mm, mainly in plagioclase, but locally touching quartz. Situated 112 cm from banded iron formation host rocks and 17 cm from contact with petalite core.

96AT-13: Black cassiterite (with inclusions of antimonian microlite) in contact with plagioclase and lesser quartz. Distance from host-rock contact was not recorded, but located in same general area as 96AT-12.

96AT-15: Loose piece of muscovite-plagioclase-quartz wall zone with abundant black oxides (cassiterite and microlite identified). Rare fluorapatite also present.

96AT-16: Yellow beryl, 26 cm from banded iron formation contact, occurring as 2 by 4 cm crystal and in contact with plagioclase, quartz and fine-grained muscovite. A piece of the beryl with a small black manganocolumbite inclusion included.

96AT-17: 7 by 10 mm cassiterite situated in wall zone 32 cm from banded iron formation host rocks and in part of pegmatite with the layered sodic pegmatite and/or grey aplite unit. Sample remarkable for containing euhedral, ferrotitanowodginite inclusions together with inclusions of ferrocolumbite, and microlite.

96AT-19: Extreme east-end of Marko's pegmatite.

A) Blue tourmaline (elbaite) from cleavelandite-quartz pod.

B) Quartz << plagioclase unit with loads of altered garnet or oxide minerals. Wodginite is the main oxide present occurring as tabular, euhedral crystals and partially replaced by microlite. Manganotantalite also present.

96AT-20: Mass of black tourmaline (schörl – very different from tourmaline in 94-44D and 96-19A) situated 2 to 5 cm from banded iron formation contact.

JAMES' PEGMATITE (ALSO CALLED PEGMATITE 4)

93-276A: Sheared, tourmaline(dark brown schörl)-apatite-muscovite-petalite pegmatite. The pegmatite elsewhere also contains cassiterite.

93-276B: Sheared tourmaline-apatite-muscovite pegmatite. Rock contains deformed masses of green apatite and odd orange spessartine garnet, wrapped by fine-grained mica and sparse, ferrowodginite, ferrotantalite and cassiterite. Also note yellow (?secondary) mineral (arsenopyrite). Ontario's first occurrence of a wodginite group mineral came from this sample.

93-276C: Small mass of cassiterite crystals in quartz-muscovite-plagioclase host. Core zone oxide mineralization occurs as clusters of coarse crystals (1 to 18 mm diameter) in a hematite-stained plagioclase-rich mass with apatite near a quartz-rich mass.

93-276D: Cluster of brown-black cassiterite in a mass of hematite-stained plagioclase situated in the pegmatite centre and proximal to an elongate quartz-rich mass (10 to 20 cm by 1.5 m). The cassiterite is entirely enveloped by plagioclase and is 1 to 18 mm in diameter. Apatite is also present in the plagioclase-rich mass.

93-276E: Platy black cassiterite, 1 mm or less in thickness, which occur in plagioclase associated with very abundant apatite (40% in a 10 by 10 cm area). Muscovite books lie in contact with the apatite-plagioclase assemblage. Oxide minerals were not seen within the apatite grains.

93-276F: Abundant brown cassiterite in a pink plagioclase-rich pod near the north contact. This pod is 15 by 60 cm and oriented normal to the northern contact.

PEGMATITE 5

94-80A: A 2 by 5 mm black cassiterite crystal which occurs in an apatite-tourmaline (schörl)-muscovite-quartz-plagioclase assemblage near the northern contact. The oxide is 1 cm from the contact.

94-80B: Twinned, euhedral brown-black cassiterite with striations. Mineral broke along twin plane during removal. Approximately square, 7 mm in diameter and entirely enclosed in plagioclase in a muscovite-biotite-petalite-potassium feldspar-plagioclase (local beryl) assemblage near the north contact.

94-80C: Fine-grained cassiterite 55 cm from 94-80B and in same assemblage. Occurs in 3 cm diameter quartz which is surrounded by plagioclase.

94-80D: Small grains of black ferrowodginite with uranmicrolite inclusions in a <1 cm thick vein with the largest mass of petalite. Vein mainly consists of plagioclase with minor garnet and tourmaline.

94-80E: A second sample from the herringbone, apatite-plagioclase intergrowth contained in the ballpeen muscovite-quartz unit that contains more fine-grained black oxides and near the same site as for previously analyzed high-WO₃ oxides, i.e., completely enclosed in apatite or lying along contact between apatite and pink plagioclase. Only cassiterite found by electron microprobe. Note: 94-80N below, contains oxides from an identical apatite-plagioclase intergrowth, but in a different specimen.

94-80F: A cut specimen with a 2 by 3 mm section of a black oxide within pink potassium feldspar (but perhaps connected to albitized petalite below surface) near its contact with quartz. On the reverse cut surface, a series of small black oxide grains occur in similar fashion. Wodginite with up to 3 wt % WO₃ present. Cassiterite also present.

94-80G: Several pieces from a biotite-muscovite-potassium feldspar-quartz-plagioclase assemblage with large scattered petalite megacrysts. The recrystallized petalite is locally replaced by veins rich in plagioclase (lesser silver muscovite, quartz, apatite and

garnet). Several small black wodginite grains have been circled in pink. Largest oxide is a euhedral crystal at 1 by 1.5 mm. Electron microprobe reveals wodginite with up to 2.9 wt % WO₃.

94-80i: Slabs from a garnet-white beryl-apatite-black tourmaline - ballpeen-texture muscovite-quartz-pink plagioclase assemblage from south contact of pegmatite and a few metres from 94-80E. Numerous grains of fine-grained black oxides tend to be more common within 3 cm of the mafic metavolcanic rock contact. A faint red hue may be due to radioactive related alteration. Ferrotantalite, cassiterite and microlite found with electron microprobe.

94-80J: Abundant black ferrowodginite in a second plagioclase-rich vein that cuts across a large recrystallized petalite megacryst. Lies about 10 cm from the vein that hosts wodginite in 94-80D.

94-80K: Two black ferrowodginite grains, about 1.5 mm diameter, in muscovite-quartz-plagioclase vein in petalite megacryst.

94-80L: Abundant black ferrowodginite grains from a piece of a 2 by 3 cm ovoid alteration pod in a petalite megacryst.

94-80N: A second block from same unit that hosts the high WO₃ wodginite of 94-80E. Fragments of fine-grained, black, possible oxides in a plagioclase-apatite intergrowth next to a large curved book of silver muscovite (ballpeen texture) are enclosed in vial. Oxides from quartz in contact with plagioclase-apatite are included in vial. The plagioclase-apatite domains here occur as veins that emanate from larger ovoid masses that have the distinctive herringbone texture. Locally, the plagioclase-apatite assemblage with the oxides seems to locally replace the outer parts of the curved muscovite books and plagioclase crystals are found within the books as well. The oxides are possibly of replacement origin.

94-80P: Several black oxide specks situated along the margins of a mass of pink potassium feldspar and lesser petalite. The white mass of muscovite-quartz<<plagioclase with the oxides looks to be a product of albitization of the potassium feldspar and petalite. The deep red-brown mass is weathered purpurite. Oxides include ferrowodginite, wodginite with up to 12.3 wt % WO₃ and cassiterite (which rims the wodginite in places). One ferrotapiolite analysis was also obtained in a grain associated with ferrowodginite.

96-AT23: Cassiterite containing large inclusions of WO₃-rich ferrowodginite from the fluorapatite-light pink plagioclase intergrowth in Pegmatite 5. Exactly the same site as sample 94-80E. Sample has a maximum value of 25.4 wt % WO₃ and averages 15.8 wt % WO₃ based on electron microprobe analysis.

PEGMATITE 6

94-90A: Garnet-beryl-muscovite-tourmaline pegmatite with a red mineral locally along subtle shear surfaces (possible some secondary uranium-thorium-bearing phase). The smaller sample contains black ferrowodginite and cassiterite grains.

94-90B: Several small oxide grains plucked from plagioclase-rich veins that replace parts of a large petalite mass. These veins also contain sparse quartz, garnet and local clusters of black tourmaline and biotite. The plagioclase veins definitely cut the delicate, fine-grained intergrowths of quartz and spodumene in the petalite. Some of the fine-grained black grains could actually turn out as tourmaline (none found). The setting for these oxides is similar to 94-80E and 94-P7E and indicated by ferrowodginite with up to 26.3 wt % WO₃. Cassiterite also present.

96-AT21A: Coarse black euhedral cassiterite in biotite-muscovite-potassium feldspar-quartz-plagioclase unit (with local black tourmaline, green beryl and petalite). The cassiterite is a 3 to 10 mm by 17 mm crystal almost entirely in contact with plagioclase.

96-AT21B: Cluster of black tourmaline (schörl) in quartz and plagioclase. The tourmaline looks primary and in same unit a 96-AT21A.

96-AT22: Tourmaline (schörl) porphyroblast that overprints petalite.

PEGMATITE 7

94-Peg7A: Several oxide crystals (cassiterite) in a quartz-muscovite-apatite-plagioclase assemblage in the western, plagioclase-rich part of pegmatite. Euhedral cassiterite occurs in plagioclase and also apatite.

94-Peg7B: Several coarse oxide crystals in plagioclase-rich material next to southern contact. Includes ferrocolumbite, ferrotantalite, wodginite, cassiterite and microlite. Arsenopyrite and very rare scheelite also found.

94-Peg7C: Black and brown cassiterite. Also note the slightly recessive brown mineral and some apatite. Otherwise, the oxides are largely enveloped by plagioclase.

94-Peg7D: Two cassiterite crystals from a 10 cm wide, plagioclase-rich border unit adjacent to thin reentrants of mafic metavolcanic rock. A 10 cm by 1 m, quartz-rich pod (quartz-beryl-tourmaline-muscovite) lies about 10 cm from the oxide-rich mineral cluster.

94-Peg7E: Small black wodginite grains from plagioclase-rich replacement patches within a recrystallized, 3.7 m long petalite crystal. This is an identical habitat to the tungsten-rich wodginite at Pegmatite 5 (94-80E). Ferrowodginite contains up to 10 wt % WO₃ in this sample.

94-Peg7F: Fragments from a 1 by 3 cm rectangular grain of löllingite in the tourmaline-muscovite-quartz<<plagioclase unit at west end of pegmatite.

94-Peg7X: Oxide-rich (cassiterite, ferrowodginite and microlite) sample – in a matrix of mainly potassium feldspar and apatite. Cut surface indicates sample came from edge of channel cut near where large crystal was removed. Vial 1 contains several small wodginite grains. Vial 2 contains a single black oxide fragment from a second vein of muscovite-plagioclase situated about 6 cm from that in Vial 1.

97-P7-1: Several black, oxide grains (ferrotantalite, wodginite and cassiterite) hosted in a vein-like mass rich in plagioclase that replaces a deformed and highly recrystallized petalite megacryst.

PEGMATITE 9

94-318: Various pieces from a large hand specimen of highly sheared garnet-muscovite-potassium feldspar-quartz-plagioclase pegmatite. Many small black specks occur which identify as ferrocolumbite, ferrotantalite, cassiterite and less commonly ferrowodginite. Nigerite also present.

PEGMATITE 10

97-P10-1: Garnet-muscovite-potassium feldspar-quartz-plagioclase rock, quite deformed and with host rock contact exposed along one edge of sample. Several clusters of fine-grained oxide minerals (ferrocolumbite, ferrotantalite, ferrotapiolite, ferrowodginite, cassiterite and nigerite) are notable.

97-P10-2: Muscovite-quartz-plagioclase-(garnet) rock with scant, fine-grained, oxide minerals (ferrocolumbite, ferrotantalite and cassiterite).

97-P10-3: Similar material to 97-P10-1 with platy black oxide grains (ferrocolumbite, ferrotantalite, ferrowodginite, cassiterite and nigerite) up to 0.75 by 2 mm.

97-P10-4: Similar rock to 97-P10-1, but richer in potassium feldspar. Black oxide grains (ferrocolumbite, ferrotantalite, ferrotapiolite, cassiterite and nigerite) are relatively abundant, but generally fine grained.

97-P10-5: Small sample and similar to 97-P10-1, but with coarsest, black oxide grains (ferrocolumbite, cassiterite and nigerite) seen in pegmatite.

PEGMATITE 11

95-117A: Garnet aplite unit that contains patches of deformed petalite. Several euhedral grains of an unknown, hard, platy, orange brown mineral (about 0.1 to 1 mm diameter) is possibly nigerite. The tantalum oxide mineral is mainly manganocolumbite, although rare strüverite is present.

95-117B: Specks of black ferrocolumbite and cassiterite found (black tourmaline is also common in Pegmatite 11). This material is from the same garnet aplite that contains 95-117A.

95-117C: Small hand specimen showing largely recrystallized, fine-grained petalite masses (brown stained mineral) which is variably overgrown by white, metasomatic plagioclase and odd black tourmaline (schörl). The circled area contains a 1 mm diameter platelet of possible nigerite which is mainly hosted by plagioclase. Ferrocolumbite and ferrotantalite are accompanied by strüverite.

95-117D: Small, dark brown, cassiterite grains hosted in a muscovite-garnet-biotite-quartz-plagioclase rock (possibly some sort of aplite). Black tourmaline (schörl) also present.

MISCELLANEOUS PEGMATITE DIKES IN EASTERN PETALITE ZONE

93-355: Specimen from a quartz-rich, small dike that occurs in the petalite zone, 50 m east of Lou's pegmatite. Consists of pink garnet, biotite, muscovite, faint blue cordierite and abundant quartz. A deep yellow, unknown mineral also present (1 to 2%). A

sparse, elongate, glossy black oxide mineral was revealed by electron microprobe work to be ferrocolumbite with very primitive composition ($\text{Ta}_2\text{O}_5 = 6.6 \text{ wt } \%$).

SOUTHWESTERN PEGMATITE SUBGROUP

Southwest Beryl Zone

94-15A: A 3 m thick, garnet aplite-pegmatite dike in mafic metavolcanic rocks near the contact of the Separation Rapids pluton at locality 93-260. Many small black oxide grains (ferrocolumbite, ferrowodginite and cassiterite) are obvious in a sample of the dike margin that comprises a biotite-quartz-plagioclase assemblage. Largest oxide grain is about 4 mm long.

94-15B: Dike margin material similar to 94-15A

96-9: Numerous black oxide specks up to 1 mm diameter in 30 cm-thick albitite dike. Mainly ferrotapiolite, but manganotantalite, microlite and strüverite also present.

96-11: 1 m thick dike of biotite-garnet-muscovite aplite and/or pegmatite (local beryl in pegmatite part). Two samples examined:

96-11A: Sparse black specks of ferrocolumbite and cassiterite (with one tiny ferrotapiolite? inclusion) occur in the garnet-quartz-plagioclase unit.

96-11B: Silver-grey arsenopyrite from biotite-garnet-muscovite, aplite and/or pegmatite dike. Local beryl present.

96-24: Platy black oxides from a 0.7 by 1 m, quartz-muscovite-cleavelandite pod (looks similar to the cleavelandite pods at 93-260) in 30 to 40 m thick dike of biotite-muscovite potassic pegmatite. Oxides up to 1 by 5 mm shown to be oscillatory zoned manganocolumbite.

96-25: A second large pegmatite dike very close to 96-24. Main rock type is biotite-garnet-muscovite-quartz-plagioclase pegmatite (probably some sort of sodic pegmatite). North contact with amphibolite reveals sporadic platy black oxides up to 2 by 5 mm which are associated with blue-green beryl.

96-25A: Platy cassiterite (with microlite inclusions) in pegmatite, but only 1 cm away from biotite-rich metasomatic selvage developed on amphibolite host-rocks.

96-25B: Platy cassiterite situated in pegmatite and 4 cm from metasomatic selvage.

96-27: 40 cm thick, garnet aplite dike situated a short distance from north contact of Big Whopper petalite pegmatite and possibly part of its mineralized system. Aplite contains numerous fine specks of black cassiterite.

96-53: 1 m thick dike of quartz-megacrystic, biotite-muscovite-garnet aplite. Sparse milky beryl also occurs.

96-53A: Garnet-beryl-biotite-quartz-plagioclase rock with several deep brown, euhedral cassiterite crystals. 96-53A and 96x53A are two separate crystals, the latter containing ferrotantalite and ferrotapiolite inclusions. A 1.3 by 1.7 cm light green crystal of beryl occurs in the small specimen.

96-53B: Coarse-grained, garnet-muscovite-quartz-plagioclase sample taken from the central part of dike. Fine-grained, sparse black cassiterite and patchy zoned, intergrowth of ferrocolumbite and ferrotantalite.

96-55: Dike of garnet-muscovite potassic pegmatite layered with garnet-muscovite aplite. The aplite contains locally abundant black ferrocolumbite and sparse milky beryl. Some of the oxides appear to be cassiterite (none found with electron microprobe). Thorium-rich monazite also noted.

96-59: Narrow deformed aplite dike evident as 30 cm thick boudins. Sparse oxides, possibly cassiterite in part, are present. Also a fine-grained, earthy red-brown mineral is evident and could be monazite. Only garnet was analyzed with electron microprobe, although many totally altered oxides were encountered.

96-76: Sparse black cassiterite and ferrocolumbite specks in a 30 cm thick dike of coarse-grained, quartz-plagioclase rock that also contains sugary aplite. Most of the oxide specks found in the sugary aplite. Dike occurs in amphibolite near south contact of Separation Rapids pluton. An earthy red-brown mineral may be monazite.

96-76A: A further sample to that previously analyzed. A number of fine black oxide specks are noted and also a metamict, grubby brown to green phase is present and confirmed by electron microprobe as zircon. Ferrocolumbite is the main oxide phase and is accompanied by cassiterite with high tantalum content (9 wt % Ta_2O_5).

96-81: Dike of deformed, quartz-megacrystic, garnet-chlorite-biotite-plagioclase pegmatite, up to 0.6 m thick. Contains numerous specks of fine-grained black oxides. The metasomatic selvage along this dike has unusually high cesium (5000 ppm Cs). Ferrotapiolite is the main oxide present; earlier, patchy zoned ferrotantalite is associated with it. Cassiterite also present in minor amounts.

96-81X: Duplicate sample contains much less ferrotantalite and ferrotapiolite than above material.

96-85: Scattered black ferrocolumbite and cassiterite (with inclusions), 1 by 1 mm to 2 by 3 mm, circled, from a coarse-grained to pegmatitic, garnet-muscovite granite dike (2 m thick). The dike intrudes foliated mafic metavolcanic rocks just outside of the Separation Rapids pluton and across the bay from 93-260.

Locality 96-86: Small pegmatitic granite pluton in SW Beryl zone

96-86: Muscovite-garnet aplite with several brown and black oxide grains, several of which appear to be cassiterite. Material from this locality may have been previously analyzed by electron microprobe, but came from a cleavelandite-rich unit. The locality is situated in the western part of the beryl zone and is 100 m north of the petalite-bearing, West pegmatite. Notable zircon in this sample. Most oxide is cassiterite, but ferrocolumbite and ferrotantalite occur as inclusions in garnet. Nigerite present too.

96-86A: Apatite-muscovite-quartz-cleavelandite pod with scattered possible oxide minerals contained in a large ovoid-shaped mass, 250 by 300 m, mainly composed of pegmatitic leucogranite and potassic pegmatite with minor aplite and quartz-rich pods. The vial contains fragments of very thin, platy black oxides (manganocolumbite that is patchily replaced with manganotantalite) and the arrows on the larger piece point to a more equant, black mineral with a reddish tinge.

96-86B: Dark brown, euhedral ferrocolumbite (zoned to a manganotantalite rim) in plates about 1 mm thick and at least 3 by 7 mm in the other dimensions, from a quartz-rich pod which also contains plagioclase, blocky potassium feldspar and muscovite books (latter two minerals analyzed at the Ontario Geological Survey Geoscience Laboratories). Also some cassiterite associated with the ferrocolumbite.

97-10A: Garnet-muscovite aplite dike, about 1 m thick, with several black oxide grains (manganotantalite) and scarce fine-grained yellow green mineral (chrysoberyl).

97-16A and 97-16B: Material from aplite dikes, 3 cm to 1.5 m thick, hosted in amphibolite very close to contact with Separation Rapids pluton. The two aplite samples contain fine-grained, black and dark green oxide minerals (cassiterite, ferrocolumbite and ferrotantalite). Some garnet also present.

97-69: Two small pieces of glossy-black, non-magnetic, oxide mineral separates (cassiterite, and ferrowodginite + lesser ferrotapiolite) chipped out of a deformed, 1m thick aplite dike.

97-134A: Garnet-biotite-muscovite-potassium feldspar aplite dike, 20 to 30 cm thick, which contains several black oxide grains (ferrocolumbite and cassiterite).

6056: Muscovite-lepidolite-polyolithionite-bearing, sodic pegmatite. A fairly evolved rock as indicated by rubidium and cesium contents of mica and potassium feldspar. Several black and green grains of oxide minerals as detailed below:

6056A: Gahnite crystal, about 45 by 6 mm, intergrown partially with muscovite, but mainly hosted in quartz.

Ferrocolumbite also present.

6056B: Two pieces represent a single crystal of a peculiar, charcoal-black, 2 by 10 mm, oxide minerals (ferrocolumbite and ferrotantalite with minor microlite).

6067A: Garnet-biotite-quartz-plagioclase rock containing a few crystals of dark brown ferrocolumbite and ferrowodginite.

6081 and 99AT-6081: Cordierite-biotite-garnet-quartz-potassium feldspar-plagioclase dike, 2 to 3 m thick, situated 25 m north of the Zone 11 petalite pegmatites. One area along the south contact of the dike contains abundant, conspicuous, coarse-grained, black cassiterite up to 7 mm diameter. Cassiterite contains ferrocolumbite and rare microlite inclusions. Holmquistite present as fine needles associated with the cordierite. Also sampled by Steve Smith (99-SS158).

6090: Biotite-garnet-quartz-plagioclase dike, 2 to 3 m thick, situated 170 m north of Big Mack pegmatite. Rock contains fine-grained black specks of ferrocolumbite.

Southwestern Petalite Zone

PEGMATITE 12

96-13B: Sample of fine-grained aplite and deformed, recrystallized petalite-rich material next to host-rock contact. Fine black specks of oxides put in plastic vial, some of which occur in rock chips. Cassiterite present with a single manganocolumbite inclusion.

BIG WHOPPER PEGMATITE

96-29A: Sparse, fine-grained, black cassiterite, manganocolumbite and manganotantalite grains in a 1.3 m thick, muscovite-quartz-plagioclase dike related to the Big Whopper pegmatite. Appreciable acicular apatite noted in thin section.

96-29B: Sparse, fine-grained, black oxides in a biotite-quartz-plagioclase dike, 2 m thick, and situated 10 m west of 96-29A. Dike also likely related to Big Whopper. Patchy zoned ferrotantalite and manganotantalite grains together with cassiterite found.

96-29C: Sample richest in oxides and from a purple mica-quartz-plagioclase dike very near Big Whopper pegmatite contact. Dike is about 1 m thick and locally rich in purple mica. Oxides range from, <1 mm to 5 by 8 mm, the largest oxide is cassiterite. Manganocolumbite and manganotantalite present too as individual crystals.

96-29D: Black cassiterite (with rare ferrocolumbite and manganotantalite inclusions) specks in garnet-quartz-plagioclase rock from same dike as 96-29A. One euhedral oxide shows double wedge-shaped outline.

96-29F: Piece from the main petalite zone of the Big Whopper pegmatite. Oxides are in general difficult to find in the petalite-rich unit. This piece has a couple of black manganocolumbite specks in a muscovite-garnet-quartz-potassium feldspar assemblage. The oxide specks appear to be associated with incipient albitization as these lie in contact with delicate plagioclase-rich veins. Two separates from this sample proved to be garnet.

96-29G: A few black oxide specks in a specimen of deformed petalite pegmatite. The oxides appear to relate to patches of plagioclase-rich material. Only sample to date that contains yttriochlorite and yttrian microlite. Ferrocolumbite, ferrotantalite, manganocolumbite, cassiterite and nigerite are also present.

96-31: Dike composed of aplite (3 m thick) and pegmatite that could represent western end of the Big Whopper pegmatite. The margins consist of a garnet-muscovite aplite with common, <1 to 3 mm diameter black oxide specks, most of which are cassiterite. Ferrocolumbite also present. The aplite grades into a pegmatitic centre marked by abundant potassium feldspar, but no petalite.

97-185A: Garnet-biotite sodic pegmatite, vaguely foliated, inequigranular adjacent to northern contact of Big Whopper pegmatite. Possible eucryptite as a greasy green spot also noted. Monazite and primitive, low Ta₂O₅ ferrocolumbite (average 13 wt %) present.

97-185B: Garnet-biotite aplite that grades into 97-185A. Sparse megacrysts, up to 2.5 cm diameter, of a green phase could be eucryptite and occur in a 2 cm thick, petalite-rich layer. Manganocolumbite and manganotantalite present.

97-186: Albite-quartz-potassium feldspar aplite that was divided for electron microprobe analysis:

97-186X: aplite with some large garnets and a little cassiterite

97-186Z: aplite with more abundant cassiterite than 97-186X and lesser garnet.

Cassiterite data also collected on 97-186vii and 97-186B

97-186A: Garnet-muscovite aplite that lies in contact with a mafic metavolcanic enclave. Part of an altered greasy green megacryst is apparent and likely represents eucryptite. Several fine-grained black specks of oxide minerals (ferrocolumbite, ferrotantalite and cassiterite) also noted.

97-186C: Potassium feldspar-megacrystic, garnet-muscovite aplite. Loose piece from northern end of trench. Several black oxide grains notable (ferrocolumbite, cassiterite and lesser manganocolumbite). Nigerite also present.

97-198: Loose piece of aplite from northern part of trench. A 5 mm diameter gahnite crystal is obvious and the coarsest seen in the Big Whopper pegmatite. A few black oxide specks present (manganocolumbite, manganotantalite and cassiterite).

97BW-1: Muscovite-petalite-plagioclase unit near southern end of trench. Contains manganocolumbite and manganotantalite.

97BW-2: Piece of layered rock with fine-grained muscovite aplite and coarser, muscovite-potassium feldspar-petalite units from northern part of trench. Glossy black elongate and equant oxide minerals (manganocolumbite, manganotantalite and cassiterite) appear to be mainly hosted by the aplite unit. Thorite also present.

97BW-3: Purple mica-quartz-plagioclase unit that is similar to 96-29C. Black possible oxide mineral noted in several parts of sample.

97BW-4: Petalite-rich sample with specks of green gahnite and dark brown cassiterite, manganocolumbite and manganotantalite (some with relatively high UO₂ contents). Sample represents a loose blast piece near southern pegmatite contact in trench.

97BW-5: Quartz-plagioclase rock from trench with several specks of oxide minerals which appear mainly to be cassiterite. Ferrocolumbite and garnet also present.

97-BW6: Aplite unit that has banded appearance due to thin layers rich in pink petalite. The sample originated from the trench about 20 m from north contact. Several fine-grained dark grains occur especially in the aplite part and were indicated by electron microprobe to be cassiterite.

97BW-7: Symmetric-zoned petalite dike emplaced in large mafic metavolcanic enclave which is intersected midway along the trench. The two internal zones were sampled as detailed below:

97BW-7A: outer 2 cm thick, fine-grained, plagioclase-rich rims contains ferrotantalite, wodginite, ferrowodginite and microlite.

97BW-7B: inner, quartz-potassium feldspar << petalite core zone that contains relatively abundant dark brown oxide grains mostly of cassiterite. Ferrocolumbite, ferrotantalite, wodginite, and microlite also present. Maximum size of grains: 5 by 6 mm.

97BW-8: Small pieces of aplite from midway along trench and just south of last mafic metavolcanic enclave in traversing from the north. Small specks of manganocolumbite and manganotantalite occur sparsely amongst more common cassiterite.

98ATBW-1: Sample of pegmatite unit with large pink petalite crystals and situated about midway along trench. Garnet, manganocolumbite and cassiterite also present.

98SS-27: Blue topaz-lepidolite-plagioclase rock from zone newly excavated by Avalon Ventures Ltd. Sparse manganotantalite, cassiterite and microlite also present.

98SS-29: Sample that contains fine-grained, plagioclase-rich border of Big Whopper and adjacent biotite-rich, metasomatized mafic metavolcanic rocks from a large enclave within the pegmatite mass. Sparse, fine-grained black oxide grains (ferrocolumbite, ferrotantalite, manganocolumbite, manganotantalite, wodginite, microlite and cassiterite) present in pegmatite part of sample.

Drill core samples from Big Whopper pegmatite

DC97-6-26: Purple mica-petalite-plagioclase-potassium feldspar assemblage (unit 6D of Avalon Ventures Ltd.). One light pink square crystal is likely beryl; sparse black oxide specks also present (manganocolumbite and manganotantalite). From Hole 97-6 at 26.2 m depth.

DC97-7-55: Quartz-purple mica-petalite unit with traces of blue-green gahnite, cassiterite and minor microlite (Unit 6D of Avalon Ventures Ltd.). From Hole 97-7 at 55.9 m depth.

DC97-8-57: Muscovite-quartz-plagioclase-potassium feldspar assemblage (unit 4 of Avalon Ventures Ltd.). Several black oxide specks noted (ferrocolumbite). From Hole 97-8 at 57.1 m.

DC97-8-91: Garnet-petalite-muscovite-plagioclase assemblage (unit 4 of Avalon Ventures Ltd.). Black oxide minerals are rare (manganocolumbite and cassiterite). From Hole 97-8 at 91 m.

DC97-8-124: Finely banded, petalite-plagioclase-potassium feldspar assemblage. Black oxide minerals present (manganocolumbite and cassiterite). From Hole 97-8 at 124.8m.

PEGMATITES 14 AND 15

96-57: Outcrop contains two highly deformed and identical petalite pegmatite dikes, both about 1.5 m thick and similar to locality 96-13. Also a related plagioclase-rich dike occurs a few metres south of Pegmatite 15, which was not sampled. Pegmatite 14 is represented by 96-57A, 96-57B and 96-57C, below:

96-57A: Specks of black cassiterite sparsely disseminated in a petalite-plagioclase-purple mica unit.

96-57B: Sparse, fine-grained specks of black cassiterite and ferrocolumbite in a garnet-quartz-plagioclase dike (possibly an albitite) situated near Pegmatite 15. Thin section has an amazing myrmekitic texture. A trace of holmquistite occurs on the outer contact of the dike with biotite-rich metasomatized amphibolite. Rock chip with a single fine-grained oxide in plastic vial is situated within 1 mm of the holmquistite-bearing, metasomatized amphibolite.

96-57C: Mass of recrystallized, light brown petalite overprinted locally by garnet and white feldspar (difficult to visually determine whether potassium feldspar or plagioclase). Specks of black and dark brown cassiterite, up to 1 mm, are mostly associated with the white feldspar-quartz-garnet-muscovite domains which possibly reflects albitization.

GREAT WHITE NORTH PEGMATITE

96-87: Oxide specks in the aplite part of white petalite-bearing pegmatite discovered by Bob Fairservice and Jim Willis. These specks appear to be of two different minerals: the glossy, less common specks are possibly cassiterite and the second mineral is splintery and dark brown. Only large cassiterite confirmed with electron microprobe.

97GWN-1: Pieces cut from two exfoliated slabs at the west end of the pegmatite and consists of garnet-muscovite aplite with white potassium feldspar megacrysts up to 3 cm diameter. This rock is the dominant unit in this part of the pegmatite. Sparse green gahnite specks are present together with ferrocolumbite.

97GWN-2: Garnet-quartz-plagioclase rocks that forms a distinct, 30 cm thick, wall zone. Several black oxide specks apparent (manganocolumbite, manganotantalite and cassiterite).

97GWN-3: Garnet-quartz-potassium feldspar-plagioclase rock that is a loose piece from the north side of the pegmatite dike. The sample resembles border zone material of 97GWN-2 except for higher quartz and presence of potassium feldspar. Ferrocolumbite, cassiterite and nigerite found with electron microprobe.

97GWN-4: Loose piece from the petalite zone that also contains the odd gahnite grain up to 2 by 3 mm. Oxides include manganocolumbite, manganotantalite and cassiterite.

97GWN-5: Two pieces of petalite-bearing material selected from trench. A few odd black speck of oxide minerals are present (manganocolumbite, manganotantalite, wodginite and cassiterite).

97GWN-6: Garnet-quartz-plagioclase border zone material adjacent to biotite-rich, metasomatized mafic metavolcanic host rocks. Several black oxide grains up to 2 mm length present (ferrocolumbite, ferrotantalite and cassiterite).

SCHOOL OF FISH PEGMATITE SWARM

97-1: Narrow, zoned, white dike with petalite and lesser, light green spodumene that is situated between the main School of Fish swarm and Bob's pegmatite. Abundant brown oxide minerals present, especially in plagioclase-rich patches that partially envelop coarse white potassium feldspar. The oxides appear mostly cassiterite, but ferrocolumbite, ferrotantalite and manganocolumbite also found.

97-70: Pegmatite 16 (largest dike in swarm and 0.7 m thick). Petalite-rich pegmatite chips taken next to a channel sample across the dike. Many fine-grained black oxide grains are noted (ferrocolumbite, manganocolumbite and cassiterite).

97-71: Narrow petalite pegmatite dike (5 cm thick) situated at the northern limit of the School of Fish dike swarm. The sample contains numerous black specks of oxide minerals (ferrotapiolite and microlite).

97-264: Cut pieces from a large specimen of a zoned dike composed of a petalite-rich core and plagioclase-rich rims. Several fine-grained oxide specks (ferrotantalite, microlite and cassiterite) occur in the plagioclase-rich rims. Nigerite also present.

BOB'S PEGMATITE

97BP-1: Loose piece from trench of the garnet-muscovite-quartz-potassium feldspar unit. One grain of an unknown black mineral is circled. Manganocolumbite, manganotantalite and cassiterite found with electron microprobe.

97BP-2: Similar rock to 97BP-1 and also with one oxide grain (manganocolumbite and cassiterite).

97BP-3: Foliated, aplite rock with several black specks and an unknown yellow-green mineral that could be chrysoberyl. Also a layer, concordant to foliation, consists of a faint green, fibrous mineral that could be spodumene. Garnet, cassiterite and manganocolumbite also present.

SWAMP PEGMATITE

97SP-1: Polished slab from the mylonitic, petalite-rich unit. Petalite grains have been ground to oblivion! Purple lepidolite mica, manganocolumbite, manganotantalite and cassiterite also locally present.

WEST PEGMATITE

97WP-1: Biotite-garnet-quartz-potassium feldspar-plagioclase rock from the trench. Sample contains relatively abundant dark brown oxide grains (cassiterite and ferrocolumbite). Rare nigerite and pyrite also noted.

97WP-2: Similar unit to 97WP-1, but with coarse potassium feldspar megacrysts and much scarcer oxide grains (ferrocolumbite, ferrotantalite and wodginite).

97WP-3: Several loose pieces from trench each with visible oxide grains (manganocolumbite and cassiterite). Nigerite also present.

BIG MACK PEGMATITE SYSTEM

98-83C: Garnet-muscovite-quartz-plagioclase rock from 10 to 15 cm thick wall zone of Big Mack pegmatite. Several partially to completely altered cordierite crystals, up to 2 to 4 by 9 mm, and fine-grained black specks of oxide minerals also notable (ferrocolumbite, ferrotantalite, cassiterite, strüverite and rare wodginite).

98-83D: Plagioclase-rich rim, 2 to 3 cm thick, developed continuously around an amphibolite enclave in the centre of the Big Mack pegmatite and probably due to albitization. Several fine-grained, black specks occur in the plagioclase-rich rims. In contrast, one black oxide speck occurs in the nearby petalite-rich unit (ferrotantalite). Gahnite also present.

98-83E: Black specks of oxide minerals (ferrocolumbite, ferrotantalite and cassiterite) from a plagioclase-rich replacement patch near the northern contact of the Big Mack pegmatite. Sample occurs near a spot where eucriptite was first identified although this mineral appears unrelated to the replacement unit. Nigerite also present.

98-83F: Fragments of a single, black, ferrotapiolite grain selected from the contact between fine-grained aplite (looks primary) and coarser grained, petalite-rich pegmatite. Sample is situated midway across the pegmatite towards its eastern end.

98-83G: Plagioclase-rich unit adjacent to contact with mafic metavolcanic rocks. A few black oxide grains (cassiterite and rare ferrotantalite) up to 1 by 1.5 mm are present.

6099: Garnet-biotite-muscovite-potassium feldspar-quartz unit with local petalite from eastern part of Big Mack pegmatite. Scant oxide grains are present and the largest is circled and platy in outline (ferrocolumbite).

99FWB-74: Platy black mainly ferrotantalite grain (some ferrocolumbite), 1 by 10 mm, in a quartz-rich patch situated in the east-central part of the pegmatite. Several polycrystalline aggregates of a white mineral that is likely petalite also occur in the quartz-rich pod. An equant black speck occurs in one of these aggregates.

ZONE 11 PEGMATITES

6082: Garnet-muscovite-petalite pegmatite. Sample from the eastern end of the Zone 11 pegmatites. Garnet and possible cordierite are also present along with several black specks of oxide minerals (ferrocolumbite). Nigerite and gahnite also present.

PEGMATITE 6059

6059: Deformed, vaguely foliated, fine- to coarse-grained, petalite-rich pegmatite. Sparse, fine-grained black specks noted (cassiterite and manganotantalite with rims of manganocolumbite). Spongy, light pink garnets overgrow the recrystallized petalite. Garnet and nigerite also present.

GLITTER ZONE PEGMATITE

99-GZ-1: Garnet-muscovite-plagioclase unit adjacent to amphibolite host rocks at northern contact of pegmatite. Several pin-size, black grains of ferrocolumbite, cassiterite and rare ferrotapiolite are apparent. Nigerite also present.

99-GZ-2: Small piece of quartz-plagioclase rock with sparse black ferrocolumbite grains. Loose piece taken from main mass of the pegmatite.

99-GZ-3: Biotite-quartz-plagioclase aplite from south part of pegmatite adjacent to amphibolite host rocks. Small black specks of ferrocolumbite present.

99-GZ-4: Garnet-quartz-plagioclase unit with local petalite megacrysts from eastern end of pegmatite. Black grains of ferrocolumbite and cassiterite are relatively abundant (lesser amounts of ferrotantalite and ferrotapiolite also found). Sparse, light green beryl is present.

99-GZ-5: Material similar to 99GZ-4 and from same area of pegmatite. Ferrocolumbite, cassiterite, ferrowodginite and nigerite are present.

99-GZ-6: Garnet aplite near 99GZ-4 and 99GZ-5 that contains the odd speck of black possible oxide minerals (ferrocolumbite, ferrotantalite, cassiterite and ferrowodginite).

99-GZ-7: Altered cordierite-bearing unit that dominates in the northeastern part of the pegmatite. Cordierite is pervasively altered to garnet-mica-rich aggregates and variable amount of holmquistite. No oxide minerals readily observed because of fine-grain size, but ferrocolumbite and nigerite found with electron microprobe.

WOLF ZONE PEGMATITE

99-WZ-1: Plagioclase-rich unit with 5 to 10% quartz and relatively abundant black oxide minerals (manganocolumbite and cassiterite).

99-WZ-2: Plagioclase-rich unit with a few specks of black oxide grains (manganocolumbite and cassiterite).

99-WZ-3: Cleavelandite-rich unit with 10% megacrysts of grey quartz and a small amount of blade to equant black oxide grains (manganocolumbite and cassiterite). One crystal of multi-coloured beryl, 2 cm in diameter, also in specimen.

99-WZ-4: Plagioclase-rich unit with 5 to 10% quartz with sparse light green apatite and scattered brown-black oxide grains (manganocolumbite, cassiterite and rare microlite).

Appendix B

Electron Microprobe Analyses

Columbite-Tantalite Group

	Sep. Rapids pluton 93-249A			Separation Rapids pluton 93-249B					Separation Rapids pluton 93-249C							
	UA	UG	UN	ZA	ZC	ZD	ZE	ZI	TD	TF	TG	TP	TQ	TR	TJ	TK
FeO	16.38	16.74	16.50	16.43	15.73	16.08	15.62	17.06	17.52	17.66	15.65	15.83	16.68	17.21	16.83	16.94
MnO	3.29	3.28	3.39	3.34	2.90	3.12	3.04	2.11	2.04	1.74	1.64	3.09	2.47	2.00	2.12	2.16
TiO2	0.47	0.57	0.52	0.45	0.96	0.71	0.75	0.71	0.64	0.60	0.57	0.53	0.56	0.55	0.58	0.55
Nb2O5	62.65	65.00	66.52	60.52	48.45	54.49	52.46	53.62	59.46	55.96	32.25	55.19	54.19	55.66	57.78	59.59
Ta2O5	15.30	12.64	13.38	18.59	30.79	24.69	27.74	26.62	18.77	22.62	50.19	24.04	26.18	24.37	21.88	20.25
SnO2	0.02	0.02	0.02	0.02	0.05	0.04	0.02	0.02	0.02	0.03	0.06	0.03	0.02	0.05	0.03	0.03
WO3	0.41	0.44	0.26	0.34	0.47	0.41	0.53	0.42	0.45	0.28	0.41	0.45	0.27	0.28	0.49	0.46
PbO	0.29	0.29	0.23	0.29	0.23	0.26	0.22	0.22	0.25	0.25	0.10	0.21	0.24	0.27	0.23	0.23
ThO2	0.00	0.01	0.02	0.02	0.02	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01
UO2	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
Sb2O3																
Bi2O3																
Sc2O3																
CaO	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Total	98.84	99.02	100.87	100.03	99.63	99.83	100.41	100.80	99.18	99.18	100.91	99.40	100.65	100.42	99.95	100.25
Structural formulae based on 6 oxygens																
Fe	0.831	0.839	0.811	0.835	0.846	0.841	0.821	0.889	0.899	0.922	0.910	0.829	0.870	0.893	0.867	0.864
Mn	0.169	0.166	0.169	0.172	0.158	0.165	0.162	0.111	0.106	0.092	0.097	0.164	0.130	0.105	0.110	0.112
Ti	0.021	0.026	0.023	0.021	0.046	0.033	0.035	0.033	0.030	0.028	0.030	0.025	0.026	0.026	0.027	0.025
Nb	1.719	1.760	1.768	1.663	1.409	1.540	1.491	1.511	1.650	1.579	1.013	1.562	1.527	1.560	1.609	1.642
Ta	0.253	0.206	0.214	0.307	0.539	0.420	0.474	0.451	0.313	0.384	0.949	0.409	0.444	0.411	0.367	0.336
Sn	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.001	0.001	0.001
W	0.006	0.007	0.004	0.005	0.008	0.007	0.009	0.007	0.007	0.005	0.007	0.007	0.004	0.005	0.008	0.007
Pb	0.005	0.005	0.004	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.002	0.004	0.004	0.005	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb																
Bi																
Sc																
Ca	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002
Total	3.007	3.011	2.995	3.012	3.014	3.013	2.999	3.009	3.011	3.017	3.011	3.003	3.008	3.007	2.994	2.992
Mn/(Mn+Fe)	0.169	0.166	0.172	0.171	0.157	0.164	0.165	0.111	0.105	0.091	0.096	0.165	0.130	0.105	0.113	0.114
Ta/(Ta+Nb)	0.128	0.105	0.108	0.156	0.277	0.214	0.241	0.230	0.160	0.196	0.484	0.208	0.225	0.208	0.186	0.170
Comments:	isolated grains			ZA - ZE same grain large tabular grains 0.5 mm in length					isolated grains associated with dark mica							
NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).																

Columbite-Tantalite Group

	Sep. Rapids pluton 93-251					Separation Rapids pluton 93-260A				Separation Rapids pluton 93-260B					
	AB	AC	UE	UF	UG	XA	XB	XC	XD	YA	YB	YC	YD	YE	YF
FeO	16.70	16.60	16.49	16.07	16.11	0.46	0.46	0.47	0.92	1.90	1.18	1.67	2.69	2.08	1.54
MnO	3.09	3.33	3.22	2.98	3.09	14.51	14.68	14.48	14.01	14.81	15.80	15.49	14.45	15.00	15.54
TiO2	0.57	0.57	0.59	0.66	0.67	0.00	0.00	0.00	0.04	0.06	0.00	0.09	0.00	0.06	0.01
Nb2O5	63.58	62.95	60.69	52.75	50.82	15.63	17.89	16.38	17.15	37.04	38.01	40.22	39.93	39.47	39.09
Ta2O5	15.99	16.77	18.85	28.00	28.51	68.39	66.22	67.57	67.30	45.88	44.94	42.32	43.31	43.45	43.64
SnO2	0.02	0.02	0.03	0.06	0.14	0.17	0.09	0.09	0.09	0.08	0.03	0.06	0.05	0.10	0.04
WO3	0.37	0.31	0.48	0.28	0.53	0.27	0.17	0.24	0.18	0.59	0.42	0.45	0.15	0.38	0.52
PbO	0.30	0.27	0.26	0.27	0.21	0.00	0.06	0.05	0.00	0.17	0.18	0.15	0.13	0.19	0.20
ThO2	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
UO2	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
Sb2O3						0.02	0.00	0.02	0.03	0.00	0.00	0.02	0.00	0.00	0.02
Bi2O3						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Sc2O3						0.00	0.00	0.13	0.00	0.00	0.05	0.01	0.04	0.04	0.00
CaO	0.01	0.03	0.04	0.04	0.03										
Total	100.63	100.85	100.65	101.11	100.11	99.46	99.57	99.41	99.71	100.52	100.64	100.48	100.75	100.76	100.59
Structural formulae based on 6 oxygens															
Fe	0.833	0.829	0.833	0.840	0.855	0.030	0.030	0.030	0.059	0.108	0.067	0.094	0.151	0.117	0.087
Mn	0.156	0.168	0.165	0.158	0.166	0.955	0.953	0.949	0.912	0.857	0.909	0.881	0.823	0.855	0.889
Ti	0.026	0.026	0.027	0.031	0.032	0.000	0.000	0.000	0.002	0.003	0.000	0.005	0.000	0.003	0.001
Nb	1.715	1.700	1.657	1.491	1.458	0.549	0.620	0.573	0.596	1.144	1.167	1.221	1.213	1.201	1.194
Ta	0.259	0.272	0.310	0.476	0.492	1.446	1.380	1.422	1.407	0.852	0.830	0.773	0.791	0.795	0.802
Sn	0.000	0.000	0.001	0.001	0.004	0.005	0.003	0.003	0.003	0.002	0.001	0.002	0.001	0.003	0.001
W	0.006	0.005	0.008	0.005	0.009	0.005	0.003	0.005	0.004	0.011	0.007	0.008	0.003	0.007	0.009
Pb	0.005	0.004	0.004	0.005	0.004	0.000	0.001	0.001	0.000	0.003	0.003	0.003	0.002	0.003	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb						0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001
Bi						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc						0.000	0.000	0.009	0.000	0.000	0.003	0.001	0.002	0.002	0.000
Ca	0.001	0.002	0.003	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.001	3.006	3.007	3.009	3.021	2.992	2.990	2.992	2.983	2.980	2.987	2.987	2.986	2.986	2.987
Mn/(Mn+Fe)	0.158	0.169	0.165	0.158	0.163	0.969	0.970	0.969	0.939	0.888	0.931	0.904	0.845	0.880	0.911
Ta/(Ta+Nb)	0.131	0.138	0.157	0.242	0.252	0.725	0.690	0.713	0.702	0.427	0.416	0.388	0.395	0.398	0.402
Comments:	isolated grains		UF & UG same grain							YA & YB same grain		YC - YF same grain			

Columbite-Tantalite Group

Separation Rapids pluton													
93-260C													
	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM
FeO	2.86	4.26	4.45	6.26	8.36	4.14	10.48	6.37	3.40	4.27	3.76	9.94	6.89
MnO	11.59	11.26	11.00	9.57	7.77	11.31	5.80	9.41	11.90	11.06	12.29	6.28	9.28
TiO2	0.01	0.07	0.08	0.13	0.10	0.10	0.12	0.15	0.18	0.20	0.09	0.14	0.13
Nb2O5	13.91	18.83	20.27	23.03	24.48	17.24	25.52	22.44	17.59	16.89	26.52	24.70	23.23
Ta2O5	70.21	64.94	63.89	60.74	58.84	66.45	57.36	60.54	65.96	66.15	57.62	58.75	59.52
SnO2	0.07	0.04	0.06	0.22	0.06	0.08	0.19	0.34	0.11	0.56	0.08	0.11	0.11
WO3	0.19	0.28	0.26	0.16	0.07	0.24	0.11	0.38	0.24	0.29	0.33	0.07	0.13
PbO	0.00	0.00	0.02	0.06	0.12	0.07	0.15	0.03	0.06	0.04	0.09	0.10	0.02
ThO2	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
UO2	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
Sb2O3	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Sc2O3	0.02	0.02	0.00	0.00	0.00	0.03	0.00	0.04	0.00	0.00	0.02	0.00	0.06
CaO	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.02	0.02	0.00
Total	98.85	99.71	100.02	100.16	99.80	99.68	99.72	99.70	99.46	99.44	100.82	100.11	99.37

Structural formulae based on 6 oxygens

Fe	0.189	0.271	0.280	0.387	0.514	0.266	0.642	0.396	0.218	0.275	0.227	0.609	0.428
Mn	0.776	0.725	0.701	0.599	0.484	0.735	0.359	0.592	0.773	0.721	0.750	0.390	0.583
Ti	0.001	0.004	0.004	0.007	0.006	0.006	0.006	0.009	0.010	0.012	0.005	0.008	0.007
Nb	0.497	0.647	0.689	0.769	0.814	0.598	0.845	0.754	0.610	0.588	0.864	0.818	0.780
Ta	1.509	1.343	1.307	1.221	1.178	1.387	1.142	1.224	1.376	1.384	1.130	1.171	1.202
Sn	0.002	0.001	0.002	0.006	0.002	0.003	0.006	0.010	0.003	0.017	0.002	0.003	0.003
W	0.004	0.005	0.005	0.003	0.001	0.005	0.002	0.007	0.005	0.006	0.006	0.001	0.003
Pb	0.000	0.000	0.000	0.001	0.002	0.001	0.003	0.001	0.001	0.001	0.002	0.002	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.003	0.000	0.000	0.001	0.000	0.004
Ca	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.002	0.000
Total	2.979	2.998	2.989	2.995	3.002	3.004	3.004	2.997	2.998	3.002	2.989	3.003	3.010
Mn/(Mn+Fe)	0.804	0.728	0.715	0.608	0.485	0.735	0.359	0.599	0.780	0.724	0.768	0.390	0.577
Ta/(Ta+Nb)	0.752	0.675	0.655	0.613	0.591	0.699	0.575	0.619	0.693	0.702	0.567	0.589	0.607

Comments: all analyses from inclusions in cassiterite (7 grains)
AA - AC same inclusion

Columbite-Tantalite Group

	Separation Rapids pluton 93-260C										East Beryl pegmatite 93-262A		
	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AZ	BB	BJ	BK
FeO	6.35	4.24	10.16	4.65	4.79	4.16	3.80	3.71	3.79	3.94	16.17	15.40	16.67
MnO	9.15	11.57	6.13	10.99	10.56	12.04	12.30	12.13	12.14	12.81	4.77	4.53	4.19
TiO2	0.07	0.03	0.09	0.03	0.09	0.07	0.02	0.13	0.10	0.18	0.63	0.57	0.67
Nb2O5	18.37	20.71	23.77	19.41	18.34	24.45	24.28	22.20	21.88	30.96	64.41	65.47	64.20
Ta2O5	64.14	62.67	59.44	64.86	65.60	58.47	58.50	61.29	61.25	51.88	13.30	13.13	13.63
SnO2	0.44	0.08	0.07	0.03	0.13	0.10	0.01	0.12	0.12	0.06	0.02	0.02	0.03
WO3	0.24	0.22	0.14	0.29	0.19	0.35	0.42	0.18	0.24	0.51	0.77	0.53	0.69
PbO	0.04	0.04	0.11	0.02	0.06	0.06	0.11	0.09	0.12	0.04	0.28	0.30	0.28
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
UO2	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
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Bi2O3	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00			
Sc2O3	0.06	0.01	0.00	0.00	0.03	0.00	0.09	0.00	0.00	0.00			
CaO	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.03	0.04	0.03
Total	98.85	99.57	99.90	100.27	99.80	99.69	99.54	99.86	99.64	100.37	100.43	99.99	100.39

Structural formulae based on 6 oxygens

Fe	0.408	0.267	0.627	0.293	0.305	0.256	0.235	0.231	0.237	0.232	0.803	0.765	0.828
Mn	0.595	0.738	0.383	0.702	0.682	0.750	0.768	0.765	0.768	0.764	0.240	0.228	0.211
Ti	0.004	0.001	0.005	0.001	0.005	0.004	0.001	0.007	0.006	0.010	0.028	0.025	0.030
Nb	0.638	0.705	0.793	0.662	0.632	0.813	0.810	0.747	0.739	0.986	1.728	1.757	1.724
Ta	1.339	1.284	1.193	1.331	1.360	1.170	1.174	1.241	1.245	0.994	0.215	0.212	0.220
Sn	0.013	0.002	0.002	0.001	0.004	0.003	0.000	0.003	0.004	0.002	0.000	0.000	0.001
W	0.005	0.004	0.003	0.006	0.004	0.007	0.008	0.003	0.005	0.009	0.012	0.008	0.011
Pb	0.001	0.001	0.002	0.000	0.001	0.001	0.002	0.002	0.002	0.001	0.004	0.005	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000			
Sc	0.004	0.001	0.000	0.000	0.002	0.000	0.006	0.000	0.000	0.000			
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.002	0.003	0.002
Total	3.006	3.004	3.008	2.997	2.995	3.005	3.005	3.001	3.006	2.999	3.033	3.003	3.031
Mn/(Mn+Fe)	0.593	0.734	0.379	0.705	0.691	0.746	0.766	0.768	0.764	0.767	0.230	0.230	0.203
Ta/(Ta+Nb)	0.677	0.645	0.601	0.668	0.683	0.590	0.592	0.624	0.627	0.502	0.111	0.108	0.113

Comments: all analyses from inclusions in cassiterite (7 grains)

BB - BK
same grain
isolated grains

Columbite-Tantalite Group

East Beryl pegmatite 93-262B																
	LF	LG	LH	LI	LK	KA1	KA2	KA3	KA4	KA5	KA6	KA7	KA8	KB	KC	KD
FeO	13.19	12.18	11.00	10.26	12.95	8.38	8.94	9.60	10.10	11.07	11.34	12.34	13.50	12.53	14.33	13.57
MnO	5.26	5.17	5.55	6.73	5.43	7.09	6.51	5.56	5.63	4.67	4.84	4.93	5.30	5.04	5.26	5.15
TiO2	0.54	0.57	0.84	1.03	0.64	0.80	0.86	0.91	0.86	0.74	0.48	0.65	0.46	0.44	0.58	0.72
Nb2O5	45.17	30.00	24.61	26.76	41.40	16.91	16.71	14.97	19.12	18.85	20.30	31.40	45.69	35.08	55.04	46.08
Ta2O5	35.77	51.35	57.32	54.11	38.45	65.23	65.29	66.41	61.77	62.29	61.86	48.66	32.73	45.19	22.52	32.43
SnO2	0.03	0.06	0.37	0.15	0.02	0.07	0.16	0.35	0.55	0.40	0.15	0.07	0.04	0.08	0.05	0.11
WO3	0.27	0.10	0.27	0.18	0.30	0.61	0.51	0.57	0.67	0.58	0.37	0.51	0.54	0.46	0.59	0.27
PbO	0.14	0.06	0.11	0.16	0.25	0.09	0.10	0.09	0.13	0.12	0.10	0.21	0.21	0.12	0.27	0.26
ThO2	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.02	0.02	0.16	0.05	0.00	0.02	0.11	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3						0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.00
Bi2O3						0.00	0.01	0.00	0.00	0.03	0.00	0.04	0.00	0.03	0.00	0.00
Sc2O3						0.14	0.00	0.25	0.10	0.17	0.00	0.00	0.00	0.05	0.03	0.12
CaO	0.04	0.04	0.05	0.08	0.05	0.02	0.01	0.05	0.01	0.04	0.02	0.00	0.00	0.00	0.01	0.00
Total	100.42	99.55	100.14	99.63	99.56	99.36	99.12	98.86	99.00	98.96	99.47	98.81	98.50	99.02	98.69	98.71

Structural formulae based on 6 oxygens

Fe	0.719	0.724	0.669	0.618	0.724	0.536	0.574	0.623	0.639	0.703	0.714	0.732	0.745	0.729	0.753	0.745
Mn	0.291	0.311	0.342	0.410	0.308	0.460	0.423	0.365	0.361	0.300	0.308	0.296	0.296	0.297	0.280	0.286
Ti	0.026	0.030	0.046	0.056	0.032	0.046	0.050	0.053	0.049	0.042	0.027	0.035	0.023	0.023	0.027	0.035
Nb	1.332	0.964	0.809	0.871	1.252	0.585	0.580	0.525	0.654	0.647	0.690	1.007	1.364	1.102	1.564	1.367
Ta	0.634	0.992	1.133	1.060	0.699	1.357	1.363	1.401	1.271	1.286	1.265	0.939	0.588	0.854	0.385	0.579
Sn	0.001	0.002	0.011	0.004	0.001	0.002	0.005	0.011	0.017	0.012	0.005	0.002	0.001	0.002	0.001	0.003
W	0.005	0.002	0.005	0.003	0.005	0.012	0.010	0.011	0.013	0.011	0.007	0.009	0.009	0.008	0.010	0.005
Pb	0.002	0.001	0.002	0.003	0.005	0.002	0.002	0.002	0.003	0.002	0.002	0.004	0.004	0.002	0.005	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Bi						0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Sc						0.009	0.000	0.017	0.007	0.011	0.000	0.000	0.000	0.003	0.001	0.007
Ca	0.003	0.003	0.004	0.006	0.004	0.002	0.001	0.004	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000
Total	3.014	3.030	3.020	3.034	3.030	3.011	3.009	3.014	3.015	3.018	3.020	3.025	3.030	3.021	3.027	3.031
Mn/(Mn+Fe)	0.288	0.301	0.338	0.399	0.298	0.462	0.424	0.370	0.361	0.299	0.302	0.288	0.284	0.289	0.271	0.278
Ta/(Ta+Nb)	0.323	0.507	0.584	0.549	0.358	0.699	0.702	0.727	0.660	0.665	0.647	0.482	0.301	0.437	0.198	0.297

Comments: all data from single grain traverse from KA core to KB rim rim overgrowth
early late

Columbite-Tantalite Group

East Beryl pegmatite																	
93-262C																	
	YG	YH	YJ	YK1	YK2	YK3	YK4	YK5	YK6	YK7	YK8	YK9	YK10	YK11	YK12	YK13	YK14
FeO	15.27	12.57	14.86	15.57	13.86	16.47	17.00	15.11	14.21	15.06	15.37	15.11	15.59	15.44	14.13	14.95	15.05
MnO	4.79	7.29	5.19	4.40	6.00	3.91	3.27	4.97	5.30	5.00	4.61	5.06	4.58	4.73	5.52	5.15	5.20
TiO2	0.77	1.64	0.76	0.55	0.59	0.43	0.64	0.69	0.65	0.57	0.54	0.68	0.67	0.64	0.66	0.60	0.64
Nb2O5	62.78	64.12	61.56	60.90	61.83	63.34	62.13	62.08	57.21	60.99	63.37	62.55	62.29	63.73	58.79	62.85	62.37
Ta2O5	13.38	11.07	14.03	17.14	15.33	14.16	14.29	14.55	20.60	15.77	13.87	14.99	14.12	14.04	20.06	14.23	14.72
SnO2	0.06	0.03	0.03	0.02	0.07	0.02	0.00	0.08	0.09	0.04	0.01	0.08	0.07	0.12	0.09	0.08	0.05
WO3	0.70	0.77	0.60	1.07	0.82	0.67	1.42	1.40	0.63	0.94	1.20	1.06	1.44	0.91	0.71	0.86	1.09
PbO	0.32	0.37	0.24	0.32	0.29	0.36	0.21	0.33	0.33	0.31	0.13	0.11	0.35	0.23	0.00	0.24	0.34
ThO2	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
UO2	0.00	0.11	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
Sb2O3				0.04	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
Bi2O3				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
Sc2O3				0.00	0.04	0.12	0.19	0.11	0.00	0.01	0.09	0.07	0.00	0.02	0.00	0.00	0.07
CaO	0.03	0.03	0.03	0.00	0.01	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Total	100.76	100.68	99.90	100.00	98.85	99.48	99.16	99.34	99.02	98.70	99.19	99.69	99.11	99.87	99.97	98.96	99.53

Structural formulae based on 6 oxygens

Fe	0.754	0.613	0.742	0.789	0.705	0.829	0.859	0.763	0.737	0.770	0.774	0.759	0.789	0.772	0.722	0.756	0.759
Mn	0.239	0.360	0.262	0.226	0.309	0.199	0.167	0.254	0.279	0.259	0.235	0.257	0.234	0.239	0.285	0.264	0.266
Ti	0.034	0.072	0.034	0.025	0.027	0.019	0.029	0.031	0.031	0.026	0.024	0.031	0.030	0.029	0.031	0.027	0.029
Nb	1.742	1.757	1.727	1.668	1.699	1.723	1.697	1.695	1.605	1.685	1.724	1.700	1.703	1.723	1.624	1.717	1.700
Ta	0.217	0.177	0.230	0.282	0.253	0.232	0.235	0.239	0.348	0.262	0.227	0.245	0.232	0.228	0.333	0.234	0.241
Sn	0.001	0.001	0.001	0.001	0.002	0.000	0.000	0.002	0.002	0.001	0.000	0.002	0.002	0.003	0.002	0.002	0.001
W	0.011	0.012	0.009	0.017	0.013	0.011	0.022	0.022	0.010	0.015	0.019	0.016	0.023	0.014	0.011	0.013	0.017
Pb	0.005	0.006	0.004	0.005	0.005	0.006	0.003	0.005	0.005	0.005	0.002	0.002	0.006	0.004	0.000	0.004	0.006
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb				0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi				0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc				0.000	0.002	0.006	0.010	0.006	0.000	0.000	0.005	0.004	0.000	0.001	0.000	0.000	0.004
Ca	0.002	0.002	0.002	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Total	3.005	3.001	3.011	3.014	3.015	3.025	3.023	3.019	3.018	3.023	3.009	3.016	3.019	3.013	3.009	3.017	3.022
Mn/(Mn+Fe)	0.241	0.370	0.261	0.222	0.305	0.194	0.163	0.250	0.274	0.251	0.233	0.253	0.229	0.237	0.283	0.259	0.259
Ta/(Ta+Nb)	0.111	0.092	0.117	0.145	0.130	0.119	0.122	0.124	0.178	0.135	0.116	0.126	0.120	0.117	0.170	0.120	0.124

Comments:

YK traverse across 3400 µm grain
minor oscillatory and patchy zonation

Columbite-Tantalite Group

East Beryl pegmatite															
93-262C															
	YK15	YK16	YK17	YK18	YK19	YK20	YK21	YK22	YK23	YK24	YK25	YK26	YK27	YK28	YK29
FeO	15.26	15.40	16.68	17.02	16.92	16.89	15.50	16.62	16.99	16.89	14.70	14.30	16.37	16.47	16.72
MnO	4.89	4.79	3.63	3.30	3.29	3.25	4.63	3.56	3.20	3.35	5.53	5.61	3.55	3.48	3.48
TiO2	0.70	0.68	0.57	0.50	0.62	0.60	0.68	0.61	0.67	0.63	0.47	0.55	0.55	0.52	0.59
Nb2O5	63.11	63.00	63.21	63.11	62.81	62.86	62.95	62.48	62.74	62.56	64.44	62.80	60.62	61.09	63.06
Ta2O5	14.52	14.02	14.13	13.99	13.94	14.14	14.34	13.57	13.80	13.66	12.98	14.88	16.60	16.33	14.86
SnO2	0.09	0.06	0.00	0.03	0.07	0.00	0.07	0.07	0.02	0.01	0.00	0.06	0.05	0.05	0.07
WO3	0.79	1.19	1.18	1.15	1.43	1.43	1.28	1.45	1.40	1.43	0.69	0.96	1.14	1.06	1.10
PbO	0.26	0.30	0.32	0.32	0.34	0.27	0.34	0.34	0.28	0.29	0.26	0.24	0.24	0.32	0.35
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	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
Sc2O3	0.04	0.15	0.10	0.02	0.00	0.16	0.10	0.01	0.03	0.04	0.04	0.03	0.05	0.00	0.09
CaO	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Total	99.67	99.57	99.84	99.44	99.46	99.63	99.90	98.77	99.15	98.87	99.10	99.43	99.18	99.35	100.33

Structural formulae based on 6 oxygens

Fe	0.766	0.773	0.836	0.857	0.852	0.849	0.777	0.842	0.857	0.855	0.738	0.721	0.835	0.838	0.836
Mn	0.249	0.244	0.184	0.168	0.168	0.165	0.235	0.183	0.164	0.172	0.281	0.286	0.184	0.179	0.176
Ti	0.032	0.031	0.026	0.023	0.028	0.027	0.031	0.028	0.030	0.029	0.021	0.025	0.025	0.024	0.027
Nb	1.712	1.710	1.713	1.718	1.710	1.708	1.706	1.712	1.711	1.711	1.748	1.711	1.671	1.680	1.705
Ta	0.237	0.229	0.230	0.229	0.228	0.231	0.234	0.224	0.226	0.225	0.212	0.244	0.275	0.270	0.242
Sn	0.002	0.001	0.000	0.001	0.002	0.000	0.002	0.002	0.001	0.000	0.000	0.001	0.001	0.001	0.002
W	0.012	0.018	0.018	0.018	0.022	0.022	0.020	0.023	0.022	0.022	0.011	0.015	0.018	0.017	0.017
Pb	0.004	0.005	0.005	0.005	0.005	0.004	0.005	0.006	0.005	0.005	0.004	0.004	0.004	0.005	0.006
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.002	0.008	0.005	0.001	0.000	0.008	0.005	0.001	0.001	0.002	0.002	0.001	0.002	0.000	0.005
Ca	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.017	3.019	3.019	3.020	3.017	3.016	3.015	3.021	3.018	3.021	3.017	3.010	3.016	3.015	3.015
Mn/(Mn+Fe)	0.245	0.240	0.181	0.164	0.165	0.163	0.232	0.178	0.160	0.167	0.276	0.284	0.180	0.176	0.174
Ta/(Ta+Nb)	0.122	0.118	0.119	0.118	0.118	0.119	0.120	0.116	0.117	0.116	0.108	0.125	0.141	0.139	0.124

Comments:

YK traverse across grain

Columbite-Tantalite Group

	East Beryl pegmatite 93-263						East Beryl pegmatite 93-265A					
	VA	VD	VF	VH	VJ	VL	ZB	ZC	ZJ	ZD	LC	LD
FeO	2.66	2.51	1.34	2.30	1.86	1.65	0.31	0.33	0.36	0.29	0.60	0.53
MnO	15.18	14.20	14.57	13.74	13.77	13.66	13.69	13.76	13.91	14.08	15.50	15.09
TiO2	0.23	0.29	0.48	0.49	0.54	0.41	0.06	0.09	0.08	0.11	0.11	0.13
Nb2O5	41.22	30.02	22.85	21.75	22.12	18.89	1.87	2.01	1.55	1.68	18.65	17.43
Ta2O5	40.54	52.10	59.52	61.69	61.14	64.82	83.45	82.78	83.06	84.06	65.46	66.48
SnO2	0.02	0.36	0.15	0.20	0.27	0.70	0.31	0.80	0.51	0.06	0.08	0.09
WO3	0.03	0.00	0.21	0.18	0.15	0.00	0.39	0.53	0.47	0.04	0.30	0.16
PbO	0.23	0.11	0.13	0.18	0.13	0.15	0.00	0.02	0.00	0.00	0.07	0.03
ThO2	0.00	0.00	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.01
UO2	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3												
Bi2O3												
Sc2O3											0.05	0.05
CaO	0.04	0.08	0.08	0.12	0.07	0.05	0.10	0.07	0.13	0.04	0.05	0.04
Total	100.15	99.67	99.34	100.68	100.06	100.38	100.18	100.39	100.07	100.36	100.90	100.04

Structural formulae based on 6 oxygens

Fe	0.149	0.149	0.083	0.142	0.115	0.104	0.022	0.023	0.025	0.020	0.038	0.034
Mn	0.860	0.856	0.915	0.859	0.863	0.871	0.974	0.975	0.991	1.001	0.987	0.975
Ti	0.012	0.016	0.027	0.027	0.030	0.023	0.004	0.006	0.005	0.007	0.006	0.007
Nb	1.246	0.966	0.766	0.726	0.740	0.643	0.071	0.076	0.059	0.064	0.634	0.601
Ta	0.737	1.008	1.201	1.238	1.231	1.328	1.906	1.883	1.900	1.918	1.338	1.379
Sn	0.001	0.010	0.004	0.006	0.008	0.021	0.010	0.027	0.017	0.002	0.002	0.003
W	0.001	0.000	0.004	0.003	0.003	0.000	0.008	0.011	0.010	0.001	0.006	0.003
Pb	0.004	0.002	0.003	0.004	0.003	0.003	0.000	0.000	0.000	0.000	0.001	0.001
Th	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
U	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Sb												
Bi												
Sc											0.003	0.003
Ca	0.003	0.006	0.006	0.009	0.006	0.004	0.009	0.006	0.012	0.004	0.004	0.003
Total	3.012	3.013	3.010	3.014	2.999	2.999	3.004	3.007	3.019	3.016	3.020	3.011
Mn/(Mn+Fe)	0.853	0.851	0.917	0.858	0.882	0.893	0.978	0.977	0.975	0.980	0.963	0.966
Ta/(Ta+Nb)	0.372	0.511	0.610	0.630	0.624	0.674	0.964	0.961	0.970	0.968	0.679	0.696

Comments:

ZB , ZC & ZJ

same grain

most evolved sample from Separation area

Columbite-Tantalite Group

	East Beryl pegmatite 93-265A							East Be peg. 93-265AM	East Beryl pegmatite 93-265J				
	JA	JB	JC	JD	JE	JF	JG	KI	PC	PE	PF	PG	PH
FeO	0.70	0.50	0.48	0.48	0.51	0.48	0.48	0.49	2.62	2.20	2.03	2.27	3.08
MnO	15.25	15.84	14.35	14.42	14.81	14.46	14.48	13.12	15.70	15.83	15.75	16.17	15.12
TiO2	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.11	0.31	0.29	0.18	0.44	0.36
Nb2O5	20.88	20.31	13.66	14.01	17.34	14.35	14.16	2.47	45.51	45.49	39.97	45.96	40.47
Ta2O5	57.06	54.48	70.88	70.68	66.15	70.57	70.21	82.99	35.82	36.47	42.67	35.00	40.53
SnO2	0.88	0.77	0.00	0.00	0.11	0.00	0.04	0.77	0.02	0.08	0.02	0.08	0.03
WO3	4.53	8.09	0.42	0.33	0.76	0.37	0.45	0.13	0.41	0.34	0.14	0.54	0.39
PbO	0.10	0.01	0.02	0.00	0.01	0.12	0.06	0.12	0.14	0.15	0.11	0.17	0.12
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.18					
Bi2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05					
Sc2O3	0.00	0.01	0.10	0.02	0.00	0.00	0.00	0.11					
CaO	0.02	0.01	0.00	0.01	0.03	0.00	0.02	0.00	0.04	0.04	0.03	0.04	0.04
Total	99.50	100.06	99.90	99.94	99.77	100.35	99.93	100.22	100.57	100.89	100.91	100.67	100.15

Structural formulae based on 6 oxygens

Fe	0.044	0.031	0.031	0.031	0.033	0.031	0.031	0.034	0.143	0.120	0.114	0.123	0.172
Mn	0.965	0.996	0.952	0.954	0.962	0.953	0.958	0.927	0.866	0.872	0.892	0.888	0.857
Ti	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.007	0.015	0.014	0.009	0.021	0.018
Nb	0.705	0.682	0.483	0.495	0.601	0.504	0.500	0.093	1.339	1.337	1.209	1.347	1.225
Ta	1.159	1.100	1.509	1.502	1.379	1.492	1.491	1.883	0.634	0.645	0.776	0.617	0.738
Sn	0.026	0.023	0.000	0.000	0.003	0.000	0.001	0.026	0.001	0.002	0.001	0.002	0.001
W	0.088	0.156	0.008	0.007	0.015	0.007	0.009	0.003	0.007	0.006	0.002	0.009	0.007
Pb	0.002	0.000	0.000	0.000	0.000	0.002	0.001	0.003	0.002	0.003	0.002	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.006					
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001					
Sc	0.000	0.001	0.006	0.001	0.000	0.000	0.000	0.008					
Ca	0.001	0.001	0.000	0.001	0.002	0.000	0.002	0.000	0.003	0.003	0.002	0.003	0.003
Total	2.996	2.991	2.991	2.991	2.996	2.990	2.994	2.990	3.010	3.000	3.008	3.013	3.023
Mn/(Mn+Fe)	0.956	0.970	0.968	0.968	0.967	0.968	0.968	0.964	0.859	0.879	0.887	0.878	0.833
Ta/(Ta+Nb)	0.622	0.617	0.757	0.752	0.696	0.747	0.749	0.953	0.321	0.325	0.391	0.314	0.376

Comments: JA & JB
 JC - JG same grain
 ragged but homogeneous

inclusion
in mica patchy zoned
 early crystallized part of grain

Columbite-Tantalite Group

East Beryl pegmatite
93-265J

	HA1	HA2	HA3	HA4	HA5	HA6	HA7	HA8	HA9	HA10	HA11	HA12
FeO	2.08	1.99	2.01	2.20	2.30	2.19	2.05	2.08	2.11	2.07	2.05	2.02
MnO	14.03	14.03	14.33	14.48	15.20	15.22	14.83	15.21	15.16	15.15	15.58	15.14
TiO2	0.00	0.00	0.00	0.00	0.01	0.06	0.04	0.02	0.03	0.04	0.02	0.01
Nb2O5	26.64	25.07	29.61	34.20	41.48	41.13	35.88	39.22	39.12	38.45	41.79	36.78
Ta2O5	57.01	58.26	53.97	47.32	40.37	40.38	46.29	42.05	42.01	42.82	39.46	44.58
SnO2	0.03	0.07	0.06	0.02	0.00	0.03	0.04	0.07	0.01	0.05	0.02	0.02
WO3	0.27	0.34	0.27	0.32	0.37	0.37	0.38	0.44	0.38	0.34	0.38	0.43
PbO	0.10	0.06	0.17	0.17	0.24	0.19	0.15	0.22	0.21	0.22	0.21	0.21
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05
Bi2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.07	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.00	0.00	0.00	0.06
CaO	0.02	0.02	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.02
Total	100.28	99.85	100.43	98.73	99.98	99.60	99.73	99.33	99.03	99.13	99.50	99.30

Structural formulae based on 6 oxygens

Fe	0.126	0.122	0.120	0.130	0.129	0.123	0.118	0.119	0.121	0.118	0.115	0.117
Mn	0.860	0.871	0.864	0.863	0.863	0.868	0.868	0.878	0.878	0.879	0.886	0.885
Ti	0.000	0.000	0.000	0.000	0.001	0.003	0.002	0.001	0.002	0.002	0.001	0.000
Nb	0.872	0.831	0.953	1.088	1.257	1.251	1.121	1.208	1.209	1.191	1.268	1.148
Ta	1.122	1.161	1.045	0.906	0.736	0.739	0.870	0.779	0.781	0.798	0.720	0.837
Sn	0.001	0.002	0.002	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.000	0.000
W	0.005	0.006	0.005	0.006	0.006	0.007	0.007	0.008	0.007	0.006	0.007	0.008
Pb	0.002	0.001	0.003	0.003	0.004	0.003	0.003	0.004	0.004	0.004	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.005	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.004
Ca	0.002	0.001	0.001	0.002	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001
Total	2.995	2.997	2.992	2.998	2.997	2.997	2.995	3.000	3.001	3.001	3.002	3.005
Mn/(Mn+Fe)	0.872	0.877	0.878	0.869	0.870	0.875	0.880	0.881	0.879	0.881	0.885	0.884
Ta/(Ta+Nb)	0.563	0.583	0.523	0.454	0.369	0.371	0.437	0.392	0.392	0.401	0.362	0.422

Comments: traverse along secondary oscillatory
zoned edge of crystal
HA1 early to HA22 late

traverse along secondary oscillatory
zoned edge of crystal
HA1 early to HA22 late

Columbite-Tantalite Group

East Beryl pegmatite
93-265J

	HA13	HA14	HA15	HA16	HA17	HA18	HA19	HA20	HA21	HA22	HA23
FeO	2.03	2.12	2.00	2.03	2.06	2.14	2.18	2.10	2.26	2.75	2.87
MnO	15.11	15.01	15.05	15.04	15.00	15.06	15.08	15.25	15.05	14.73	14.38
TiO2	0.04	0.04	0.03	0.07	0.07	0.08	0.07	0.03	0.03	0.05	0.19
Nb2O5	37.19	37.90	37.28	38.58	36.53	39.54	40.19	39.74	40.36	42.45	41.08
Ta2O5	44.26	43.77	43.79	43.36	44.73	41.94	41.36	41.67	41.16	38.83	40.52
SnO2	0.03	0.01	0.07	0.03	0.03	0.04	0.07	0.00	0.03	0.06	0.05
WO3	0.37	0.40	0.37	0.40	0.34	0.43	0.43	0.43	0.36	0.43	0.66
PbO	0.56	0.20	0.19	0.18	0.20	0.23	0.18	0.13	0.16	0.22	0.17
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.00	0.01	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.01	0.00	0.00	0.14	0.00	0.11	0.04	0.00	0.00	0.08
CaO	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.03	0.02
Total	99.61	99.45	98.77	99.71	99.09	99.46	99.71	99.40	99.42	99.54	100.01

Structural formulae based on 6 oxygens

Fe	0.117	0.121	0.116	0.115	0.119	0.121	0.123	0.119	0.128	0.154	0.161
Mn	0.881	0.871	0.881	0.869	0.879	0.867	0.862	0.877	0.863	0.835	0.816
Ti	0.002	0.002	0.001	0.003	0.003	0.004	0.004	0.002	0.002	0.002	0.010
Nb	1.157	1.175	1.166	1.189	1.142	1.215	1.227	1.219	1.235	1.284	1.244
Ta	0.829	0.816	0.823	0.804	0.841	0.775	0.760	0.769	0.758	0.706	0.738
Sn	0.001	0.000	0.002	0.001	0.001	0.001	0.002	0.000	0.001	0.002	0.001
W	0.007	0.007	0.007	0.007	0.006	0.008	0.007	0.008	0.006	0.007	0.011
Pb	0.010	0.004	0.003	0.003	0.004	0.004	0.003	0.002	0.003	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.000	0.008	0.000	0.006	0.002	0.000	0.000	0.005
Ca	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.002	0.001	0.002	0.001
Total	3.005	2.997	3.000	2.992	3.004	2.995	2.996	3.000	2.996	2.996	2.990
Mn/(Mn+Fe)	0.883	0.878	0.884	0.883	0.880	0.877	0.875	0.880	0.871	0.845	0.835
Ta/(Ta+Nb)	0.417	0.410	0.414	0.403	0.424	0.390	0.382	0.387	0.380	0.355	0.372

Comments:

Columbite-Tantalite Group

East Beryl pegmatite 93-265J															
	HB1	HB2	HB3	HB4	HB5	HB6	HB7	HB8	HB9	HB10	HB11	HB12	HB13	HB14	HB15
FeO	1.60	1.51	1.40	1.29	1.31	1.47	1.44	1.70	1.66	1.70	2.07	2.14	2.30	2.50	2.52
MnO	15.60	15.68	15.89	16.11	16.18	16.02	16.03	15.92	15.90	15.95	15.78	15.81	15.77	15.73	15.43
TiO2	0.18	0.17	0.18	0.20	0.19	0.16	0.18	0.20	0.19	0.18	0.21	0.29	0.26	0.25	0.25
Nb2O5	37.77	38.07	38.02	38.29	38.80	39.28	39.45	39.76	39.94	40.40	41.69	43.66	44.21	44.98	43.41
Ta2O5	43.55	43.09	42.66	41.87	41.93	41.50	40.75	40.53	39.88	39.42	38.48	35.32	34.52	34.08	35.43
SnO2	0.13	0.05	0.13	0.14	0.07	0.07	0.08	0.06	0.10	0.07	0.04	0.04	0.03	0.05	0.10
WO3	0.76	0.82	0.81	0.83	0.80	0.75	0.81	0.77	0.82	0.81	0.72	0.94	0.95	0.85	0.67
PbO	0.16	0.16	0.18	0.19	0.19	0.17	0.21	0.21	0.16	0.14	0.23	0.16	0.22	0.19	0.21
ThO2	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
UO2	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
Sb2O3	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.02
Bi2O3	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.04	0.03	0.00	0.00	0.11	0.00	0.00	0.14	0.00	0.00	0.03	0.00	0.00	0.00
CaO	0.01	0.02	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.01
Total	99.77	99.61	99.28	98.95	99.50	99.53	98.96	99.15	98.78	98.69	99.23	98.45	98.29	98.64	98.05

Structural formulae based on 6 oxygens

Fe	0.091	0.086	0.080	0.074	0.074	0.083	0.082	0.096	0.094	0.097	0.116	0.120	0.128	0.138	0.141
Mn	0.902	0.906	0.921	0.934	0.932	0.920	0.925	0.915	0.915	0.917	0.898	0.894	0.891	0.883	0.878
Ti	0.009	0.009	0.009	0.010	0.010	0.008	0.009	0.010	0.010	0.009	0.011	0.014	0.013	0.013	0.012
Nb	1.166	1.175	1.176	1.186	1.194	1.204	1.215	1.220	1.227	1.240	1.266	1.318	1.333	1.347	1.317
Ta	0.809	0.800	0.794	0.780	0.776	0.765	0.755	0.748	0.737	0.728	0.703	0.641	0.626	0.614	0.647
Sn	0.003	0.001	0.003	0.004	0.002	0.002	0.002	0.002	0.003	0.002	0.001	0.001	0.001	0.001	0.003
W	0.013	0.015	0.014	0.015	0.014	0.013	0.014	0.014	0.014	0.014	0.013	0.016	0.016	0.015	0.012
Pb	0.003	0.003	0.003	0.004	0.004	0.003	0.004	0.004	0.003	0.003	0.004	0.003	0.004	0.003	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.002	0.002	0.000	0.000	0.007	0.000	0.000	0.008	0.000	0.000	0.002	0.000	0.000	0.000
Ca	0.001	0.002	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.001	0.001
Total	2.998	2.998	3.003	3.008	3.006	3.006	3.006	3.009	3.010	3.010	3.011	3.012	3.014	3.015	3.015
Mn/(Mn+Fe)	0.908	0.913	0.920	0.927	0.926	0.917	0.919	0.905	0.906	0.905	0.885	0.882	0.874	0.865	0.861
Ta/(Ta+Nb)	0.410	0.405	0.403	0.397	0.394	0.389	0.383	0.380	0.375	0.370	0.357	0.327	0.320	0.313	0.329

Comments:

traverse across main (early) part of crystal
HB1 primary core to HB30 patchy zoned opposite edge

Columbite-Tantalite Group

East Beryl pegmatite 93-265J															
	HB16	HB17	HB18	HB19	HB20	HB21	HB23	HB24	HB25	HB26	HB27	HB28	HB29	HB30	HC
FeO	2.51	2.61	2.65	2.55	2.65	2.55	2.22	2.53	2.73	2.98	2.96	2.91	3.76	2.62	2.45
MnO	15.49	15.35	15.48	15.48	15.50	15.35	15.78	15.51	14.98	14.95	14.73	14.15	13.49	14.97	14.86
TiO2	0.28	0.25	0.26	0.26	0.27	0.05	0.03	0.18	0.19	0.19	0.20	0.29	0.29	0.22	0.16
Nb2O5	43.34	43.49	44.00	44.54	44.48	42.96	42.90	42.06	40.90	40.61	37.68	35.19	35.15	36.34	37.11
Ta2O5	35.29	35.25	34.84	34.29	34.21	36.96	36.93	37.57	38.38	38.47	41.81	44.56	45.12	43.85	43.31
SnO2	0.05	0.07	0.05	0.07	0.07	0.02	0.06	0.09	0.07	0.00	0.07	0.08	0.06	0.04	0.08
WO3	0.63	0.74	0.83	0.91	0.92	0.41	0.34	0.65	0.75	0.79	0.74	0.83	0.79	0.73	0.76
PbO	0.18	0.20	0.14	0.23	0.24	0.21	0.22	0.24	0.15	0.13	0.16	0.12	0.18	0.15	0.17
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.03	0.01	0.00	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.10	0.00	0.10	0.00	0.02	0.07	0.05	0.09	0.00	0.09	0.00	0.07	0.00	0.00	0.00
CaO	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.02	0.02	0.03	0.01	0.01
Total	97.91	97.97	98.35	98.35	98.37	98.59	98.54	98.92	98.20	98.26	98.38	98.22	98.86	98.94	98.91

Structural formulae based on 6 oxygens

Fe	0.141	0.147	0.148	0.142	0.147	0.143	0.125	0.142	0.155	0.169	0.171	0.170	0.219	0.152	0.142
Mn	0.881	0.873	0.874	0.873	0.874	0.873	0.898	0.882	0.862	0.861	0.861	0.838	0.796	0.877	0.868
Ti	0.014	0.013	0.013	0.013	0.013	0.003	0.001	0.009	0.010	0.010	0.010	0.015	0.015	0.012	0.008
Nb	1.316	1.320	1.326	1.341	1.338	1.304	1.303	1.277	1.256	1.248	1.175	1.113	1.107	1.136	1.157
Ta	0.644	0.644	0.632	0.621	0.619	0.675	0.675	0.686	0.709	0.711	0.784	0.848	0.854	0.825	0.812
Sn	0.001	0.002	0.001	0.002	0.002	0.001	0.002	0.002	0.002	0.000	0.002	0.002	0.002	0.001	0.002
W	0.011	0.013	0.014	0.016	0.016	0.007	0.006	0.011	0.013	0.014	0.013	0.015	0.014	0.013	0.014
Pb	0.003	0.004	0.002	0.004	0.004	0.004	0.004	0.004	0.003	0.002	0.003	0.002	0.003	0.003	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.006	0.000	0.006	0.000	0.001	0.004	0.003	0.005	0.000	0.005	0.000	0.004	0.000	0.000	0.000
Ca	0.002	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.002	0.001	0.001
Total	3.020	3.014	3.017	3.012	3.016	3.013	3.017	3.019	3.013	3.021	3.022	3.010	3.013	3.020	3.008
Mn/(Mn+Fe)	0.862	0.856	0.855	0.860	0.856	0.859	0.878	0.861	0.848	0.836	0.834	0.831	0.784	0.853	0.860
Ta/(Ta+Nb)	0.329	0.328	0.323	0.316	0.316	0.341	0.341	0.349	0.361	0.363	0.400	0.432	0.436	0.421	0.412

Comments:

Columbite-Tantalite Group

	East Beryl pegmatite 93-265N(i)			East Beryl pegmatite 93-265N(ii)						East Beryl pegmatite 93-265P			East Be peg. 93-265Q	
	AA	AB	AC	BB	BC	BD	BE	BF	BJ	WB	WC	WD	JD	JH
FeO	5.69	6.65	6.89	8.97	7.71	6.79	5.19	4.85	5.80	6.48	6.00	5.66	8.57	8.43
MnO	12.45	11.66	11.43	10.57	11.63	12.60	14.31	14.75	13.25	12.80	13.10	12.51	10.86	10.04
TiO2	0.74	0.69	0.67	0.55	0.65	0.55	0.59	0.65	0.52	0.47	0.27	0.39	0.63	0.54
Nb2O5	43.28	45.48	46.16	63.74	61.61	58.64	61.35	63.37	57.73	42.29	42.83	42.74	57.83	58.32
Ta2O5	35.18	33.28	33.24	13.27	16.19	19.65	16.59	14.89	21.48	36.99	36.83	37.83	22.01	19.75
SnO2	0.22	0.17	0.20	0.11	0.10	0.14	0.08	0.13	0.16	0.22	0.19	0.11	0.10	0.11
WO3	0.57	0.52	0.52	0.58	0.67	0.71	0.55	0.61	0.40	0.59	0.26	0.45	0.46	0.44
PbO	0.43	0.40	0.43	0.66	0.56	0.47	0.50	0.51	0.55	0.22	0.23	0.23	0.31	0.84
ThO2	0.06	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
UO2	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.60
Sb2O3	0.08	0.06	0.06	0.07	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.03	0.03
Bi2O3														
Sc2O3	0.03	0.05	0.03	0.07	0.07	0.02	0.07	0.05	0.07	0.02	0.02	0.00	0.02	0.02
CaO	0.07	0.04	0.06	0.04	0.04	0.03	0.04	0.06	0.06	0.04	0.04	0.04	0.03	0.37
Total	98.80	99.00	99.70	98.68	99.29	99.65	99.32	99.92	100.07	100.18	99.82	100.03	100.88	99.49

Structural formulae based on 6 oxygens

Fe	0.317	0.365	0.376	0.453	0.391	0.349	0.264	0.243	0.299	0.358	0.333	0.314	0.438	0.436
Mn	0.702	0.649	0.631	0.541	0.598	0.655	0.736	0.748	0.691	0.717	0.736	0.702	0.562	0.526
Ti	0.037	0.034	0.033	0.025	0.030	0.025	0.027	0.029	0.024	0.023	0.013	0.019	0.029	0.025
Nb	1.302	1.351	1.360	1.742	1.691	1.628	1.685	1.716	1.606	1.265	1.284	1.281	1.597	1.630
Ta	0.637	0.595	0.589	0.218	0.267	0.328	0.274	0.243	0.360	0.665	0.664	0.682	0.366	0.332
Sn	0.006	0.004	0.005	0.003	0.002	0.003	0.002	0.003	0.004	0.006	0.005	0.003	0.002	0.003
W	0.010	0.009	0.009	0.009	0.011	0.011	0.009	0.009	0.006	0.010	0.004	0.008	0.007	0.007
Pb	0.008	0.007	0.008	0.011	0.009	0.008	0.008	0.008	0.009	0.004	0.004	0.004	0.005	0.014
Th	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008
Sb	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.001	0.001
Bi														
Sc	0.002	0.003	0.002	0.004	0.004	0.001	0.004	0.003	0.004	0.001	0.001	0.000	0.001	0.001
Ca	0.005	0.003	0.004	0.003	0.003	0.002	0.003	0.004	0.004	0.003	0.003	0.003	0.002	0.025
Total	3.027	3.022	3.018	3.011	3.007	3.013	3.013	3.008	3.008	3.054	3.049	3.017	3.010	3.006
Mn/(Mn+Fe)	0.689	0.640	0.627	0.544	0.604	0.653	0.736	0.755	0.698	0.667	0.689	0.691	0.562	0.547
Ta/(Ta+Nb)	0.328	0.306	0.302	0.111	0.136	0.168	0.140	0.124	0.183	0.345	0.341	0.347	0.186	0.169

Comments: AA - AC
same grain

BB & BC
same grain

WC & WD
same grain

Columbite-Tantalite Group

	East Beryl pegmatite 93-265Ri					Audrey's pegmatite 93-271				Lou's pegmatite 93-272A			Lou's pegmatite 93-272B				
	MB	MC	MD	DJ	DN	YB	QB	YF	YG	QC	QD	QI	XB	XC	XD	CA1	CA2
FeO	2.30	2.25	2.47	2.35	2.49	12.19	12.43	12.33	12.16	9.83	9.67	9.29	11.22	11.60	10.04	10.07	9.95
MnO	13.99	13.77	13.49	13.22	13.23	4.76	4.98	4.09	3.93	8.16	6.88	7.75	7.04	6.15	6.73	6.25	6.34
TiO2	0.30	0.33	0.37	0.12	0.17	1.17	1.13	1.70	1.43	1.98	1.12	1.62	1.42	2.05	1.56	1.05	0.93
Nb2O5	20.94	19.64	19.52	20.94	21.78	37.40	40.35	31.85	31.83	45.81	26.06	36.61	48.71	45.34	28.69	26.41	25.95
Ta2O5	61.21	62.55	63.09	62.22	61.83	40.45	38.80	48.16	46.31	32.85	56.32	43.30	31.11	32.93	51.46	54.42	56.12
SnO2	0.18	0.00	0.00	0.21	0.07	0.34	0.16	0.56	0.63	0.57	0.32	0.39	0.24	0.47	1.19	0.37	0.54
WO3	0.15	0.25	0.18	0.45	0.49	1.01	1.79	0.15	1.19	0.60	0.24	0.45	0.44	0.66	0.55	0.65	0.62
PbO	0.21	0.15	0.10	0.06	0.07	0.44	0.13	0.37	0.29	0.26	0.13	0.17	0.22	0.21	0.08	0.11	0.10
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.02	0.02	0.00	0.00	0.18	0.00	0.10	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.06	0.05	0.08	0.00	0.02	0.08	0.00	0.08	0.06							0.00	0.00
Bi2O3																0.00	0.03
Sc2O3	0.03	0.03	0.03	0.03	0.02	0.32	0.13	0.49	0.32							0.00	0.20
CaO	0.00	0.00	0.00	0.04	0.03	0.25	0.01	0.16	0.64	0.12	0.05	0.04	0.04	0.04	0.05	0.01	0.00
Total	99.37	99.04	99.35	99.63	100.20	98.59	99.92	100.06	98.90	100.20	100.79	99.63	100.44	99.44	100.36	99.35	100.77
Structural formulae based on 6 oxygens																	
Fe	0.144	0.143	0.156	0.148	0.155	0.697	0.693	0.714	0.711	0.528	0.579	0.528	0.597	0.629	0.590	0.609	0.596
Mn	0.890	0.885	0.865	0.841	0.833	0.276	0.281	0.240	0.233	0.444	0.417	0.446	0.379	0.338	0.401	0.383	0.385
Ti	0.017	0.019	0.021	0.007	0.010	0.060	0.057	0.089	0.075	0.096	0.060	0.083	0.068	0.100	0.083	0.057	0.050
Nb	0.711	0.674	0.668	0.711	0.732	1.156	1.215	0.997	1.006	1.331	0.843	1.124	1.401	1.328	0.912	0.863	0.840
Ta	1.250	1.291	1.299	1.270	1.250	0.752	0.703	0.907	0.881	0.574	1.096	0.800	0.538	0.580	0.984	1.070	1.093
Sn	0.005	0.000	0.000	0.006	0.002	0.009	0.004	0.015	0.018	0.015	0.009	0.011	0.006	0.012	0.033	0.011	0.015
W	0.003	0.005	0.004	0.009	0.009	0.018	0.031	0.003	0.022	0.010	0.004	0.008	0.007	0.011	0.010	0.012	0.011
Pb	0.004	0.003	0.002	0.001	0.001	0.008	0.002	0.007	0.005	0.004	0.003	0.003	0.004	0.004	0.001	0.002	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.002	0.002	0.002	0.000	0.000	0.002	0.000	0.002	0.002							0.000	0.000
Bi																0.000	0.001
Sc	0.002	0.002	0.002	0.002	0.001	0.019	0.008	0.030	0.019							0.000	0.013
Ca	0.000	0.000	0.000	0.003	0.002	0.018	0.001	0.012	0.048	0.008	0.004	0.003	0.003	0.002	0.004	0.001	0.000
Total	3.029	3.023	3.019	2.997	2.996	3.019	2.995	3.017	3.021	3.011	3.014	3.005	3.003	3.003	3.019	3.008	3.006
Mn/(Mn+Fe)	0.860	0.861	0.847	0.851	0.843	0.283	0.289	0.251	0.247	0.457	0.419	0.458	0.389	0.349	0.404	0.386	0.392
Ta/(Ta+Nb)	0.637	0.657	0.660	0.641	0.631	0.394	0.366	0.476	0.467	0.301	0.565	0.416	0.278	0.304	0.519	0.553	0.565
Comments:	MB - DN same grain					YB & QB same grain unzoned grains		YF & YG same grain		QC & QD in cluster			isolated grains later than cass.		CA traverse 570 μm rim		

Columbite-Tantalite Group

Lou's pegmatite 93-272B													
	CA3	CA4	CA5	CA6	CA7	CA8	CA9	CA10	CA11	CA12	CA13	CA14	CA15
FeO	9.91	9.90	9.95	9.97	9.73	9.83	9.85	9.84	9.78	10.08	10.25	10.17	10.25
MnO	6.35	6.38	6.38	6.49	6.68	6.69	6.63	6.62	6.56	6.42	6.37	6.27	6.18
TiO2	0.95	1.09	1.09	1.35	0.95	1.40	1.28	1.06	1.16	1.04	0.98	1.05	1.32
Nb2O5	25.56	25.88	26.09	28.18	25.95	29.60	27.64	26.30	26.06	27.28	29.23	27.19	27.07
Ta2O5	55.19	54.83	54.50	52.42	55.31	50.81	52.11	55.29	54.80	53.91	51.61	53.84	53.20
SnO2	0.85	0.79	0.86	0.84	0.40	0.68	0.62	0.37	0.48	0.47	0.27	0.29	0.55
WO3	0.55	0.75	0.75	0.81	0.69	0.86	0.80	0.73	0.66	0.74	0.72	0.72	0.78
PbO	0.12	0.05	0.12	0.17	0.11	0.09	0.19	0.14	0.09	0.21	0.13	0.24	0.12
ThO2	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
UO2	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
Sb2O3	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
Bi2O3	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.13	0.08	0.14	0.07	0.14	0.00	0.05	0.11	0.00	0.13	0.10	0.00	0.01
CaO	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01
Total	99.63	99.76	99.89	100.30	99.99	99.98	99.18	100.47	99.60	100.27	99.66	99.77	99.50

Structural formulae based on 6 oxygens

Fe	0.601	0.597	0.599	0.590	0.587	0.579	0.591	0.589	0.591	0.601	0.609	0.610	0.615
Mn	0.389	0.390	0.389	0.389	0.408	0.399	0.403	0.401	0.401	0.388	0.383	0.381	0.375
Ti	0.052	0.059	0.059	0.072	0.052	0.074	0.069	0.057	0.063	0.056	0.053	0.057	0.071
Nb	0.837	0.844	0.849	0.902	0.846	0.942	0.896	0.851	0.850	0.880	0.938	0.882	0.878
Ta	1.087	1.075	1.066	1.009	1.084	0.973	1.016	1.076	1.076	1.046	0.996	1.051	1.038
Sn	0.025	0.023	0.025	0.024	0.012	0.019	0.018	0.011	0.014	0.013	0.008	0.008	0.016
W	0.010	0.014	0.014	0.015	0.013	0.016	0.015	0.014	0.012	0.014	0.013	0.013	0.014
Pb	0.002	0.001	0.002	0.003	0.002	0.002	0.004	0.003	0.002	0.004	0.002	0.005	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.008	0.005	0.009	0.004	0.009	0.000	0.003	0.007	0.000	0.008	0.006	0.000	0.001
Ca	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Total	3.012	3.009	3.011	3.007	3.012	3.003	3.014	3.010	3.009	3.011	3.008	3.008	3.011
Mn/(Mn+Fe)	0.393	0.395	0.393	0.398	0.410	0.408	0.405	0.405	0.405	0.392	0.386	0.384	0.379
Ta/(Ta+Nb)	0.565	0.560	0.557	0.528	0.562	0.508	0.531	0.558	0.559	0.543	0.515	0.544	0.542

Comments: CA traverse 570 μm

core
(along length of elongate grain)

Columbite-Tantalite Group

Lou's pegmatite 93-272B												
	CA16	CA17	CA18	CA19	CA20	CA21	CA22	CA23	CA24	CA25	CA26	CC
FeO	10.09	9.67	9.72	9.75	10.05	10.01	10.15	10.21	10.13	10.34	10.24	10.06
MnO	6.19	6.27	6.76	6.59	6.64	6.48	6.27	6.19	6.13	6.26	6.10	6.45
TiO2	1.37	1.04	1.16	1.16	1.43	1.11	1.07	1.05	1.08	1.03	0.97	1.47
Nb2O5	26.28	25.36	26.63	27.62	30.16	25.78	26.28	26.86	26.06	29.22	27.37	29.39
Ta2O5	53.90	54.93	54.56	53.23	49.73	55.31	55.31	54.18	54.98	52.02	54.55	50.77
SnO2	0.72	1.02	0.38	0.74	0.50	0.47	0.48	0.50	0.59	0.33	0.34	0.73
WO3	0.79	0.69	0.79	0.77	0.88	0.71	0.68	0.64	0.74	0.71	0.42	0.83
PbO	0.09	0.17	0.12	0.09	0.16	0.11	0.04	0.12	0.02	0.13	0.09	0.16
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.04	0.09	0.07	0.01	0.05	0.15	0.12	0.10	0.08	0.03	0.26	0.00
CaO	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00
Total	99.47	99.25	100.20	99.99	99.62	100.14	100.40	99.86	99.81	100.10	100.36	99.87

Structural formulae based on 6 oxygens

Fe	0.607	0.588	0.582	0.581	0.592	0.602	0.608	0.612	0.610	0.612	0.610	0.593
Mn	0.377	0.386	0.409	0.398	0.396	0.395	0.381	0.376	0.374	0.375	0.368	0.385
Ti	0.074	0.057	0.062	0.062	0.076	0.060	0.057	0.057	0.058	0.055	0.052	0.078
Nb	0.855	0.834	0.862	0.890	0.959	0.838	0.851	0.871	0.849	0.934	0.882	0.937
Ta	1.055	1.087	1.062	1.032	0.952	1.082	1.077	1.057	1.077	1.001	1.057	0.974
Sn	0.021	0.030	0.011	0.021	0.014	0.014	0.014	0.014	0.017	0.009	0.010	0.020
W	0.015	0.013	0.015	0.014	0.016	0.013	0.013	0.012	0.014	0.013	0.008	0.015
Pb	0.002	0.003	0.002	0.002	0.003	0.002	0.001	0.002	0.000	0.003	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.002	0.006	0.004	0.001	0.003	0.009	0.008	0.006	0.005	0.002	0.016	0.000
Ca	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Total	3.009	3.004	3.010	3.004	3.010	3.015	3.008	3.009	3.005	3.006	3.006	3.006
Mn/(Mn+Fe)	0.383	0.396	0.413	0.406	0.401	0.396	0.385	0.380	0.380	0.380	0.377	0.393
Ta/(Ta+Nb)	0.552	0.566	0.552	0.537	0.498	0.563	0.559	0.548	0.559	0.517	0.545	0.510

Comments:

rim

Columbite-Tantalite Group

Lou's pegmatite 93-272B															
	CD1	CD2	CD3	CD4	CD5	CD6	CD7	CD8	CD9	CD10	CD11	CD12	CD13	CD14	CD15
FeO	10.08	10.26	10.64	10.99	10.69	10.76	10.99	10.45	10.93	10.89	11.06	11.35	11.33	11.41	11.39
MnO	6.18	6.18	6.36	6.66	6.46	6.58	6.68	6.42	6.86	6.70	6.69	6.69	6.69	6.66	6.68
TiO2	1.09	1.08	1.15	1.35	1.26	1.38	1.12	1.12	1.14	1.14	1.43	1.62	1.58	1.64	1.59
Nb2O5	25.97	27.21	33.37	41.87	36.43	40.76	42.39	33.77	43.97	40.93	44.20	48.24	47.78	48.60	48.68
Ta2O5	54.61	53.39	47.41	37.34	43.68	39.33	37.13	47.01	36.07	40.04	34.80	30.24	30.45	29.78	29.66
SnO2	0.37	0.29	0.36	0.35	0.31	0.36	0.28	0.25	0.20	0.25	0.26	0.41	0.42	0.49	0.46
WO3	0.74	0.77	0.81	0.77	0.66	0.65	0.56	0.56	0.70	0.63	0.70	0.75	0.81	0.77	0.75
PbO	0.08	0.15	0.18	0.25	0.13	0.18	0.15	0.14	0.20	0.14	0.22	0.26	0.33	0.21	0.23
ThO2	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
UO2	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
Sb2O3	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
Bi2O3	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
Sc2O3	0.08	0.18	0.12	0.25	0.25	0.02	0.22	0.17	0.26	0.06	0.12	0.19	0.30	0.13	0.20
CaO	0.02	0.02	0.00	0.00	0.02	0.05	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Total	99.22	99.53	100.39	99.84	99.89	100.08	99.56	99.93	100.33	100.79	99.48	99.76	99.69	99.70	99.67

Structural formulae based on 6 oxygens

Fe	0.611	0.615	0.613	0.607	0.607	0.597	0.608	0.603	0.596	0.602	0.606	0.606	0.607	0.609	0.608
Mn	0.379	0.376	0.371	0.372	0.372	0.370	0.374	0.375	0.379	0.375	0.371	0.362	0.363	0.360	0.361
Ti	0.059	0.058	0.060	0.067	0.064	0.069	0.056	0.058	0.056	0.057	0.070	0.078	0.076	0.079	0.076
Nb	0.851	0.883	1.039	1.250	1.119	1.223	1.267	1.054	1.297	1.223	1.308	1.393	1.384	1.402	1.404
Ta	1.076	1.042	0.888	0.671	0.807	0.710	0.668	0.882	0.640	0.720	0.620	0.525	0.531	0.517	0.515
Sn	0.011	0.008	0.010	0.009	0.008	0.010	0.007	0.007	0.005	0.007	0.007	0.010	0.011	0.013	0.012
W	0.014	0.014	0.014	0.013	0.012	0.011	0.010	0.010	0.012	0.011	0.012	0.012	0.013	0.013	0.012
Pb	0.002	0.003	0.003	0.005	0.002	0.003	0.003	0.003	0.003	0.002	0.004	0.004	0.006	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.005	0.011	0.007	0.015	0.015	0.001	0.013	0.010	0.015	0.003	0.007	0.011	0.016	0.007	0.011
Ca	0.001	0.002	0.000	0.000	0.001	0.004	0.003	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.009	3.012	3.007	3.009	3.008	2.998	3.009	3.005	3.003	3.000	3.004	3.003	3.006	3.002	3.004
Mn/(Mn+Fe)	0.383	0.379	0.377	0.380	0.380	0.382	0.381	0.384	0.389	0.384	0.380	0.374	0.374	0.372	0.373
Ta/(Ta+Nb)	0.558	0.541	0.461	0.349	0.419	0.367	0.345	0.456	0.330	0.370	0.321	0.274	0.277	0.269	0.268

Comments: CD and CE traverses on same patchily zoned grain
 CD traverse 240 µm
 patchy zonation masks any primary zonation

Columbite-Tantalite Group

Lou's pegmatite 93-272B														
	CD16	CD17	CD18	CD19	CD20	CD21	CD22	CE1	CE2	CE3	CE4	CE5	CE6	CE7
FeO	11.21	11.10	11.13	11.16	11.11	10.82	10.34	9.91	10.74	10.89	10.88	10.80	10.31	10.43
MnO	6.87	6.71	6.93	7.01	6.85	6.62	6.48	6.34	6.62	6.76	7.02	6.68	6.35	7.12
TiO2	1.48	1.10	1.21	1.23	1.22	1.14	1.10	0.96	1.37	1.04	1.09	1.22	1.10	1.02
Nb2O5	47.14	41.94	46.20	45.05	45.55	39.83	32.51	27.03	40.13	41.37	45.91	40.64	32.66	40.45
Ta2O5	32.42	37.70	33.27	34.24	33.55	40.49	48.30	54.39	39.69	38.12	33.60	38.85	48.67	39.49
SnO2	0.35	0.24	0.23	0.30	0.27	0.26	0.31	0.30	0.42	0.25	0.24	0.22	0.25	0.22
WO3	0.75	0.57	0.75	0.67	0.65	0.62	0.60	0.63	0.79	0.57	0.70	0.66	0.57	0.58
PbO	0.19	0.22	0.23	0.23	0.28	0.25	0.15	0.08	0.22	0.25	0.27	0.26	0.20	0.19
ThO2	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
UO2	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
Sb2O3	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
Bi2O3	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
Sc2O3	0.07	0.14	0.21	0.22	0.06	0.17	0.00	0.08	0.27	0.05	0.22	0.17	0.20	0.04
CaO	0.00	0.01	0.00	0.00	0.00	0.03	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.01
Total	100.48	99.74	100.17	100.11	99.55	100.23	99.81	99.74	100.26	99.33	99.93	99.52	100.32	99.55

Structural formulae based on 6 oxygens

Fe	0.600	0.615	0.601	0.606	0.605	0.604	0.602	0.595	0.596	0.608	0.590	0.603	0.597	0.584
Mn	0.372	0.377	0.379	0.385	0.378	0.374	0.382	0.386	0.372	0.382	0.386	0.378	0.373	0.404
Ti	0.071	0.055	0.059	0.060	0.060	0.057	0.058	0.052	0.068	0.052	0.053	0.061	0.057	0.051
Nb	1.364	1.256	1.348	1.322	1.342	1.202	1.024	0.878	1.205	1.249	1.346	1.227	1.023	1.225
Ta	0.564	0.679	0.584	0.604	0.594	0.735	0.915	1.063	0.717	0.692	0.593	0.705	0.917	0.719
Sn	0.009	0.006	0.006	0.008	0.007	0.007	0.009	0.009	0.011	0.007	0.006	0.006	0.007	0.006
W	0.012	0.010	0.013	0.011	0.011	0.011	0.011	0.012	0.014	0.010	0.012	0.011	0.010	0.010
Pb	0.003	0.004	0.004	0.004	0.005	0.004	0.003	0.002	0.004	0.004	0.005	0.005	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.008	0.012	0.013	0.003	0.010	0.000	0.005	0.016	0.003	0.013	0.010	0.012	0.003
Ca	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.002	0.000	0.001	0.001	0.001
Total	3.001	3.011	3.006	3.014	3.006	3.005	3.004	3.002	3.003	3.009	3.003	3.007	3.000	3.006
Mn/(Mn+Fe)	0.383	0.380	0.387	0.389	0.385	0.383	0.388	0.393	0.384	0.386	0.395	0.385	0.384	0.409
Ta/(Ta+Nb)	0.293	0.351	0.302	0.314	0.307	0.379	0.472	0.548	0.373	0.357	0.306	0.365	0.473	0.370

Comments: CD and CE traverses on same patchily zoned grain
 CD traverse 240 µm
 patchy zonation masks any primary zonation

Columbite-Tantalite Group

Lou's pegmatite 93-272B													
	CE8	CE9	CE10	CE11	CE12	CE13	CE14	CE15	CE16	CE17	CE18	CF	CG
FeO	10.93	10.69	10.62	11.06	10.72	11.12	10.61	10.68	10.51	10.60	10.39	10.27	10.58
MnO	6.99	7.01	6.71	7.11	6.63	7.01	6.50	6.45	6.36	6.50	6.46	6.69	6.32
TiO2	1.18	1.14	1.11	1.06	1.14	1.09	1.11	1.14	1.12	1.10	1.08	1.03	1.03
Nb2O5	45.46	42.93	38.74	45.79	37.85	47.05	35.97	36.58	34.36	36.87	34.29	34.36	31.51
Ta2O5	34.33	36.70	41.80	33.39	42.58	32.69	44.47	44.64	46.80	44.38	46.45	47.09	50.13
SnO2	0.23	0.29	0.20	0.25	0.24	0.24	0.27	0.30	0.25	0.25	0.29	0.26	0.29
WO3	0.63	0.63	0.64	0.62	0.61	0.52	0.53	0.55	0.48	0.49	0.49	0.42	0.35
PbO	0.24	0.23	0.22	0.22	0.23	0.25	0.21	0.18	0.19	0.21	0.18	0.15	0.20
ThO2	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
UO2	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
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Sc2O3	0.21	0.18	0.18	0.21	0.10	0.20	0.08	0.13	0.13	0.12	0.17	0.24	0.09
CaO	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00
Total	100.22	99.81	100.22	99.71	100.10	100.17	99.75	100.67	100.23	100.53	99.80	100.54	100.51

Structural formulae based on 6 oxygens

Fe	0.593	0.589	0.596	0.601	0.605	0.599	0.607	0.604	0.604	0.600	0.599	0.589	0.617
Mn	0.384	0.391	0.382	0.391	0.379	0.382	0.376	0.370	0.370	0.373	0.377	0.388	0.373
Ti	0.057	0.057	0.056	0.052	0.058	0.053	0.057	0.058	0.058	0.056	0.056	0.053	0.054
Nb	1.332	1.278	1.176	1.345	1.155	1.369	1.112	1.119	1.067	1.128	1.069	1.064	0.992
Ta	0.605	0.657	0.763	0.590	0.782	0.572	0.827	0.821	0.874	0.817	0.871	0.878	0.950
Sn	0.006	0.008	0.005	0.006	0.007	0.006	0.007	0.008	0.007	0.007	0.008	0.007	0.008
W	0.010	0.011	0.011	0.010	0.011	0.009	0.009	0.010	0.009	0.009	0.009	0.009	0.006
Pb	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.004	0.004	0.003	0.003	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Sc	0.012	0.011	0.010	0.012	0.006	0.011	0.005	0.008	0.008	0.007	0.010	0.014	0.005
Ca	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.001	0.000	0.000
Total	3.004	3.005	3.003	3.012	3.006	3.006	3.006	3.001	3.002	3.000	3.003	3.004	3.009
Mn/(Mn+Fe)	0.393	0.399	0.390	0.394	0.385	0.390	0.383	0.379	0.380	0.383	0.386	0.397	0.377
Ta/(Ta+Nb)	0.312	0.340	0.394	0.305	0.404	0.295	0.426	0.423	0.450	0.420	0.449	0.452	0.489

Comments: CD and CE traverses on same patchily zoned grain
 CD traverse 240 µm
 patchy zonation masks any primary zonation

Columbite-Tantalite Group

	Lou's pegmatite 93-272D				Lou's pegmatite 93-272E						James' peg. 93-276B		James' peg. 93-276B	
	PG	PI	PK	PL	MA	MD	ME	JA	JB	JC	SL	SM	SQ	ST
FeO	9.58	10.37	10.84	11.27	10.60	13.25	12.76	12.00	12.43	12.29	11.01	10.82	10.98	10.95
MnO	6.36	5.53	6.08	5.80	6.86	6.23	6.68	5.32	6.41	6.38	5.51	5.63	5.94	5.06
TiO2	0.84	0.85	1.09	1.75	1.23	1.35	1.36	1.53	1.42	1.44	1.95	1.81	2.23	1.71
Nb2O5	21.11	23.54	34.64	39.72	54.16	52.34	53.98	48.10	48.76	48.21	24.09	21.23	24.18	22.51
Ta2O5	59.30	58.06	46.35	37.72	25.63	24.82	24.20	31.00	30.27	30.41	53.42	55.36	53.14	54.16
SnO2	0.81	0.46	0.39	0.55	0.22	0.27	0.28	0.47	0.35	0.40	2.00	3.95	2.48	3.32
WO3	0.01	0.08	0.35	0.65	0.33	0.37	0.34	0.41	0.22	0.31	0.84	0.57	0.95	0.91
PbO	0.17	0.15	0.32	0.42	0.24	0.34	0.36	0.33	0.22	0.27	0.13	0.15	0.15	0.12
ThO2	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
UO2	0.08	0.11	0.14	0.11	0.00	0.10	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Sb2O3	0.08	0.08	0.08	0.08				0.00	0.03	0.06				
Bi2O3														
Sc2O3	0.06	0.08	0.15	0.18				0.00	0.19	0.19				
CaO	0.07	0.07	0.10	0.08	0.03	0.04	0.06	0.00	0.04	0.04	0.05	0.08	0.11	0.13
Total	98.47	99.38	100.54	98.33	99.30	99.13	100.10	99.16	100.16	99.84	99.00	99.60	100.16	98.87
Structural formulae based on 6 oxygens														
Fe	0.603	0.639	0.621	0.636	0.556	0.699	0.663	0.647	0.662	0.658	0.668	0.663	0.657	0.672
Mn	0.405	0.345	0.353	0.331	0.364	0.333	0.352	0.291	0.346	0.346	0.339	0.349	0.360	0.314
Ti	0.048	0.047	0.056	0.089	0.058	0.064	0.064	0.074	0.068	0.069	0.106	0.100	0.120	0.094
Nb	0.718	0.784	1.073	1.211	1.535	1.493	1.517	1.402	1.404	1.395	0.790	0.703	0.782	0.746
Ta	1.213	1.163	0.863	0.692	0.437	0.426	0.409	0.544	0.524	0.529	1.054	1.103	1.033	1.080
Sn	0.024	0.014	0.011	0.015	0.006	0.007	0.007	0.012	0.009	0.010	0.058	0.115	0.071	0.097
W	0.000	0.002	0.006	0.011	0.005	0.006	0.005	0.007	0.004	0.005	0.016	0.011	0.018	0.017
Pb	0.003	0.003	0.006	0.008	0.004	0.006	0.006	0.006	0.004	0.005	0.003	0.003	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.001	0.002	0.002	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.002	0.002	0.002	0.002				0.000	0.001	0.002				
Bi														
Sc	0.004	0.005	0.009	0.011				0.000	0.000	0.000				
Ca	0.006	0.006	0.007	0.006	0.002	0.003	0.004	0.000	0.003	0.003	0.004	0.006	0.008	0.010
Total	3.027	3.011	3.009	3.012	2.967	3.038	3.028	2.982	3.023	3.022	3.038	3.054	3.051	3.034
Mn/(Mn+Fe)	0.402	0.351	0.362	0.343	0.396	0.323	0.347	0.310	0.343	0.345	0.336	0.345	0.354	0.319
Ta/(Ta+Nb)	0.628	0.597	0.446	0.364	0.222	0.222	0.212	0.279	0.272	0.275	0.572	0.611	0.569	0.591
Comments:	PG & PI same grain	PK & PL same grain				MD & ME same grain					isolated grains with cassiterite	isolated grains with cassiterite	isolated grains with cassiterite	isolated grains with cassiterite

Columbite-Tantalite Group

	East Beryl pegmatite 94-1a(a)								East Beryl pegmatite 94-1a(b)							
	DA	DJ	DK	DL	DM	DN	DR	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM
FeO	14.22	15.32	15.28	15.53	15.50	15.53	15.55	15.03	14.56	14.36	14.46	13.12	13.39	13.76	15.32	15.13
MnO	5.91	4.96	4.95	4.92	4.46	4.68	3.80	4.39	4.50	4.79	4.71	6.18	6.01	5.34	4.74	4.64
TiO2	0.61	0.62	1.02	0.91	1.21	1.24	1.06	0.58	0.55	0.56	0.72	0.59	0.61	0.60	0.48	0.59
Nb2O5	62.86	65.88	65.81	66.40	63.99	63.03	54.12	61.40	57.57	58.56	59.29	59.44	60.06	55.71	66.45	63.01
Ta2O5	16.03	12.94	11.81	11.63	13.73	12.59	24.31	17.57	22.21	20.83	19.60	19.66	19.39	23.90	12.10	14.37
SnO2	0.24	0.27	0.02	0.00	0.07	0.22	0.00	0.08	0.08	0.12	0.23	0.12	0.13	0.10	0.05	0.06
WO3	0.57	0.63	0.87	0.78	0.86	0.57	0.86	0.58	0.48	0.36	0.37	0.55	0.55	0.48	0.42	0.67
PbO	0.40	0.27	0.00	0.41	0.62	0.44	0.61	0.27	0.32	0.30	0.33	0.33	0.29	0.28	0.27	0.31
ThO2	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.03	0.03	0.00	0.00	0.12	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.38	0.00	0.00	0.27	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.40	0.01	0.58	0.00	0.03	0.31	0.49	0.11	0.11	0.00	0.00	0.00	0.00	0.04	0.04	0.00
CaO																
Total	101.62	100.92	100.37	100.84	100.51	98.87	100.81	100.03	100.40	99.88	99.74	100.00	100.43	100.21	99.88	98.78
Structural formulae based on 6 oxygens																
Fe	0.705	0.754	0.749	0.762	0.769	0.781	0.804	0.760	0.748	0.737	0.740	0.670	0.680	0.714	0.758	0.766
Mn	0.297	0.247	0.246	0.244	0.224	0.238	0.199	0.225	0.234	0.249	0.244	0.320	0.309	0.281	0.237	0.238
Ti	0.027	0.027	0.045	0.040	0.054	0.056	0.049	0.026	0.026	0.026	0.033	0.027	0.028	0.028	0.021	0.027
Nb	1.685	1.752	1.744	1.761	1.716	1.712	1.514	1.678	1.599	1.626	1.640	1.641	1.648	1.562	1.778	1.725
Ta	0.259	0.207	0.188	0.185	0.221	0.206	0.409	0.289	0.371	0.348	0.326	0.326	0.320	0.403	0.195	0.237
Sn	0.006	0.006	0.001	0.000	0.002	0.005	0.000	0.002	0.002	0.003	0.006	0.003	0.003	0.002	0.001	0.001
W	0.009	0.010	0.013	0.012	0.013	0.009	0.014	0.009	0.008	0.006	0.006	0.009	0.009	0.008	0.006	0.010
Pb	0.006	0.004	0.000	0.006	0.010	0.007	0.010	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.006	0.000	0.000	0.004	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.021	0.000	0.029	0.000	0.002	0.016	0.026	0.006	0.006	0.000	0.000	0.000	0.000	0.002	0.002	0.000
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.020	3.008	3.015	3.015	3.011	3.033	3.026	3.000	2.999	3.000	3.000	3.002	3.000	3.005	3.004	3.009
Mn/(Mn+Fe)	0.296	0.247	0.247	0.243	0.226	0.234	0.199	0.228	0.238	0.253	0.248	0.323	0.312	0.282	0.238	0.237
Ta/(Ta+Nb)	0.133	0.106	0.097	0.095	0.114	0.107	0.213	0.147	0.188	0.176	0.166	0.166	0.163	0.205	0.099	0.121
Comments:	cluster of grains associated with monazite					rim of oscillatory zoned grain			ZE - ZM traverse along single crystal			ZE, ZL & ZM are from recrystallized ends				

Columbite-Tantalite Group

	East Beryl pegmatite 94-1a(c)			E Beryl 94-1a(d)		East Beryl pegmatite 94-1b					East Beryl pegmatite 94-2							
	YA	YB	YC	YF	AG	AA	AB	AC	AD	AE	KA	KB	KC	KE	KF	KG	KH	
FeO	14.99	16.60	16.05	15.09	14.56	13.44	13.76	14.22	13.81	11.07	13.91	14.45	15.45	16.06	15.95	16.26	13.98	
MnO	3.93	3.64	3.42	4.03	5.15	5.26	5.43	5.04	5.40	7.87	5.58	4.79	4.01	3.47	3.33	3.33	4.58	
TiO2	0.61	0.63	0.73	0.61	0.62	0.52	0.53	0.53	0.56	0.71	0.96	1.27	1.20	1.69	1.97	1.90	1.29	
Nb2O5	57.16	64.95	59.70	58.04	63.38	52.48	58.18	58.81	58.63	56.57	50.92	51.17	49.20	50.28	49.59	50.72	46.08	
Ta2O5	21.42	12.76	18.71	20.67	14.26	26.90	20.81	20.31	20.36	21.57	27.89	27.47	28.67	28.08	27.75	27.36	32.33	
SnO2	0.12	0.05	0.15	0.14	0.22	0.12	0.08	0.10	0.10	0.19	0.17	0.24	0.24	0.33	0.35	0.32	0.27	
WO3	0.32	0.70	0.49	0.26	0.52	0.42	0.40	0.39	0.40	0.49	0.44	0.40	0.15	0.30	0.28	0.24	0.10	
PbO	0.26	0.35	0.29	0.29	0.37	0.22	0.33	0.29	0.27	0.28	0.25	0.22	0.24	0.25	0.19	0.27	0.26	
ThO2	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	0.02	0.02	0.04	
UO2	0.00	0.00	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.05	0.02	0.03	0.03	0.32	
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.05	0.02	0.08	0.05	0.05	0.06	
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
Sc2O3	0.01	0.12	0.02	0.00	0.44	0.00	0.11	0.10	0.04	0.15	0.15	0.35	0.29	0.15	0.14	0.17	0.41	
CaO					0.00						0.03	0.03	0.03	0.03	0.04	0.03	0.10	
Total	98.81	99.78	99.56	99.12	99.95	99.35	99.62	99.79	99.57	98.89	100.37	100.48	99.55	100.75	99.70	100.69	99.82	
Structural formulae based on 6 oxygens																		
Fe	0.781	0.826	0.820	0.781	0.729	0.713	0.709	0.730	0.710	0.576	0.734	0.758	0.824	0.842	0.844	0.850	0.756	
Mn	0.207	0.183	0.177	0.211	0.261	0.283	0.283	0.262	0.281	0.415	0.298	0.254	0.217	0.184	0.178	0.176	0.251	
Ti	0.028	0.028	0.034	0.028	0.028	0.025	0.024	0.024	0.026	0.033	0.046	0.060	0.058	0.080	0.094	0.089	0.063	
Nb	1.609	1.748	1.649	1.623	1.715	1.506	1.620	1.631	1.630	1.592	1.452	1.451	1.419	1.425	1.418	1.433	1.347	
Ta	0.363	0.207	0.311	0.348	0.232	0.464	0.349	0.339	0.340	0.365	0.478	0.469	0.497	0.479	0.477	0.465	0.569	
Sn	0.003	0.001	0.004	0.003	0.005	0.003	0.002	0.002	0.003	0.005	0.004	0.006	0.006	0.008	0.009	0.008	0.007	
W	0.005	0.011	0.008	0.004	0.008	0.007	0.006	0.006	0.006	0.008	0.007	0.007	0.002	0.005	0.005	0.004	0.002	
Pb	0.004	0.006	0.005	0.005	0.006	0.004	0.005	0.005	0.004	0.005	0.004	0.004	0.004	0.004	0.003	0.005	0.005	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
U	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.005	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.001	0.002	0.001	0.001	0.002	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.000	0.006	0.001	0.000	0.023	0.000	0.006	0.005	0.002	0.008	0.008	0.019	0.016	0.008	0.008	0.009	0.023	
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.002	0.003	0.002	0.007	
Total	3.001	3.015	3.007	3.003	3.013	3.004	3.005	3.004	3.003	3.007	3.035	3.031	3.047	3.040	3.040	3.043	3.036	
Mn/(Mn+Fe)	0.210	0.182	0.177	0.213	0.264	0.284	0.286	0.264	0.284	0.419	0.289	0.251	0.208	0.180	0.175	0.172	0.249	
Ta/(Ta+Nb)	0.184	0.106	0.159	0.176	0.119	0.236	0.177	0.172	0.173	0.187	0.248	0.244	0.260	0.251	0.252	0.245	0.297	
Comments:	YB & YC			strongly zoned in parts such as at AA						all data from single unzoned grain								
	same inclusion in garnet																	

Columbite-Tantalite Group

	SW Beryl pegmatite 94-15A				East Beryl pegmatite 94-24				East Beryl pegmatite 94-24A				
	FG	CG	CH	CI	GF	GG	GI	GJ	ZH	ZJ	ZF	ZG	ZJ
FeO	13.37	14.29	15.44	15.01	14.04	14.51	12.10	12.68	13.15	13.22	13.14	14.17	13.72
MnO	4.70	4.05	4.49	4.39	8.16	7.79	9.21	8.92	6.90	7.13	7.28	6.91	7.43
TiO2	0.54	0.80	0.71	0.79	1.15	1.35	0.81	1.02	1.21	1.15	1.21	0.99	1.39
Nb2O5	41.48	47.79	65.82	59.95	69.88	67.81	67.27	66.47	63.96	67.43	70.61	66.62	68.37
Ta2O5	37.66	30.35	11.76	18.28	6.65	7.24	10.04	10.33	11.23	7.44	7.39	10.65	8.01
SnO2	0.24	0.41	0.19	0.30	0.00	0.03	0.00	0.02	0.03	0.02	0.02	0.00	0.00
WO3	0.16	0.48	0.35	0.29	0.62	0.64	0.46	0.75	0.51	0.55	0.63	0.55	0.82
PbO	0.50	0.41	0.59	0.52	0.28	0.34	0.28	0.28	0.30	0.32	0.29	0.29	0.38
ThO2	0.00	0.10	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.01	0.02
UO2	0.16	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00
Sb2O3	0.00	0.05	0.03	0.05									
Bi2O3													
Sc2O3	0.07	0.08	0.05	0.07									
CaO	0.14	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.03	0.03	0.03	0.04	0.03
Total	99.02	98.85	99.52	99.74	100.82	99.76	100.22	100.51	99.99	100.09	100.62	100.23	100.17
Structural formulae based on 6 oxygens													
Fe	0.752	0.777	0.768	0.765	0.674	0.707	0.592	0.620	0.646	0.639	0.631	0.695	0.666
Mn	0.268	0.223	0.226	0.227	0.397	0.384	0.457	0.442	0.343	0.349	0.354	0.343	0.365
Ti	0.027	0.039	0.032	0.036	0.050	0.059	0.036	0.045	0.053	0.050	0.052	0.044	0.061
Nb	1.261	1.405	1.769	1.652	1.814	1.786	1.781	1.758	1.767	1.833	1.834	1.767	1.794
Ta	0.689	0.537	0.190	0.303	0.104	0.115	0.160	0.164	0.181	0.118	0.115	0.170	0.126
Sn	0.006	0.011	0.005	0.007	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
W	0.003	0.008	0.005	0.005	0.009	0.010	0.007	0.011	0.008	0.008	0.009	0.008	0.012
Pb	0.009	0.007	0.009	0.009	0.004	0.005	0.004	0.004	0.005	0.005	0.004	0.005	0.006
Th	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.001	0.001	0.001									
Bi													
Sc	0.004	0.005	0.003	0.004									
Ca	0.010	0.003	0.003	0.003	0.002	0.002	0.003	0.003	0.002	0.002	0.002	0.003	0.002
Total	3.032	3.017	3.011	3.012	3.055	3.069	3.039	3.048	3.007	3.006	3.004	3.035	3.033
Mn/(Mn+Fe)	0.263	0.223	0.228	0.229	0.371	0.352	0.435	0.416	0.347	0.353	0.359	0.331	0.354
Ta/(Ta+Nb)	0.353	0.276	0.097	0.155	0.054	0.060	0.082	0.085	0.093	0.061	0.059	0.088	0.066
Comments:	incl. in cassiterite				F, G, I and J same grain core = J								

Columbite-Tantalite Group

	Separation Rapids pluton 94-29					Separation Rapids pluton 94-29A										
	XA	XB	XC	XD	XE	#1	#2	#3	#4	#5	BA	BB	BC	BD	BF	BG
FeO	14.16	11.89	11.24	11.87	12.09	13.83	15.17	14.44	12.74	14.10	14.29	14.17	13.58	14.08	13.78	13.97
MnO	4.80	5.84	5.98	5.68	5.66	3.65	4.19	4.02	5.43	5.54	5.14	5.09	4.81	5.56	5.89	5.31
TiO2	0.38	0.40	0.42	0.52	0.45	0.39	0.55	0.31	0.40	0.46	0.51	0.42	0.50	0.46	0.42	0.51
Nb2O5	60.13	46.47	39.88	45.38	46.93	48.58	60.51	55.22	47.89	62.61	54.90	55.36	44.23	59.20	58.22	58.22
Ta2O5	19.88	34.67	41.11	35.57	33.44	31.72	18.69	24.34	31.68	16.01	23.69	23.95	36.59	19.31	20.25	19.58
SnO2	0.03	0.05	0.05	0.07	0.07	0.01	0.04	0.03	0.05	0.06	0.34	0.07	0.10	0.02	0.00	0.08
WO3	0.53	0.43	0.43	0.47	0.47	0.47	0.51	0.41	0.47	0.46	0.49	0.46	0.50	0.68	0.32	0.44
PbO	0.26	0.20	0.21	0.19	0.20	0.22	0.31	0.26	0.26	0.31	0.41	0.13	0.25	0.20	0.49	0.55
ThO2	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	0.24	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.02	0.11	0.00	0.04
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.46
Sc2O3	0.00	0.00	0.03	0.06	0.05	0.11	0.16	0.11	0.00	0.00	0.12	0.00	0.00	0.00	0.40	0.10
CaO																
Total	100.17	99.95	99.35	99.80	99.36	98.98	100.13	99.12	98.91	99.55	100.12	99.65	100.57	99.62	100.01	99.25
Structural formulae based on 6 oxygens																
Fe	0.721	0.648	0.637	0.651	0.660	0.752	0.770	0.759	0.695	0.712	0.745	0.740	0.744	0.722	0.707	0.723
Mn	0.248	0.323	0.343	0.316	0.313	0.201	0.215	0.214	0.300	0.283	0.271	0.269	0.267	0.289	0.306	0.278
Ti	0.017	0.020	0.022	0.026	0.022	0.019	0.025	0.015	0.020	0.021	0.024	0.020	0.024	0.021	0.020	0.024
Nb	1.656	1.370	1.221	1.345	1.385	1.428	1.660	1.569	1.412	1.710	1.547	1.563	1.310	1.641	1.616	1.629
Ta	0.329	0.615	0.757	0.634	0.594	0.561	0.308	0.416	0.562	0.263	0.402	0.407	0.652	0.322	0.338	0.330
Sn	0.001	0.001	0.001	0.002	0.002	0.000	0.001	0.001	0.001	0.001	0.009	0.002	0.003	0.000	0.000	0.002
W	0.008	0.007	0.008	0.008	0.008	0.008	0.008	0.007	0.008	0.007	0.008	0.007	0.008	0.011	0.005	0.007
Pb	0.004	0.003	0.004	0.003	0.003	0.004	0.005	0.004	0.004	0.005	0.007	0.002	0.004	0.003	0.008	0.009
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.007
Sc	0.000	0.000	0.002	0.003	0.003	0.006	0.008	0.006	0.000	0.000	0.006	0.000	0.000	0.000	0.021	0.005
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	2.986	2.987	2.994	2.987	2.990	2.979	3.001	2.991	3.002	3.003	3.023	3.009	3.013	3.011	3.025	3.015
Mn/(Mn+Fe)	0.256	0.332	0.350	0.327	0.322	0.211	0.219	0.220	0.301	0.284	0.267	0.267	0.264	0.286	0.302	0.278
Ta/(Ta+Nb)	0.166	0.310	0.383	0.320	0.300	0.282	0.157	0.210	0.285	0.133	0.206	0.207	0.332	0.164	0.173	0.168
Comments:	XA - XE same grain unzoned apart from patchy zonation at one end										BA - BC same grain					

Columbite-Tantalite Group

Separation Rapids pluton																
94-29A																
	BM	BN	BV	BW	BR	BS	BU	AA	AB	AE	AF	AG	AH	AI	AJ	AK
FeO	13.50	14.71	10.95	11.80	13.91	14.25	13.61	15.67	15.59	15.78	15.55	15.47	14.24	14.84	15.81	15.19
MnO	6.51	5.50	5.02	5.79	5.45	5.21	4.85	4.46	4.34	4.36	4.39	4.23	4.05	4.04	4.17	4.15
TiO2	0.51	0.58	0.23	0.32	0.39	0.44	0.37	0.76	0.88	0.49	0.50	0.39	0.34	0.32	0.53	0.39
Nb2O5	63.20	64.07	24.83	32.05	53.11	53.95	42.29	67.89	67.30	65.08	64.11	61.06	47.45	53.37	64.90	56.99
Ta2O5	14.45	12.99	56.66	50.48	26.99	25.93	38.93	9.28	9.30	13.04	14.19	18.19	32.99	26.05	12.88	21.69
SnO2	0.00	0.00	0.03	0.14	0.14	0.00	0.15	0.05	0.08	0.03	0.02	0.04	0.07	0.04	0.04	0.05
WO3	0.47	0.62	0.00	0.08	0.54	0.21	0.32	0.67	1.02	0.65	0.10	0.24	0.17	0.44	0.52	0.53
PbO	0.11	0.43	0.00	0.00	0.00	0.08	0.00	0.42	0.35	0.30	0.42	0.39	0.24	0.25	0.41	0.42
ThO2	0.00	0.00	0.14	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
UO2	0.36	0.22	0.00	0.20	0.06	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Sb2O3	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.03	0.37	0.00	0.23	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.23	0.00	0.25	0.00	0.00	0.00	0.00	0.01	0.22	0.00	0.13	0.09	0.00	0.06	0.00	0.17
CaO																
Total	99.37	99.48	98.20	101.08	100.86	100.21	100.51	99.19	99.08	99.73	99.39	100.09	99.55	99.43	99.26	99.57
Structural formulae based on 6 oxygens																
Fe	0.679	0.739	0.680	0.688	0.728	0.746	0.753	0.773	0.769	0.787	0.780	0.785	0.775	0.785	0.792	0.788
Mn	0.332	0.280	0.315	0.342	0.289	0.276	0.272	0.223	0.217	0.220	0.223	0.217	0.224	0.217	0.211	0.218
Ti	0.023	0.026	0.013	0.017	0.018	0.021	0.018	0.033	0.039	0.022	0.022	0.018	0.016	0.015	0.024	0.018
Nb	1.720	1.740	0.833	1.009	1.503	1.527	1.265	1.810	1.796	1.754	1.740	1.674	1.397	1.526	1.757	1.598
Ta	0.236	0.212	1.144	0.956	0.459	0.441	0.701	0.149	0.149	0.211	0.232	0.300	0.584	0.448	0.210	0.366
Sn	0.000	0.000	0.001	0.004	0.003	0.000	0.004	0.001	0.002	0.001	0.000	0.001	0.002	0.001	0.001	0.001
W	0.007	0.010	0.000	0.001	0.009	0.003	0.005	0.010	0.016	0.010	0.002	0.004	0.003	0.007	0.008	0.009
Pb	0.002	0.007	0.000	0.000	0.000	0.001	0.000	0.007	0.006	0.005	0.007	0.006	0.004	0.004	0.007	0.007
Th	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.005	0.003	0.000	0.003	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.006	0.000	0.004	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.012	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.007	0.005	0.000	0.003	0.000	0.009
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.017	3.021	3.008	3.023	3.015	3.018	3.019	3.006	3.005	3.009	3.013	3.010	3.005	3.007	3.009	3.014
Mn/(Mn+Fe)	0.328	0.275	0.317	0.332	0.284	0.270	0.265	0.224	0.220	0.219	0.222	0.217	0.224	0.216	0.211	0.217
Ta/(Ta+Nb)	0.121	0.109	0.579	0.487	0.234	0.224	0.356	0.076	0.077	0.108	0.117	0.152	0.295	0.227	0.107	0.186
Comments:	BM & BN same grain	BV, BW, BR & BS core inter. rim rim secondary						AA & AB same grain	complex zoning				AF, AG & AH same grain	AJ & AK same grain patchy zoned		

Columbite-Tantalite Group

	Pegmatite 1 94-34					Pegmatite 1 94-34C					Marko's pegmatite 94-44A				
	LC	LD	LI	CD	CE	GJ	GM	GN	GQ	GR	VB	VQ	VR	VT	VX
FeO	11.20	10.93	12.49	13.06	13.15	11.89	11.78	12.14	12.67	11.94	1.95	2.27	2.26	2.26	2.18
MnO	5.66	5.80	5.86	6.42	6.89	6.36	6.48	6.55	6.49	6.50	14.36	13.06	13.29	13.32	13.68
TiO2	0.44	0.55	0.43	0.51	0.61	0.40	0.45	0.40	0.43	0.43	1.61	1.27	1.29	1.25	1.10
Nb2O5	37.85	33.85	52.71	56.33	57.91	55.02	54.27	55.04	52.60	52.62	24.23	17.37	18.08	18.31	19.41
Ta2O5	42.80	47.25	26.84	23.00	20.05	25.60	25.64	25.03	26.57	26.56	54.36	61.41	62.53	62.28	60.47
SnO2	0.20	0.33	0.16	0.05	0.07	0.11	0.17	0.13	0.13	0.13	0.40	2.27	0.49	0.50	1.31
WO3	0.11	0.12	0.22	0.50	0.64	0.21	0.44	0.27	0.35	0.35	0.49	0.25	0.23	0.18	0.22
PbO	0.41	0.40	0.58	0.29	0.34	0.21	0.28	0.22	0.24	0.24	0.08	0.13	0.07	0.18	0.10
ThO2	0.01	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00
UO2	0.24	0.10	0.13	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.12	0.00	0.06	0.00
Sb2O3	0.06	0.08	0.06	0.00	0.00	0.05	0.03	0.03	0.05	0.05					
Bi2O3				0.00	0.00										
Sc2O3	0.03	0.07	0.02	0.11	0.05	0.02	0.02	0.00	0.02	0.02					
CaO	0.14	0.14	0.14	0.02	0.00	0.03	0.06	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00
Total	99.15	99.65	99.64	100.26	99.70	99.91	99.68	99.87	99.59	98.88	98.99	99.46	99.60	99.71	99.85
Structural formulae based on 6 oxygens															
Fe	0.643	0.637	0.662	0.675	0.677	0.622	0.619	0.635	0.671	0.636	0.118	0.143	0.142	0.142	0.136
Mn	0.329	0.342	0.315	0.336	0.359	0.337	0.345	0.347	0.348	0.351	0.882	0.834	0.846	0.847	0.862
Ti	0.023	0.029	0.021	0.024	0.028	0.019	0.021	0.019	0.020	0.021	0.088	0.072	0.073	0.071	0.062
Nb	1.175	1.067	1.511	1.574	1.610	1.556	1.542	1.556	1.505	1.515	0.826	0.616	0.639	0.646	0.679
Ta	0.799	0.896	0.463	0.387	0.335	0.435	0.438	0.426	0.457	0.460	1.083	1.272	1.290	1.284	1.236
Sn	0.005	0.009	0.004	0.001	0.002	0.003	0.004	0.003	0.003	0.003	0.012	0.068	0.015	0.015	0.039
W	0.002	0.002	0.004	0.008	0.010	0.003	0.007	0.004	0.006	0.006	0.009	0.005	0.004	0.004	0.004
Pb	0.008	0.008	0.010	0.005	0.006	0.004	0.005	0.004	0.004	0.004	0.002	0.003	0.001	0.004	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.004	0.002	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000
Sb	0.002	0.002	0.002	0.000	0.000	0.001	0.001	0.001	0.001	0.001					
Bi				0.000	0.000										
Sc	0.002	0.004	0.001	0.006	0.003	0.001	0.001	0.000	0.001	0.001					
Ca	0.010	0.010	0.010	0.001	0.000	0.002	0.004	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000
Total	3.001	3.009	3.004	3.016	3.030	2.983	2.988	2.996	3.019	3.000	3.019	3.016	3.010	3.012	3.019
Mn/(Mn+Fe)	0.339	0.350	0.322	0.333	0.347	0.351	0.358	0.353	0.342	0.355	0.882	0.854	0.856	0.857	0.864
Ta/(Ta+Nb)	0.405	0.456	0.234	0.197	0.172	0.219	0.221	0.215	0.233	0.233	0.567	0.674	0.669	0.665	0.645
Comments:				CD & CE same grain				isolated grains						all from single grain intergrown with wadginitite and microlite	

Columbite-Tantalite Group

	Marko's pegmatite 94-44C				Marko's pegmatite 94-44D			Marko's pegmatite 94-44E1		
	YC	YG	YH	YL	BB	BC	BE	KE	KF	KJ
FeO	2.38	2.22	2.17	2.24	2.09	2.34	2.30	2.16	2.06	3.21
MnO	14.49	14.50	15.02	14.53	14.60	14.24	14.19	14.84	14.52	14.93
TiO2	1.83	0.84	0.87	0.74	1.03	1.14	0.79	0.88	1.00	2.59
Nb2O5	32.68	31.54	31.81	31.88	32.60	32.90	30.30	24.77	27.26	54.91
Ta2O5	46.74	51.32	50.21	49.75	47.95	47.63	50.78	57.44	54.63	23.18
SnO2	0.50	0.15	0.17	0.22	0.28	0.31	0.19	0.12	0.15	0.25
WO3	0.34	0.15	0.27	0.15	0.54	0.74	0.77	0.30	0.31	0.73
PbO	0.25	0.16	0.18	0.16	0.19	0.16	0.16	0.11	0.10	0.35
ThO2	0.00	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.02
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
Sb2O3					0.00	0.00	0.00			
Bi2O3					0.00	0.00	0.00			
Sc2O3					0.06	0.00	0.00			
CaO	0.05	0.07	0.05	0.11	0.03	0.05	0.03	0.07	0.18	0.52
Total	99.26	100.97	100.75	99.84	99.38	99.52	99.52	100.68	100.23	100.76
Structural formulae based on 6 oxygens										
Fe	0.138	0.129	0.126	0.131	0.122	0.136	0.136	0.130	0.123	0.164
Mn	0.851	0.854	0.884	0.862	0.864	0.839	0.851	0.906	0.878	0.770
Ti	0.095	0.044	0.045	0.039	0.054	0.060	0.042	0.048	0.054	0.119
Nb	1.025	0.991	0.999	1.010	1.029	1.035	0.970	0.808	0.880	1.512
Ta	0.882	0.970	0.948	0.948	0.911	0.901	0.978	1.127	1.060	0.384
Sn	0.014	0.004	0.005	0.006	0.008	0.009	0.005	0.003	0.004	0.006
W	0.006	0.003	0.005	0.003	0.010	0.013	0.014	0.006	0.006	0.011
Pb	0.005	0.003	0.003	0.003	0.004	0.003	0.003	0.002	0.002	0.006
Th	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Sb					0.000	0.000	0.000			
Bi					0.000	0.000	0.000			
Sc					0.004	0.000	0.000			
Ca	0.004	0.005	0.004	0.008	0.002	0.004	0.002	0.006	0.014	0.034
Total	3.019	3.004	3.019	3.012	3.007	3.000	3.003	3.036	3.021	3.007
Mn/(Mn+Fe)	0.860	0.869	0.875	0.868	0.876	0.860	0.862	0.874	0.877	0.825
Ta/(Ta+Nb)	0.462	0.495	0.487	0.484	0.469	0.465	0.502	0.582	0.547	0.203
Comments:	YG & YH same grain		in cluster with cass.		BB - BE same grain minor patchy zonation			coarse part	fine part	

Columbite-Tantalite Group

Marko's pegmatite 94-44E2															
	HB	HI	HK	DA	DB	DC	DD	DE	DG	DH	DI	DX	DW	DJ	DK
FeO	2.31	2.31	2.46	1.74	1.69	2.29	2.33	2.06	1.81	1.82	1.89	1.94	1.79	1.73	1.92
MnO	13.22	13.00	13.07	13.72	13.52	12.72	12.63	12.79	13.66	13.94	13.99	14.06	13.81	14.38	14.00
TiO2	1.22	0.86	0.78	1.76	1.14	0.78	0.72	1.10	1.51	1.40	0.78	0.81	0.85	0.88	0.96
Nb2O5	18.34	16.23	15.65	26.23	24.72	17.39	16.30	19.28	24.72	28.63	27.55	27.09	24.55	29.38	26.60
Ta2O5	64.42	66.31	66.52	54.09	57.05	65.28	65.25	62.23	56.02	52.65	54.25	54.37	57.03	52.61	54.72
SnO2	0.56	0.49	0.43	0.36	0.54	0.38	1.09	0.65	0.80	0.37	0.21	0.25	0.24	0.19	0.30
WO3	0.00	0.00	0.00	0.79	0.76	0.57	0.53	0.70	0.77	0.74	0.80	0.81	0.80	0.85	0.81
PbO	0.12	0.10	0.02	0.18	0.12	0.12	0.05	0.13	0.13	0.07	0.04	0.08	0.17	0.15	0.09
ThO2	0.02	0.00	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
UO2	0.08	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
Sb2O3	0.06	0.06	0.06	0.01	0.00	0.01	0.00	0.03	0.00	0.00	0.02	0.00	0.01	0.00	0.02
Bi2O3				0.00	0.00	0.04	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.01	0.00
Sc2O3	0.02	0.03	0.06	0.07	0.02	0.04	0.08	0.08	0.02	0.00	0.00	0.03	0.00	0.17	0.00
CaO	0.05	0.05	0.04	0.05	0.12	0.11	0.03	0.09	0.04	0.01	0.03	0.03	0.05	0.03	0.07
Total	100.40	99.41	99.04	99.00	99.67	99.73	99.00	99.13	99.50	99.63	99.56	99.47	99.31	100.38	99.50
Structural formulae based on 6 oxygens															
Fe	0.145	0.148	0.159	0.105	0.103	0.146	0.150	0.130	0.110	0.108	0.114	0.117	0.110	0.102	0.116
Mn	0.839	0.845	0.855	0.838	0.833	0.820	0.824	0.816	0.839	0.838	0.852	0.858	0.857	0.860	0.856
Ti	0.069	0.050	0.045	0.095	0.062	0.044	0.042	0.062	0.082	0.075	0.042	0.044	0.047	0.047	0.052
Nb	0.621	0.563	0.547	0.855	0.813	0.598	0.567	0.657	0.811	0.919	0.895	0.883	0.813	0.937	0.868
Ta	1.312	1.384	1.398	1.060	1.128	1.351	1.366	1.275	1.105	1.017	1.061	1.066	1.136	1.009	1.074
Sn	0.017	0.015	0.013	0.010	0.016	0.012	0.033	0.020	0.023	0.010	0.006	0.007	0.007	0.005	0.009
W	0.000	0.000	0.000	0.015	0.014	0.011	0.010	0.014	0.014	0.014	0.015	0.015	0.015	0.016	0.015
Pb	0.002	0.002	0.000	0.004	0.002	0.002	0.001	0.003	0.003	0.001	0.001	0.002	0.003	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Bi				0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.004	0.001	0.002	0.005	0.005	0.001	0.000	0.000	0.002	0.000	0.011	0.000
Ca	0.004	0.004	0.003	0.004	0.009	0.009	0.002	0.007	0.003	0.001	0.002	0.002	0.004	0.002	0.006
Total	3.012	3.013	3.023	2.990	2.981	2.996	3.001	2.989	2.992	2.984	2.988	2.995	2.992	2.992	2.997
Mn/(Mn+Fe)	0.853	0.851	0.843	0.889	0.890	0.849	0.846	0.863	0.884	0.886	0.882	0.880	0.886	0.894	0.881
Ta/(Ta+Nb)	0.679	0.711	0.719	0.554	0.581	0.693	0.707	0.660	0.577	0.525	0.542	0.547	0.583	0.519	0.553
Comments:	same area as DE			DA - DH exsolution in microlite DC & DD same inclusion			core of incl. in microlite			DI & DX rim to DE		same as DI		exsolution in microlite	

Columbite-Tantalite Group

Marko's pegmatite 94-44E2															
	DL	DR	DM	DN	DO	DP	DQ	DS	DT	DU	EA	EB	EI	EJ	EK
FeO	2.10	1.99	1.81	2.09	1.88	1.96	2.04	2.21	2.45	2.09	2.20	2.05	1.77	2.21	2.15
MnO	14.35	12.44	14.41	14.04	13.77	13.23	14.34	13.05	12.41	13.68	12.84	12.91	13.20	12.79	12.84
TiO2	0.71	0.98	0.85	0.84	2.05	0.71	0.86	1.10	0.62	0.82	0.69	0.71	0.60	0.67	0.70
Nb2O5	31.13	19.57	29.44	27.88	27.88	19.88	31.30	19.14	16.11	26.83	16.89	16.85	16.90	16.63	16.80
Ta2O5	50.15	61.17	51.75	53.77	51.04	61.85	50.38	62.45	66.63	54.89	66.02	65.45	66.61	65.62	65.80
SnO2	0.15	0.45	0.25	0.25	1.18	1.04	0.17	0.54	0.76	0.24	0.44	0.55	0.27	1.04	0.45
WO3	0.84	0.65	0.90	0.82	0.89	0.51	0.83	0.64	0.48	0.73	0.58	0.62	0.43	0.55	0.54
PbO	0.12	0.16	0.11	0.11	0.11	0.12	0.16	0.09	0.02	0.18	0.10	0.14	0.13	0.10	0.10
ThO2	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
UO2	0.00	0.09	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
Sb2O3	0.00	0.46	0.00	0.00	0.00	0.00	0.01	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.11
Bi2O3	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.06	0.03	0.00	0.31	0.04	0.06	0.16	0.06	0.01	0.07	0.15	0.09	0.00	0.15	0.00
CaO	0.02	0.73	0.02	0.03	0.03	0.01	0.03	0.01	0.15	0.01	0.03	0.04	0.03	0.03	0.02
Total	99.65	98.72	99.53	100.13	98.89	99.39	100.29	99.30	99.72	99.53	99.95	99.39	99.94	99.80	99.51
Structural formulae based on 6 oxygens															
Fe	0.124	0.125	0.107	0.124	0.112	0.123	0.119	0.139	0.157	0.126	0.140	0.131	0.113	0.141	0.138
Mn	0.856	0.796	0.868	0.847	0.830	0.843	0.849	0.832	0.807	0.837	0.828	0.837	0.854	0.827	0.833
Ti	0.038	0.056	0.046	0.045	0.110	0.040	0.045	0.062	0.036	0.044	0.040	0.041	0.034	0.039	0.040
Nb	0.991	0.668	0.946	0.898	0.897	0.676	0.989	0.652	0.559	0.876	0.582	0.583	0.583	0.574	0.582
Ta	0.961	1.257	1.000	1.041	0.988	1.265	0.957	1.279	1.390	1.078	1.367	1.363	1.383	1.362	1.370
Sn	0.004	0.013	0.007	0.007	0.033	0.031	0.005	0.016	0.023	0.007	0.013	0.017	0.008	0.032	0.014
W	0.015	0.013	0.017	0.015	0.016	0.010	0.015	0.013	0.010	0.014	0.011	0.012	0.009	0.011	0.011
Pb	0.002	0.003	0.002	0.002	0.002	0.002	0.003	0.002	0.000	0.003	0.002	0.003	0.003	0.002	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.004
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.002	0.000	0.019	0.002	0.004	0.010	0.004	0.001	0.004	0.010	0.006	0.000	0.010	0.000
Ca	0.002	0.059	0.001	0.003	0.002	0.000	0.003	0.001	0.012	0.000	0.002	0.003	0.002	0.003	0.001
Total	2.997	3.008	2.994	3.000	2.994	2.995	2.995	2.999	2.997	2.989	2.996	2.996	2.990	3.000	2.995
Mn/(Mn+Fe)	0.874	0.864	0.890	0.872	0.881	0.872	0.877	0.857	0.837	0.869	0.856	0.865	0.883	0.854	0.858
Ta/(Ta+Nb)	0.492	0.653	0.514	0.537	0.524	0.652	0.492	0.662	0.713	0.552	0.702	0.700	0.703	0.704	0.702
Comments:	DL & DR col. part rest microlite	exsolution in microlite	over- growth on microlite	exsol.		DP & DQ same grain core	rim		DT & DU large inclusion in microlite		EA - EK large primary Mn col. enclosed by microlite				

Columbite-Tantalite Group

Marko's pegmatite																
94-44E2																
	EC	ED	EE	EH	EL	EM	AC	AD	AE	AF	AG	AH	AI	AJ	AK	
FeO	2.03	1.98	1.89	2.06	1.80	1.88	2.81	2.80	2.05	2.21	2.04	2.31	2.21	2.24	2.16	
MnO	13.71	13.78	13.86	13.50	13.99	13.70	15.33	15.37	13.41	14.75	14.25	13.09	13.16	13.12	14.90	
TiO2	1.29	1.07	0.78	1.62	1.61	1.64	0.77	1.05	0.80	0.47	0.46	0.94	1.07	1.03	0.48	
Nb2O5	26.31	27.11	24.80	26.00	26.80	26.49	48.78	50.12	21.36	35.65	29.74	20.22	19.55	19.95	36.76	
Ta2O5	54.73	54.10	56.85	54.45	53.41	53.95	30.85	28.61	61.00	46.31	52.46	62.07	62.88	62.51	45.02	
SnO2	0.64	0.26	0.20	0.56	0.40	0.55	0.15	0.24	0.29	0.13	0.10	0.32	0.40	0.37	0.13	
WO3	0.69	0.83	0.76	0.96	0.87	0.79	0.74	0.80	0.53	0.60	0.49	0.50	0.57	0.49	0.54	
PbO	0.15	0.18	0.11	0.19	0.06	0.13	0.00	0.20	0.10	0.20	0.17	0.09	0.14	0.22	0.14	
ThO2	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	
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	
Sb2O3	0.01	0.04	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.01	
Bi2O3	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
Sc2O3	0.14	0.01	0.04	0.03	0.29	0.18	0.02	0.00	0.10	0.07	0.11	0.00	0.09	0.06	0.00	
CaO	0.05	0.02	0.04	0.04	0.03	0.02	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.00	
Total	99.77	99.38	99.36	99.42	99.30	99.34	99.46	99.20	99.65	100.40	99.86	99.60	100.12	100.01	100.13	
Structural formulae based on 6 oxygens																
Fe	0.122	0.119	0.116	0.124	0.108	0.113	0.151	0.150	0.127	0.127	0.121	0.144	0.138	0.140	0.123	
Mn	0.834	0.840	0.858	0.823	0.848	0.833	0.835	0.832	0.845	0.856	0.858	0.830	0.832	0.829	0.862	
Ti	0.070	0.058	0.043	0.088	0.087	0.088	0.037	0.051	0.045	0.024	0.025	0.053	0.060	0.058	0.024	
Nb	0.854	0.883	0.820	0.846	0.867	0.859	1.418	1.448	0.718	1.105	0.956	0.684	0.660	0.673	1.135	
Ta	1.069	1.060	1.130	1.066	1.040	1.053	0.539	0.497	1.233	0.863	1.014	1.263	1.276	1.268	0.836	
Sn	0.018	0.008	0.006	0.016	0.012	0.016	0.004	0.006	0.008	0.004	0.003	0.009	0.012	0.011	0.003	
W	0.013	0.015	0.014	0.018	0.016	0.015	0.012	0.013	0.010	0.011	0.009	0.010	0.011	0.009	0.009	
Pb	0.003	0.003	0.002	0.004	0.001	0.003	0.000	0.003	0.002	0.004	0.003	0.002	0.003	0.004	0.003	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	
Sb	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.009	0.001	0.003	0.002	0.018	0.011	0.001	0.000	0.006	0.004	0.007	0.000	0.006	0.004	0.000	
Ca	0.004	0.001	0.003	0.003	0.002	0.002	0.001	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.000	
Total	2.996	2.989	2.996	2.990	2.999	2.993	2.998	3.000	2.996	2.997	2.997	2.998	2.999	2.998	2.997	
Mn/(Mn+Fe)	0.873	0.876	0.881	0.869	0.887	0.881	0.847	0.847	0.869	0.871	0.876	0.852	0.858	0.856	0.875	
Ta/(Ta+Nb)	0.556	0.546	0.580	0.557	0.545	0.551	0.276	0.256	0.632	0.439	0.515	0.649	0.659	0.653	0.424	
Comments:	EC - EM dark rim not mantled by microlite patchy replacement composition of EA - EK							AC - AK same grain complex multi-phase growth part horizontal trend and part vertical trend on quadrilateral								

Columbite-Tantalite Group

Marko's pegmatite 94-44E2													
	AL1	AL2	AL3	AL4	AL5	AL6	AL7	AL8	AL9	AL10	AL11	AL12	AL13
FeO	1.87	2.05	2.18	2.16	2.21	2.22	2.64	2.76	2.84	2.82	2.86	2.38	2.85
MnO	13.63	13.45	13.19	13.32	13.34	13.05	15.73	15.72	15.71	15.38	13.43	13.92	15.74
TiO2	0.74	0.98	0.94	0.94	0.94	0.95	0.99	0.69	0.76	0.72	0.77	0.68	0.62
Nb2O5	20.21	19.99	20.22	20.38	20.92	21.45	52.14	52.06	52.45	49.13	50.14	29.01	52.13
Ta2O5	62.28	61.71	61.71	62.15	61.63	60.65	26.47	26.64	26.25	29.74	27.33	51.94	26.59
SnO2	0.40	0.36	0.34	0.35	0.41	0.39	0.22	0.11	0.15	0.11	0.20	0.18	0.15
WO3	0.56	0.60	0.54	0.50	0.53	0.58	0.77	0.66	0.71	0.74	0.65	0.56	0.75
PbO	0.12	0.11	0.07	0.10	0.13	0.11	0.33	0.28	0.31	0.27	0.28	0.17	0.23
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.02	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00	0.16	0.02	0.02
Bi2O3	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
Sc2O3	0.07	0.08	0.00	0.09	0.04	0.09	0.14	0.00	0.10	0.04	0.08	0.05	0.17
CaO	0.02	0.02	0.00	0.04	0.00	0.05	0.03	0.05	0.03	0.01	1.62	0.02	0.02
Total	99.90	99.36	99.20	100.00	100.13	99.55	99.49	98.96	99.30	98.95	97.51	98.93	99.25

Structural formulae based on 6 oxygens

Fe	0.117	0.128	0.137	0.135	0.137	0.138	0.140	0.147	0.150	0.152	0.155	0.143	0.151
Mn	0.863	0.854	0.839	0.840	0.838	0.821	0.841	0.847	0.841	0.840	0.735	0.846	0.845
Ti	0.042	0.055	0.053	0.052	0.052	0.053	0.047	0.033	0.036	0.035	0.037	0.037	0.029
Nb	0.683	0.677	0.686	0.686	0.701	0.720	1.488	1.497	1.500	1.433	1.465	0.941	1.494
Ta	1.265	1.258	1.260	1.258	1.243	1.225	0.454	0.461	0.452	0.522	0.480	1.013	0.458
Sn	0.012	0.011	0.010	0.010	0.012	0.011	0.006	0.003	0.004	0.003	0.005	0.005	0.004
W	0.011	0.012	0.011	0.010	0.010	0.011	0.013	0.011	0.012	0.012	0.011	0.010	0.012
Pb	0.002	0.002	0.001	0.002	0.003	0.002	0.006	0.005	0.005	0.005	0.005	0.003	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.004	0.001	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.005	0.000	0.006	0.002	0.006	0.008	0.000	0.006	0.002	0.005	0.003	0.009
Ca	0.002	0.002	0.000	0.003	0.000	0.004	0.002	0.003	0.002	0.000	0.112	0.002	0.001
Total	3.000	3.005	2.997	3.000	2.998	2.992	3.004	3.006	3.007	3.005	3.014	3.004	3.009
Mn/(Mn+Fe)	0.881	0.869	0.860	0.862	0.859	0.856	0.858	0.852	0.849	0.847	0.826	0.856	0.848
Ta/(Ta+Nb)	0.650	0.650	0.647	0.647	0.639	0.630	0.234	0.235	0.231	0.267	0.247	0.518	0.235

Comments:

AL traverse 700 µm euhedral grain
2 distinct parts - patchy then Ta-rich overgrowth at each end
part horizontal trend and part vertical trend on quadrilateral

Columbite-Tantalite Group

Marko's pegmatite 94-44E2												
	AL14	AL15	AL16	AL17	AL18	AL19	AL20	AM2	AM3	AM4	AM5	AN
FeO	2.85	2.90	2.73	2.41	2.11	2.12	2.11	2.28	2.77	3.45	4.08	2.53
MnO	15.48	15.60	15.72	12.88	13.10	13.33	13.23	12.73	15.44	14.84	13.94	15.69
TiO2	0.68	0.68	0.94	0.86	0.90	0.92	0.92	0.61	0.86	1.19	1.22	1.20
Nb2O5	51.63	51.44	51.48	20.89	20.01	19.68	18.78	16.35	48.47	50.02	50.47	50.18
Ta2O5	27.42	27.39	26.63	60.58	61.91	62.53	63.70	66.37	30.26	27.87	28.01	27.41
SnO2	0.11	0.19	0.27	0.35	0.38	0.37	0.34	0.38	0.18	0.24	0.29	0.25
WO3	0.54	0.62	0.88	0.53	0.49	0.54	0.50	0.47	0.80	0.84	0.70	0.85
PbO	0.26	0.24	0.27	0.15	0.12	0.12	0.11	0.16	0.26	0.28	0.28	0.31
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00
Sb2O3	0.00	0.00	0.00	0.27	0.17	0.00	0.01	0.00	0.00	0.00	0.00	0.03
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.11	0.06	0.04	0.02	0.00	0.00	0.03	0.05	0.06	0.21	0.06	0.16
CaO	0.04	0.02	0.01	0.13	0.20	0.02	0.00	0.02	0.01	0.03	0.17	0.03
Total	99.11	99.15	98.98	99.05	99.39	99.63	99.74	99.42	99.10	98.97	99.25	98.63

Structural formulae based on 6 oxygens

Fe	0.152	0.154	0.145	0.151	0.132	0.133	0.133	0.147	0.149	0.184	0.217	0.135
Mn	0.834	0.842	0.847	0.817	0.833	0.847	0.844	0.830	0.844	0.802	0.752	0.850
Ti	0.032	0.033	0.045	0.049	0.051	0.052	0.052	0.035	0.042	0.057	0.058	0.058
Nb	1.486	1.481	1.480	0.708	0.679	0.668	0.640	0.569	1.414	1.444	1.452	1.452
Ta	0.475	0.474	0.461	1.235	1.263	1.276	1.305	1.388	0.531	0.484	0.485	0.477
Sn	0.003	0.005	0.007	0.010	0.011	0.011	0.010	0.012	0.005	0.006	0.007	0.006
W	0.009	0.010	0.015	0.010	0.010	0.011	0.010	0.009	0.013	0.014	0.011	0.014
Pb	0.004	0.004	0.005	0.003	0.002	0.002	0.002	0.003	0.005	0.005	0.005	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Sb	0.000	0.000	0.000	0.008	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.006	0.003	0.002	0.001	0.000	0.000	0.002	0.003	0.003	0.012	0.003	0.009
Ca	0.003	0.001	0.001	0.010	0.016	0.001	0.000	0.001	0.001	0.002	0.011	0.002
Total	3.004	3.008	3.007	3.002	3.003	3.001	2.999	2.997	3.007	3.011	3.003	3.010
Mn/(Mn+Fe)	0.846	0.845	0.854	0.844	0.863	0.864	0.864	0.850	0.850	0.813	0.776	0.863
Ta/(Ta+Nb)	0.242	0.243	0.237	0.636	0.651	0.656	0.671	0.709	0.273	0.251	0.250	0.247

Comments:

AM traverse
dark patchy 3-5, Ta-rich overgrowth 2

minor
patchy

Columbite-Tantalite Group

Marko's pegmatite									
94-44E2									
	AV1	AV2	AV3	AV5	AV6	AV7	AV8	AV9	AV10
FeO	1.94	2.07	2.04	2.13	2.19	2.11	2.10	2.22	2.20
MnO	13.49	13.37	13.06	12.49	12.74	12.32	12.81	12.93	12.91
TiO2	0.81	0.79	0.58	0.75	0.71	0.66	0.65	0.65	0.68
Nb2O5	22.72	22.59	17.42	15.16	16.02	16.32	16.62	16.81	16.82
Ta2O5	59.62	59.87	64.95	65.60	65.95	65.45	66.15	65.84	65.95
SnO2	0.41	0.17	0.78	2.58	1.58	0.68	1.03	0.27	0.24
WO3	0.47	0.56	0.49	0.48	0.53	0.47	0.42	0.53	0.49
PbO	0.15	0.11	0.09	0.07	0.05	0.06	0.12	0.17	0.14
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.03	0.00	0.00	0.00	0.40	0.00	0.03	0.01
Bi2O3	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00
Sc2O3	0.16	0.14	0.10	0.02	0.06	0.00	0.01	0.06	0.05
CaO	0.03	0.03	0.03	0.04	0.02	0.51	0.04	0.02	0.07
Total	99.79	99.72	99.52	99.30	99.89	99.01	99.95	99.51	99.55

Structural formulae based on 6 oxygens

Fe	0.120	0.128	0.130	0.137	0.140	0.136	0.134	0.142	0.141
Mn	0.841	0.836	0.844	0.817	0.826	0.804	0.829	0.839	0.837
Ti	0.045	0.044	0.033	0.043	0.041	0.038	0.037	0.038	0.039
Nb	0.757	0.754	0.601	0.529	0.554	0.568	0.574	0.582	0.582
Ta	1.194	1.202	1.347	1.377	1.372	1.371	1.374	1.371	1.373
Sn	0.012	0.005	0.024	0.079	0.048	0.021	0.031	0.008	0.007
W	0.009	0.011	0.010	0.010	0.011	0.009	0.008	0.010	0.010
Pb	0.003	0.002	0.002	0.001	0.001	0.001	0.003	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.001	0.000	0.000	0.000	0.013	0.000	0.001	0.000
Bi	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Sc	0.010	0.009	0.007	0.001	0.004	0.000	0.001	0.004	0.003
Ca	0.002	0.003	0.002	0.003	0.002	0.042	0.003	0.002	0.005
Total	2.993	2.992	2.999	2.998	2.999	3.005	2.993	3.001	3.000
Mn/(Mn+Fe)	0.875	0.867	0.866	0.856	0.855	0.856	0.861	0.855	0.856
Ta/(Ta+Nb)	0.612	0.615	0.692	0.723	0.712	0.707	0.705	0.702	0.702

Comments: AV traverse - covers same part as 2 of AM traverse
 very faint patchy zoning in Ta-rich overgrowth

Columbite-Tantalite Group

	Marko's pegmatite 94-44G				Marko's 94-44I		Marko's pegmatite 94-44K								
	IA	IB	IC	IE	IF	XO	CB	CF	ZJ	QA	QD	QE	QN	QP	QS
FeO	5.52	7.21	6.77	6.22	6.55	11.65	5.03	4.55	3.37	3.22	3.21	3.33	2.99	3.02	3.10
MnO	12.89	11.82	11.94	11.60	11.72	5.73	12.31	11.94	13.13	14.41	13.23	13.02	13.29	13.29	13.25
TiO2	0.91	1.17	1.86	1.16	1.92	1.01	1.91	2.74	2.08	1.47	1.06	1.46	1.70	1.16	1.26
Nb2O5	51.45	49.99	53.17	51.02	52.60	45.38	40.32	29.36	26.32	39.97	25.50	26.48	27.21	25.94	25.74
Ta2O5	28.68	29.01	25.14	29.09	25.69	33.52	39.73	49.91	54.13	38.66	56.07	53.38	52.45	54.68	54.46
SnO2	0.25	0.22	0.35	0.28	0.39	0.24	0.72	0.69	0.42	0.33	0.37	0.45	0.51	0.39	0.40
WO3	0.50	0.57	0.58	0.57	0.77	0.33	0.00	0.00	0.00	0.42	0.34	0.51	0.66	0.40	0.43
PbO	0.25	0.29	0.34	0.23	0.33	0.40	0.14	0.13	0.15	0.31	0.15	0.24	0.21	0.18	0.21
ThO2	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00
UO2	0.19	0.03	0.32	0.00	0.21	0.10	0.00	0.00	0.00	0.08	0.09	0.24	0.09	0.09	0.06
Sb2O3	0.05	0.03	0.06	0.05	0.06	0.05				0.06	0.08	0.23	0.06	0.08	0.08
Bi2O3															
Sc2O3	0.10	0.08	0.17	0.05	0.10	0.12	0.03	0.03	0.07	0.03	0.05	0.02	0.03	0.02	0.05
CaO	0.06	0.04	0.11	0.06	0.06	0.17	0.00	0.00	0.00	0.08	0.07	0.15	0.08	0.00	0.07
Total	100.85	100.47	100.83	100.34	100.41	98.70	100.19	99.35	99.67	99.07	100.23	99.51	99.28	99.25	99.11
Structural formulae based on 6 oxygens															
Fe	0.290	0.381	0.350	0.328	0.340	0.641	0.278	0.266	0.201	0.181	0.193	0.200	0.179	0.183	0.188
Mn	0.686	0.633	0.625	0.620	0.617	0.319	0.689	0.707	0.794	0.819	0.808	0.793	0.805	0.816	0.814
Ti	0.043	0.056	0.086	0.055	0.090	0.050	0.095	0.144	0.112	0.074	0.057	0.079	0.091	0.063	0.069
Nb	1.461	1.429	1.485	1.455	1.478	1.350	1.205	0.928	0.849	1.212	0.831	0.860	0.880	0.850	0.844
Ta	0.490	0.499	0.422	0.499	0.434	0.600	0.714	0.949	1.050	0.705	1.099	1.043	1.020	1.077	1.074
Sn	0.006	0.006	0.009	0.007	0.010	0.006	0.019	0.019	0.012	0.009	0.011	0.013	0.015	0.011	0.012
W	0.008	0.009	0.009	0.009	0.012	0.006	0.000	0.000	0.000	0.007	0.006	0.009	0.012	0.008	0.008
Pb	0.004	0.005	0.006	0.004	0.006	0.007	0.002	0.002	0.003	0.006	0.003	0.005	0.004	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.003	0.000	0.004	0.000	0.003	0.001	0.000	0.000	0.000	0.001	0.001	0.004	0.001	0.001	0.001
Sb	0.001	0.001	0.002	0.001	0.002	0.001				0.002	0.002	0.007	0.002	0.002	0.002
Bi															
Sc	0.005	0.004	0.009	0.003	0.005	0.007	0.002	0.002	0.004	0.002	0.003	0.001	0.002	0.001	0.003
Ca	0.004	0.003	0.007	0.004	0.004	0.012	0.000	0.000	0.000	0.006	0.005	0.012	0.006	0.000	0.005
Total	3.002	3.026	3.015	2.986	3.001	3.002	3.006	3.019	3.025	3.023	3.020	3.026	3.017	3.016	3.024
Mn/(Mn+Fe)	0.703	0.624	0.641	0.654	0.644	0.333	0.713	0.727	0.798	0.819	0.807	0.798	0.818	0.817	0.812
Ta/(Ta+Nb)	0.251	0.259	0.221	0.255	0.227	0.308	0.372	0.506	0.553	0.368	0.569	0.548	0.537	0.559	0.560
Comments:							CB, CF & CJ surround a large cassiterite grain all stuck to edge			QD - QS surround a large cassiterite grain stuck to partially stuck to edge mantled edge partially mantled					

Columbite-Tantalite Group

Marko's pegmatite 94-44MU5														
	BA	BB	BC	BE	BF3	BF4	BF5	BF9	BF10	BF11	BF13	BF14	BF15	BF16
FeO	4.64	4.15	4.27	3.84	4.00	3.95	3.81	3.61	4.41	4.64	3.89	3.93	3.90	4.01
MnO	13.26	13.80	13.33	13.00	13.66	13.52	13.78	13.33	12.55	12.96	13.03	13.78	13.22	13.31
TiO2	1.07	0.98	1.34	0.45	1.10	0.76	0.93	0.54	0.72	1.04	0.46	0.66	0.90	0.85
Nb2O5	48.91	50.80	50.56	38.38	49.09	49.09	48.71	40.30	40.45	51.60	39.59	50.00	44.20	45.78
Ta2O5	29.53	28.32	28.01	43.71	30.05	31.28	30.84	40.41	40.45	27.66	41.62	30.14	36.18	33.16
SnO2	0.37	0.13	0.00	0.07	0.41	0.09	0.17	0.00	0.00	0.06	0.06	0.14	0.09	0.18
WO3	0.96	0.38	0.77	0.22	0.72	0.48	0.61	0.57	0.63	0.75	0.61	0.44	0.53	0.72
PbO	0.52	0.49	0.44	0.19	0.51	0.00	0.71	0.49	0.47	0.32	0.36	0.00	0.71	0.46
ThO2	0.03	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.27	0.29
Sb2O3	0.14	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.05	0.00	0.08	0.00	0.01	0.07
Bi2O3	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.28	0.41	0.00	0.00	0.00	0.00	0.37
Sc2O3	0.00	0.99	0.71	0.17	0.00	0.15	0.26	0.12	0.67	0.16	0.50	0.00	0.00	0.54
CaO														
Total	100.00	100.11	99.42	100.04	99.53	99.32	99.89	99.67	100.81	99.18	100.21	99.09	99.99	99.74
Structural formulae based on 6 oxygens														
Fe	0.249	0.219	0.226	0.218	0.215	0.213	0.205	0.204	0.245	0.247	0.219	0.211	0.215	0.219
Mn	0.720	0.737	0.715	0.747	0.743	0.736	0.749	0.761	0.706	0.697	0.741	0.750	0.737	0.735
Ti	0.052	0.046	0.064	0.023	0.053	0.037	0.045	0.027	0.036	0.050	0.023	0.032	0.044	0.041
Nb	1.417	1.448	1.448	1.176	1.424	1.427	1.414	1.228	1.215	1.482	1.202	1.452	1.315	1.349
Ta	0.515	0.486	0.483	0.806	0.524	0.547	0.538	0.741	0.731	0.478	0.760	0.526	0.648	0.588
Sn	0.009	0.003	0.000	0.002	0.011	0.002	0.004	0.000	0.000	0.001	0.002	0.004	0.002	0.005
W	0.016	0.006	0.013	0.004	0.012	0.008	0.010	0.010	0.011	0.012	0.011	0.007	0.009	0.012
Pb	0.009	0.008	0.007	0.003	0.009	0.000	0.012	0.009	0.008	0.005	0.006	0.000	0.013	0.008
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004
Sb	0.004	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.002
Bi	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.005	0.007	0.000	0.000	0.000	0.000	0.006
Sc	0.000	0.054	0.039	0.010	0.000	0.009	0.015	0.007	0.039	0.009	0.029	0.000	0.000	0.031
Ca														
Total	2.999	3.009	2.995	2.989	2.990	2.979	2.994	2.993	3.000	2.981	2.995	2.982	2.987	3.000
Mn/(Mn+Fe)	0.743	0.771	0.760	0.774	0.776	0.776	0.785	0.789	0.742	0.739	0.772	0.780	0.775	0.771
Ta/(Ta+Nb)	0.266	0.251	0.250	0.407	0.269	0.277	0.276	0.376	0.376	0.244	0.387	0.266	0.330	0.303
Comments:	BA - BF complex zoned spectacular patchy zonation grain contains monazite light coloured BSE inclusions													

Columbite-Tantalite Group

	Marko's pegmatite 94-44MU5									Marko's pegmatite 94-44MU5(2)						
	BF18	BF19	BF20	BH2	BH3	BH4	BH17	BH19	BH20	AG	AJ	AK	AL	AM4	AM6	AM7
FeO	4.07	3.90	3.94	6.51	7.15	7.62	7.70	7.25	7.27	8.43	7.87	7.46	7.45	7.60	7.75	7.57
MnO	13.58	13.10	13.18	10.95	10.40	9.66	9.50	9.75	10.10	9.05	9.58	9.89	10.11	9.87	9.48	9.58
TiO2	1.17	0.88	0.77	2.21	2.22	2.89	2.92	2.53	1.91	3.17	2.65	2.67	2.50	2.97	2.83	2.77
Nb2O5	50.82	43.37	43.92	51.28	51.38	50.52	51.06	50.82	51.73	49.69	50.62	51.14	51.42	49.98	50.10	50.22
Ta2O5	28.58	37.03	36.85	25.79	25.80	25.33	25.76	25.72	26.04	25.17	26.20	24.97	25.16	25.81	25.79	25.49
SnO2	0.12	0.12	0.13	0.42	0.44	0.35	0.17	0.70	0.27	0.62	0.22	0.41	0.79	0.32	0.53	0.53
WO3	0.53	0.55	0.55	0.98	1.42	1.05	1.40	0.90	0.99	1.46	0.83	1.25	1.08	1.46	1.34	1.29
PbO	0.14	0.48	0.20	0.21	0.00	0.53	0.26	0.50	0.37	0.49	0.65	0.56	0.27	0.16	0.15	0.54
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.22	0.00	0.00
UO2	0.00	0.00	0.00	0.28	0.14	0.00	0.00	0.00	0.49	0.15	0.66	0.43	0.27	0.42	0.00	0.00
Sb2O3	0.07	0.00	0.07	0.00	0.15	0.19	0.00	0.00	0.05	0.27	0.00	0.00	0.00	0.07	0.21	0.00
Bi2O3	0.00	0.00	0.24	0.00	0.00	0.06	0.37	0.23	0.00	0.15	0.00	0.47	0.05	0.00	0.00	0.36
Sc2O3	0.00	0.33	0.00	1.23	0.55	0.98	0.52	0.75	0.41	0.29	0.00	0.00	0.61	0.17	0.85	1.21
CaO																
Total	99.06	99.75	99.85	99.84	99.65	99.18	99.67	99.15	99.63	99.09	99.29	99.24	99.71	99.06	99.03	99.54
Structural formulae based on 6 oxygens																
Fe	0.217	0.215	0.217	0.339	0.374	0.399	0.401	0.381	0.382	0.444	0.416	0.393	0.388	0.401	0.406	0.396
Mn	0.733	0.732	0.736	0.577	0.550	0.512	0.502	0.519	0.537	0.483	0.512	0.528	0.534	0.527	0.504	0.507
Ti	0.056	0.043	0.038	0.103	0.104	0.136	0.137	0.119	0.090	0.150	0.126	0.127	0.117	0.141	0.134	0.130
Nb	1.465	1.293	1.309	1.443	1.451	1.429	1.439	1.443	1.468	1.415	1.445	1.457	1.449	1.424	1.421	1.419
Ta	0.495	0.664	0.661	0.436	0.438	0.431	0.437	0.439	0.445	0.431	0.450	0.428	0.426	0.442	0.440	0.433
Sn	0.003	0.003	0.003	0.010	0.011	0.009	0.004	0.017	0.007	0.016	0.006	0.010	0.020	0.008	0.013	0.013
W	0.009	0.009	0.009	0.016	0.023	0.017	0.023	0.015	0.016	0.024	0.014	0.020	0.018	0.024	0.022	0.021
Pb	0.002	0.008	0.004	0.003	0.000	0.009	0.004	0.009	0.006	0.008	0.011	0.009	0.005	0.003	0.003	0.009
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.000
U	0.000	0.000	0.000	0.004	0.002	0.000	0.000	0.000	0.007	0.002	0.009	0.006	0.004	0.006	0.000	0.000
Sb	0.002	0.000	0.002	0.000	0.004	0.005	0.000	0.000	0.001	0.007	0.000	0.000	0.000	0.002	0.005	0.000
Bi	0.000	0.000	0.004	0.000	0.000	0.001	0.006	0.004	0.000	0.002	0.000	0.008	0.001	0.000	0.000	0.006
Sc	0.000	0.019	0.000	0.067	0.030	0.054	0.028	0.041	0.023	0.016	0.000	0.000	0.033	0.009	0.046	0.066
Ca																
Total	2.982	2.988	2.983	2.999	2.987	3.001	2.982	2.987	2.982	3.000	2.989	2.986	2.994	2.989	2.993	3.000
Mn/(Mn+Fe)	0.772	0.773	0.772	0.630	0.596	0.562	0.556	0.577	0.585	0.521	0.552	0.573	0.579	0.568	0.553	0.562
Ta/(Ta+Nb)	0.253	0.339	0.335	0.232	0.232	0.232	0.233	0.233	0.232	0.234	0.237	0.227	0.227	0.237	0.236	0.234

Comments:

BH large unzoned grain

no zonation observed

Columbite-Tantalite Group

Marko's pegmatite 94-44MU5(2)															
	AM8	AM9	AM12	AM13	AM14	AM15	AM16	AM17	AM18	AN1	AN2	AN3	AN4	AN6	AN7
FeO	7.78	7.76	8.12	8.23	7.94	7.33	7.76	8.17	8.10	7.18	7.51	7.73	7.74	7.42	7.52
MnO	9.57	9.67	9.38	9.04	9.35	9.92	9.43	9.29	9.39	10.07	9.65	9.52	9.60	9.76	9.66
TiO2	2.87	2.82	2.97	2.91	2.95	3.05	3.00	2.98	2.87	2.70	3.00	2.99	3.19	3.08	2.93
Nb2O5	50.99	50.85	50.43	50.13	50.45	50.33	50.37	50.64	51.18	51.22	50.38	49.70	50.07	49.56	50.34
Ta2O5	25.96	25.80	25.70	25.25	25.17	25.19	25.33	25.35	25.09	26.40	26.71	26.19	25.60	26.19	25.90
SnO2	0.46	0.37	0.18	0.56	0.23	0.54	0.27	0.69	0.56	0.45	0.12	0.72	0.55	0.59	0.32
WO3	1.46	1.12	0.78	1.17	1.35	0.82	1.35	0.63	1.13	1.14	1.16	0.74	1.48	1.26	1.19
PbO	0.69	0.27	0.27	0.30	0.32	0.25	0.71	0.79	0.66	0.19	0.04	0.67	0.40	0.44	0.58
ThO2	0.04	0.00	0.00	0.10	0.00	0.41	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.59	0.37	1.10	0.61	0.47	0.12	0.00	0.16	0.42	0.46	0.00	0.34	0.34	0.24
Sb2O3	0.13	0.17	0.14	0.16	0.08	0.00	0.09	0.03	0.06	0.00	0.26	0.23	0.20	0.12	0.00
Bi2O3	0.09	0.00	0.00	0.20	0.00	0.53	0.18	0.09	0.49	0.00	0.00	0.00	0.19	0.01	0.11
Sc2O3	0.78	0.20	1.35	0.69	0.77	0.34	0.39	0.19	0.07	0.00	0.00	0.50	0.37	0.44	0.50
CaO															
Total	100.82	99.62	99.68	99.82	99.22	99.17	99.00	99.00	99.79	99.76	99.27	98.99	99.75	99.21	99.29
Structural formulae based on 6 oxygens															
Fe	0.402	0.406	0.422	0.431	0.416	0.386	0.408	0.430	0.424	0.375	0.395	0.408	0.405	0.391	0.395
Mn	0.501	0.513	0.494	0.480	0.496	0.529	0.503	0.495	0.498	0.534	0.514	0.508	0.509	0.521	0.514
Ti	0.134	0.133	0.139	0.137	0.139	0.144	0.142	0.141	0.135	0.127	0.142	0.142	0.150	0.146	0.138
Nb	1.425	1.440	1.417	1.420	1.429	1.433	1.434	1.442	1.448	1.449	1.432	1.417	1.416	1.411	1.429
Ta	0.437	0.439	0.435	0.430	0.429	0.431	0.434	0.434	0.427	0.449	0.457	0.449	0.435	0.449	0.442
Sn	0.011	0.009	0.005	0.014	0.006	0.014	0.007	0.017	0.014	0.011	0.003	0.018	0.014	0.015	0.008
W	0.023	0.018	0.012	0.019	0.022	0.013	0.022	0.010	0.018	0.019	0.019	0.012	0.024	0.021	0.019
Pb	0.012	0.005	0.004	0.005	0.005	0.004	0.012	0.013	0.011	0.003	0.001	0.011	0.007	0.007	0.010
Th	0.001	0.000	0.000	0.001	0.000	0.006	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.008	0.005	0.015	0.009	0.007	0.002	0.000	0.002	0.006	0.006	0.000	0.005	0.005	0.003
Sb	0.003	0.004	0.003	0.004	0.002	0.000	0.002	0.001	0.002	0.000	0.007	0.006	0.005	0.003	0.000
Bi	0.001	0.000	0.000	0.003	0.000	0.009	0.003	0.001	0.008	0.000	0.000	0.000	0.003	0.000	0.002
Sc	0.042	0.011	0.073	0.038	0.042	0.018	0.022	0.011	0.004	0.000	0.000	0.028	0.020	0.024	0.027
Ca															
Total	2.992	2.987	3.010	2.997	2.994	2.994	2.991	2.999	2.992	2.972	2.975	3.000	2.993	2.991	2.989
Mn/(Mn+Fe)	0.555	0.558	0.539	0.527	0.544	0.578	0.552	0.535	0.540	0.587	0.566	0.555	0.557	0.571	0.566
Ta/(Ta+Nb)	0.234	0.234	0.235	0.233	0.231	0.231	0.232	0.231	0.228	0.237	0.242	0.241	0.235	0.241	0.236

Comments: no zonation observed

Columbite-Tantalite Group

	Marko's pegmatite 94-44MU5(2)							Marko's peg. 94-44N1			Marko's pegmatite 94-44N2					
	AN9	AO44	AO46	AO47	AO49	AO50	AO51	AA	AC	AO	BB	BD	BE	BG	BH	BP
FeO	7.76	7.73	8.15	8.10	7.53	8.08	7.73	3.47	3.11	3.44	6.70	6.61	6.32	7.01	8.13	7.04
MnO	9.66	9.90	9.26	9.39	9.73	9.37	9.47	13.92	12.43	13.65	11.72	11.37	11.81	11.66	10.23	11.18
TiO2	2.79	2.94	2.89	2.69	3.04	2.57	3.23	3.05	2.52	3.24	2.67	2.84	3.74	2.47	2.37	2.33
Nb2O5	49.41	49.92	51.07	51.70	51.11	51.88	50.67	39.24	32.68	36.32	49.06	48.02	47.19	49.73	51.99	50.04
Ta2O5	26.53	26.27	25.34	24.78	25.07	25.36	25.30	37.74	45.00	38.98	28.33	28.29	27.16	26.57	23.62	25.52
SnO2	0.50	0.34	0.47	0.50	0.44	0.51	0.42	1.09	0.72	0.95	0.57	0.60	0.55	0.41	0.47	0.55
WO3	1.26	1.25	1.28	1.19	1.17	1.14	1.52	0.53	0.55	0.75	0.67	0.73	0.69	0.67	0.74	0.68
PbO	0.00	0.55	0.00	0.24	0.61	0.79	0.93	0.36	0.27	0.41	0.33	0.38	0.47	0.32	0.55	0.52
ThO2	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00
UO2	0.42	0.00	0.42	0.31	0.51	0.00	0.00	0.29	0.59	0.46	0.13	0.32	0.53	0.19	0.18	0.13
Sb2O3	0.02	0.00	0.16	0.27	0.00	0.00	0.05				0.06	0.10	0.05	0.10	0.05	0.06
Bi2O3	0.49	0.45	0.00	0.04	0.37	0.25	0.00									
Sc2O3	0.58	0.68	0.41	0.16	0.00	0.32	0.53				0.07	0.12	0.08	0.08	0.17	0.15
CaO								0.07	0.19	0.05	0.04	0.06	0.04	0.06	0.04	0.04
Total	99.43	100.02	99.43	99.35	99.58	100.29	99.85	99.69	97.87	98.21	100.35	99.46	98.63	99.27	98.51	98.20
Structural formulae based on 6 oxygens																
Fe	0.409	0.404	0.425	0.423	0.395	0.420	0.403	0.192	0.181	0.195	0.352	0.351	0.337	0.370	0.428	0.375
Mn	0.515	0.524	0.490	0.497	0.517	0.493	0.500	0.779	0.735	0.783	0.623	0.611	0.637	0.624	0.545	0.603
Ti	0.132	0.138	0.136	0.127	0.143	0.120	0.151	0.151	0.132	0.165	0.126	0.136	0.179	0.117	0.112	0.112
Nb	1.407	1.411	1.441	1.461	1.448	1.459	1.427	1.171	1.031	1.112	1.393	1.378	1.358	1.420	1.479	1.441
Ta	0.454	0.446	0.430	0.421	0.427	0.429	0.429	0.678	0.854	0.718	0.484	0.488	0.470	0.456	0.404	0.442
Sn	0.013	0.008	0.012	0.012	0.011	0.013	0.011	0.029	0.020	0.026	0.014	0.015	0.014	0.010	0.012	0.014
W	0.021	0.020	0.021	0.019	0.019	0.018	0.025	0.009	0.010	0.013	0.011	0.012	0.011	0.011	0.012	0.011
Pb	0.000	0.009	0.000	0.004	0.010	0.013	0.016	0.006	0.005	0.007	0.006	0.006	0.008	0.005	0.009	0.009
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.006	0.000	0.006	0.004	0.007	0.000	0.000	0.004	0.009	0.007	0.002	0.005	0.008	0.003	0.003	0.002
Sb	0.001	0.000	0.004	0.007	0.000	0.000	0.001				0.002	0.003	0.001	0.003	0.001	0.002
Bi	0.008	0.007	0.000	0.001	0.006	0.004	0.000									
Sc	0.032	0.037	0.022	0.008	0.000	0.017	0.029				0.004	0.007	0.004	0.004	0.009	0.008
Ca								0.005	0.014	0.004	0.003	0.004	0.003	0.004	0.003	0.003
Total	2.997	3.005	2.986	2.986	2.984	2.988	2.990	3.024	2.992	3.030	3.018	3.016	3.031	3.029	3.018	3.021
Mn/(Mn+Fe)	0.558	0.565	0.535	0.540	0.567	0.540	0.554	0.802	0.802	0.801	0.639	0.635	0.654	0.628	0.560	0.617
Ta/(Ta+Nb)	0.244	0.240	0.230	0.224	0.228	0.227	0.231	0.367	0.453	0.392	0.258	0.262	0.257	0.243	0.215	0.235
Comments:								acicular	acicular		larger grains					
								grain	grain							

Columbite-Tantalite Group

	Marko's pegmatite 94-44N2								Marko's pegmatite 94-44P			
	BJ	BL	BM	BN	BO	BR	BS	BT	BV	DB	DE1	DE2
FeO	3.31	3.96	3.47	4.13	4.11	4.93	4.23	4.30	4.20	4.99	2.44	2.37
MnO	15.25	14.48	14.80	14.39	14.07	13.43	14.35	14.31	14.28	13.19	17.53	15.88
TiO2	1.20	1.20	1.18	1.30	2.31	2.23	0.86	1.73	2.11	2.15	1.22	1.35
Nb2O5	52.62	52.05	51.26	53.27	49.19	50.95	52.44	53.96	52.61	49.12	49.17	50.25
Ta2O5	25.32	25.53	27.20	23.74	26.70	25.01	25.72	22.67	23.39	28.01	28.26	28.69
SnO2	0.09	0.24	0.14	0.16	0.50	0.46	0.22	0.36	0.44	0.46	0.13	0.25
WO3	0.41	0.42	0.45	0.69	0.61	0.73	0.40	0.62	0.58	0.62	0.30	0.14
PbO	0.24	0.49	0.24	0.80	0.52	0.49	0.54	0.57	0.47	0.45	0.26	0.47
ThO2	0.00	0.00	0.00	0.04	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00
UO2	0.52	0.08	0.00	0.11	0.26	0.15	0.02	0.08	0.16	0.03	0.00	0.00
Sb2O3	0.07	0.08	0.06	0.08	0.08	0.08	0.06	0.05	0.10	0.08	0.05	0.05
Bi2O3												
Sc2O3	0.09	0.10	0.08	0.08	0.07	0.13	0.08	0.15	0.17	0.10	0.07	0.07
CaO	0.07	0.12	0.18	0.08	0.06	0.07	0.07	0.06	0.07	0.08	0.11	0.11
Total	99.19	98.75	99.06	98.87	98.43	98.60	98.92	98.81	98.52	99.20	99.43	99.65
Structural formulae based on 6 oxygens												
Fe	0.175	0.210	0.184	0.218	0.220	0.261	0.224	0.225	0.221	0.265	0.130	0.126
Mn	0.815	0.778	0.796	0.769	0.761	0.719	0.771	0.758	0.760	0.710	0.946	0.854
Ti	0.057	0.057	0.056	0.062	0.111	0.106	0.041	0.081	0.100	0.103	0.058	0.065
Nb	1.501	1.493	1.471	1.519	1.421	1.457	1.504	1.525	1.494	1.412	1.417	1.443
Ta	0.434	0.441	0.470	0.407	0.464	0.430	0.444	0.385	0.400	0.484	0.490	0.496
Sn	0.002	0.006	0.004	0.004	0.013	0.012	0.006	0.009	0.011	0.012	0.003	0.006
W	0.007	0.007	0.007	0.011	0.010	0.012	0.007	0.010	0.009	0.010	0.005	0.002
Pb	0.004	0.008	0.004	0.014	0.009	0.008	0.009	0.010	0.008	0.008	0.004	0.008
Th	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.007	0.001	0.000	0.002	0.004	0.002	0.000	0.001	0.002	0.000	0.000	0.000
Sb	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.003	0.002	0.001	0.001
Bi												
Sc	0.005	0.006	0.004	0.004	0.004	0.007	0.004	0.008	0.009	0.006	0.004	0.004
Ca	0.005	0.008	0.012	0.005	0.004	0.005	0.005	0.004	0.005	0.005	0.008	0.008
Total	3.014	3.017	3.011	3.017	3.022	3.021	3.016	3.018	3.021	3.017	3.066	3.013
Mn/(Mn+Fe)	0.824	0.787	0.812	0.779	0.776	0.734	0.775	0.771	0.775	0.728	0.879	0.871
Ta/(Ta+Nb)	0.224	0.228	0.242	0.211	0.246	0.228	0.228	0.202	0.211	0.255	0.257	0.256

Comments: smaller grains

Columbite-Tantalite Group

	Marko's pegmatite 94-44R						Marko's pegmatite 94-44U										
	DA	DE	DG	AA	AB	AC	QA	QB	QC	QD	QE	QF	QG	QI	QO	QQ	
FeO	2.10	2.02	1.98	3.84	4.14	6.75	3.37	4.35	6.64	3.88	4.68	4.81	3.68	5.58	3.51	7.00	
MnO	15.29	14.85	15.03	14.64	14.25	11.42	15.30	13.89	11.48	14.31	13.47	13.32	14.76	12.70	14.99	10.83	
TiO2	0.82	0.82	0.77	2.28	1.83	2.98	1.37	1.75	2.41	1.78	1.91	1.80	1.40	1.83	0.91	3.18	
Nb2O5	27.03	30.06	31.83	50.58	47.54	48.10	50.13	47.98	48.41	47.73	48.38	47.70	49.05	47.91	49.08	46.37	
Ta2O5	53.95	50.81	50.52	26.47	29.79	27.79	29.15	30.09	29.31	30.94	30.68	29.91	30.09	31.18	31.18	30.81	
SnO2	0.15	0.15	0.11	0.28	0.38	0.60	0.30	0.46	0.61	0.47	0.44	0.46	0.27	0.49	0.22	0.77	
WO3	0.25	0.45	0.38	0.81	0.54	0.61	0.59	0.61	0.58	0.61	0.61	0.56	0.55	0.51	0.52	0.49	
PbO	0.13	0.16	0.14	0.36	0.29	0.44	0.29	0.30	0.29	0.33	0.36	0.35	0.20	0.32	0.20	0.44	
ThO2	0.00	0.00	0.00	0.01	0.03	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.02	0.01	0.02	
UO2	0.00	0.00	0.00	0.26	0.08	0.37	0.00	0.10	0.10	0.13	0.26	0.08	0.00	0.06	0.00	0.53	
Sb2O3																	
Bi2O3																	
Sc2O3				0.13	0.10	0.10	0.08	0.08	0.07	0.00	0.08	0.07	0.08	0.03	0.05	0.05	
CaO	0.07	0.07	0.05	0.04	0.04	0.04	0.06	0.06	0.03	0.04	0.07	0.06	0.04	0.04	0.04	0.25	
Total	99.72	99.32	100.76	99.70	99.01	99.22	100.65	99.68	99.93	100.23	100.94	99.12	100.13	100.67	100.71	100.74	
Structural formulae based on 6 oxygens																	
Fe	0.126	0.120	0.115	0.202	0.223	0.359	0.178	0.233	0.352	0.207	0.247	0.259	0.196	0.296	0.187	0.370	
Mn	0.930	0.892	0.885	0.779	0.776	0.614	0.816	0.752	0.616	0.773	0.721	0.725	0.794	0.683	0.807	0.580	
Ti	0.044	0.044	0.040	0.108	0.089	0.142	0.065	0.084	0.115	0.085	0.091	0.087	0.067	0.087	0.043	0.151	
Nb	0.877	0.964	1.000	1.437	1.382	1.381	1.427	1.387	1.386	1.376	1.382	1.386	1.409	1.375	1.410	1.326	
Ta	1.053	0.980	0.955	0.452	0.521	0.480	0.499	0.523	0.505	0.537	0.527	0.523	0.520	0.538	0.539	0.530	
Sn	0.004	0.004	0.003	0.007	0.010	0.015	0.008	0.012	0.015	0.012	0.011	0.012	0.007	0.012	0.006	0.019	
W	0.005	0.008	0.007	0.013	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.009	0.008	0.009	0.008	
Pb	0.003	0.003	0.003	0.006	0.005	0.008	0.005	0.005	0.005	0.006	0.006	0.006	0.003	0.005	0.003	0.007	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.004	0.001	0.005	0.000	0.001	0.001	0.002	0.004	0.001	0.000	0.001	0.000	0.007	
Sb																	
Bi																	
Sc				0.007	0.006	0.006	0.004	0.004	0.004	0.000	0.004	0.004	0.004	0.002	0.003	0.003	
Ca	0.005	0.005	0.004	0.003	0.003	0.003	0.004	0.004	0.002	0.003	0.005	0.004	0.003	0.003	0.003	0.017	
Total	3.047	3.020	3.011	3.018	3.024	3.023	3.016	3.016	3.011	3.011	3.008	3.016	3.012	3.012	3.009	3.020	
Mn/(Mn+Fe)	0.881	0.882	0.885	0.794	0.777	0.631	0.821	0.764	0.637	0.789	0.745	0.737	0.802	0.697	0.812	0.610	
Ta/(Ta+Nb)	0.546	0.504	0.488	0.239	0.274	0.258	0.259	0.274	0.267	0.281	0.276	0.274	0.270	0.281	0.276	0.286	
Comments:	forms cluster with cassiterite		manganocolumbite-rich sample					QB-QE in cluster (QC latest)					incl. in garnet				

Columbite-Tantalite Group

	Marko's pegmatite 94-44U				Marko's pegmatite 94-44W												
	QS	QK	QL	QP	FA	FG	FN	PG	PH	PI	PJ	PL	PM	PN	PO	PQ	
FeO	6.88	4.99	7.76	6.62	6.86	3.68	3.38	5.29	6.49	5.44	3.00	5.55	5.49	4.14	4.36	4.06	
MnO	11.12	13.13	10.24	12.02	11.26	13.91	14.60	12.50	11.19	12.44	15.14	12.30	12.20	13.48	13.47	14.03	
TiO2	2.87	2.44	3.12	2.69	3.26	2.77	2.28	3.61	3.30	3.45	1.28	3.58	3.31	3.62	3.78	2.46	
Nb2O5	48.95	53.04	51.38	53.09	47.06	41.62	45.80	46.56	48.04	47.02	46.48	48.35	45.54	47.47	46.06	44.52	
Ta2O5	28.40	24.31	24.51	23.99	28.83	35.36	31.26	29.38	28.33	29.29	33.28	28.07	30.26	29.72	29.85	32.40	
SnO2	0.52	0.58	0.41	0.36	0.66	0.80	0.39	0.78	0.61	0.77	0.22	0.86	0.75	0.83	0.86	0.69	
WO3	0.59	0.70	0.66	0.52	0.56	0.49	0.70	0.46	0.70	0.51	0.50	0.61	0.48	0.57	0.58	0.61	
PbO	0.39	0.33	0.45	0.34	0.42	0.29	0.29	0.50	0.53	0.50	0.27	0.53	0.46	0.49	0.36	0.29	
ThO2	0.00	0.02	0.02	0.03	0.01	0.00	0.03	0.01	0.00	0.01	0.02	0.01	0.03	0.01	0.00	0.02	
UO2	0.26	0.58	0.45	0.21	0.37	0.26	0.13	0.44	0.52	0.50	0.02	0.37	0.44	0.37	0.24	0.00	
Sb2O3																	
Bi2O3																	
Sc2O3	0.10	0.17	0.20	0.18				0.08	0.07	0.10	0.05	0.05	0.08	0.05	0.10	0.05	
CaO	0.04	0.06	0.03	0.03	0.03	0.11	0.10	0.03	0.03	0.02	0.04	0.07	0.08	0.02	0.03	0.04	
Total	100.12	100.35	99.23	100.08	99.29	99.18	98.86	99.64	99.81	100.05	100.30	100.35	99.12	100.77	99.69	99.17	
Structural formulae based on 6 oxygens																	
Fe	0.362	0.258	0.405	0.342	0.365	0.202	0.183	0.281	0.343	0.288	0.162	0.291	0.295	0.217	0.231	0.220	
Mn	0.592	0.687	0.542	0.628	0.607	0.773	0.800	0.672	0.599	0.666	0.826	0.653	0.664	0.716	0.724	0.770	
Ti	0.136	0.113	0.147	0.125	0.156	0.137	0.111	0.172	0.157	0.164	0.062	0.169	0.160	0.171	0.180	0.120	
Nb	1.392	1.482	1.451	1.481	1.355	1.235	1.339	1.337	1.372	1.345	1.353	1.369	1.322	1.346	1.321	1.305	
Ta	0.486	0.409	0.416	0.403	0.499	0.631	0.550	0.507	0.487	0.504	0.583	0.478	0.528	0.507	0.515	0.571	
Sn	0.013	0.014	0.010	0.009	0.017	0.021	0.010	0.020	0.015	0.019	0.006	0.021	0.019	0.021	0.022	0.018	
W	0.010	0.011	0.011	0.008	0.009	0.008	0.012	0.008	0.011	0.008	0.008	0.010	0.008	0.009	0.010	0.010	
Pb	0.007	0.005	0.008	0.006	0.007	0.005	0.005	0.009	0.009	0.009	0.005	0.009	0.008	0.008	0.006	0.005	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.004	0.008	0.006	0.003	0.005	0.004	0.002	0.006	0.007	0.007	0.000	0.005	0.006	0.005	0.003	0.000	
Sb																	
Bi																	
Sc	0.005	0.009	0.011	0.010				0.004	0.004	0.006	0.003	0.003	0.004	0.003	0.006	0.003	
Ca	0.003	0.004	0.002	0.002	0.002	0.008	0.007	0.002	0.002	0.001	0.003	0.005	0.006	0.001	0.002	0.003	
Total	3.009	3.001	3.009	3.016	3.023	3.023	3.019	3.018	3.007	3.017	3.010	3.012	3.020	3.004	3.019	3.026	
Mn/(Mn+Fe)	0.621	0.727	0.572	0.648	0.624	0.793	0.814	0.705	0.636	0.698	0.836	0.692	0.692	0.767	0.758	0.778	
Ta/(Ta+Nb)	0.259	0.216	0.223	0.214	0.269	0.338	0.291	0.275	0.262	0.273	0.301	0.259	0.286	0.274	0.280	0.304	
Comments:	incl. in gamet							G & N acicular crystals big crystal									PH & PI same grain
																	PM & PN same grain
appears to be two generations of manganocolumbite in this sample																	

Columbite-Tantalite Group

	Marko's pegmatite 94-44W										Marko's 94-44Y	Marko's 94-44iii(V2)	East Beryl pegmatite 94-49		
	PR	PS	PU	PV	CH	CI	CJ	CK	CP	CT	UG	IB	WA	WB	WF
FeO	3.94	3.51	4.22	3.94	6.54	5.88	3.09	3.04	4.19	6.66	10.32	1.84	13.03	13.06	12.84
MnO	13.70	14.09	13.79	13.87	11.24	11.99	12.86	12.75	13.45	11.18	7.42	13.48	5.01	5.01	5.32
TiO2	2.75	2.11	2.81	2.78	3.10	2.68	0.92	0.90	2.28	2.58	2.20	1.64	2.75	2.75	2.45
Nb2O5	44.40	46.17	45.03	45.49	47.45	47.58	24.46	22.56	44.80	47.04	39.42	22.79	59.53	59.87	52.87
Ta2O5	32.24	32.23	32.20	32.03	27.80	27.90	56.86	59.41	31.59	29.60	37.06	57.72	15.42	15.31	23.83
SnO2	0.66	0.41	0.78	0.67	0.68	0.62	0.31	0.27	0.63	0.61	0.73	1.24	0.04	0.03	0.00
WO3	0.57	0.66	0.58	0.54	0.98	1.07	0.77	0.75	0.97	0.94	0.40	0.49	0.78	0.91	0.92
PbO	0.32	0.32	0.38	0.39	0.45	0.37	0.12	0.14	0.51	0.30	0.65	0.25	0.42	0.47	0.28
ThO2	0.00	0.09	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
UO2	0.16	0.03	0.25	0.22	0.21	0.12	0.00	0.00	0.20	0.09	0.91	0.00	0.07	0.08	0.00
Sb2O3											0.06	0.00	0.00	0.00	0.00
Bi2O3													0.00	0.00	0.00
Sc2O3	0.03	0.07	0.07	0.03	0.15	0.11	0.05	0.09	0.13	0.11	0.03	0.06	0.30	0.37	0.07
CaO	0.07	0.05	0.03	0.05	0.01	0.01	0.00	0.02	0.03	0.00	0.10	0.19			
Total	98.84	99.74	100.16	100.04	98.61	98.33	99.44	99.91	98.76	99.10	99.34	99.70	97.36	97.85	98.57
Structural formulae based on 6 oxygens															
Fe	0.214	0.189	0.226	0.211	0.349	0.316	0.189	0.187	0.228	0.356	0.578	0.112	0.666	0.664	0.673
Mn	0.754	0.768	0.748	0.752	0.608	0.652	0.796	0.795	0.742	0.606	0.421	0.834	0.259	0.258	0.282
Ti	0.134	0.102	0.135	0.134	0.149	0.130	0.050	0.050	0.111	0.124	0.111	0.090	0.126	0.126	0.115
Nb	1.304	1.343	1.304	1.317	1.370	1.380	0.808	0.750	1.319	1.362	1.193	0.753	1.644	1.645	1.498
Ta	0.569	0.564	0.561	0.558	0.483	0.487	1.130	1.189	0.560	0.515	0.675	1.147	0.256	0.253	0.406
Sn	0.017	0.011	0.020	0.017	0.017	0.016	0.009	0.008	0.016	0.016	0.019	0.036	0.001	0.001	0.000
W	0.010	0.011	0.010	0.009	0.016	0.018	0.015	0.014	0.016	0.016	0.007	0.009	0.012	0.014	0.015
Pb	0.006	0.006	0.007	0.007	0.008	0.006	0.002	0.003	0.009	0.005	0.012	0.005	0.007	0.008	0.005
Th	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
U	0.002	0.000	0.004	0.003	0.003	0.002	0.000	0.000	0.003	0.001	0.014	0.000	0.001	0.001	0.000
Sb											0.002	0.000	0.000	0.000	0.000
Bi													0.000	0.000	0.000
Sc	0.002	0.004	0.004	0.002	0.008	0.006	0.003	0.005	0.007	0.006	0.002	0.004	0.016	0.019	0.004
Ca	0.005	0.003	0.002	0.003	0.001	0.000	0.000	0.002	0.002	0.000	0.007	0.015			
Total	3.016	3.002	3.021	3.014	3.014	3.013	3.003	3.002	3.015	3.008	3.039	3.005	2.989	2.988	2.997
Mn/(Mn+Fe)	0.779	0.803	0.768	0.781	0.635	0.674	0.808	0.810	0.765	0.630	0.421	0.881	0.280	0.280	0.296
Ta/(Ta+Nb)	0.304	0.296	0.301	0.298	0.261	0.261	0.583	0.613	0.298	0.275	0.361	0.604	0.135	0.133	0.213
Comments:	PR & PS same grain	PU & PV same grain	CH - CK same grain early early later later rim rim				unzoned				closely assoc. with wodginite		WA & WB same grain assoc. metamict Nb/U oxide		

Columbite-Tantalite Group

East Beryl pegmatite										
94-57										
	XA	XC	XD	XE	XG	XK	XO	XP	XQ	XR
FeO	13.20	13.82	13.56	14.03	14.90	14.98	10.93	12.85	11.10	10.63
MnO	4.35	4.06	4.18	3.60	3.97	3.78	6.48	4.36	6.20	6.49
TiO2	0.04	0.52	0.07	0.78	1.61	0.88	0.12	0.08	0.09	0.05
Nb2O5	42.10	45.27	42.43	42.71	56.48	54.93	38.67	36.10	37.85	36.50
Ta2O5	39.08	34.84	39.22	37.30	20.79	23.42	43.91	45.94	44.37	46.43
SnO2	0.11	0.10	0.09	0.10	0.17	0.07	0.04	0.13	0.06	0.07
WO3	0.35	0.52	0.41	0.74	1.58	0.94	0.37	0.49	0.29	0.34
PbO	0.23	0.26	0.23	0.25	0.29	0.33	0.22	0.12	0.15	0.13
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.00	0.09	0.14	0.03	0.00	0.00	0.02	0.01
CaO										
Total	99.48	99.39	100.19	99.60	99.92	99.37	100.73	100.06	100.11	100.65
Structural formulae based on 6 oxygens										
Fe	0.741	0.760	0.755	0.779	0.764	0.783	0.618	0.740	0.633	0.609
Mn	0.248	0.226	0.236	0.202	0.206	0.200	0.371	0.254	0.358	0.376
Ti	0.002	0.026	0.004	0.039	0.074	0.041	0.006	0.004	0.005	0.002
Nb	1.278	1.347	1.278	1.281	1.566	1.553	1.182	1.124	1.167	1.130
Ta	0.714	0.624	0.711	0.673	0.347	0.398	0.807	0.861	0.823	0.864
Sn	0.003	0.003	0.002	0.003	0.004	0.002	0.001	0.004	0.002	0.002
W	0.006	0.009	0.007	0.013	0.025	0.015	0.006	0.009	0.005	0.006
Pb	0.004	0.005	0.004	0.004	0.005	0.006	0.004	0.002	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.005	0.008	0.002	0.000	0.000	0.001	0.001
Ca					0.000	0.000	0.000	0.000	0.000	0.000
Total	2.996	2.999	2.997	2.999	2.999	3.000	2.996	2.998	2.997	2.992
Mn/(Mn+Fe)	0.250	0.229	0.238	0.206	0.212	0.204	0.375	0.256	0.361	0.382
Ta/(Ta+Nb)	0.358	0.316	0.357	0.344	0.181	0.204	0.406	0.434	0.414	0.433
Comments:	XA, XC & XD same grain			XP- XR same grain - all primary comps.						
	XC replacement comp.		XE primary composition							
	rest are patchy zoned secondary/replacement comps.									

Columbite-Tantalite Group

	Pegmatite 5						Treelined Lake Complex									
	94-80i						94-84A									
	QK	QL	QM	QN	QO	QT	AA	YA	YB	YC	YD	YE	YF	YG	YH	
FeO	10.62	10.65	10.49	10.31	10.75	9.61	6.48	6.19	6.05	5.66	5.46	5.87	5.36	5.62	5.64	
MnO	5.18	5.15	5.23	5.58	5.21	6.28	11.18	12.00	12.55	11.72	11.94	11.46	11.39	10.10	10.55	
TiO2	1.44	1.43	1.47	1.36	1.36	1.36	0.25	0.62	0.53	0.23	0.24	0.22	0.18	0.92	1.07	
Nb2O5	26.25	27.22	26.98	27.68	27.93	27.79	37.47	46.53	49.03	35.56	37.48	38.25	34.42	27.24	29.67	
Ta2O5	54.20	53.58	54.14	53.63	53.87	53.97	40.61	30.28	28.26	42.93	43.01	41.10	48.29	52.01	50.22	
SnO2	0.34	0.35	0.41	0.33	0.32	0.30	0.08	0.22	0.12	0.07	0.10	0.07	0.06	0.33	0.37	
WO3	1.25	0.71	0.54	0.55	0.58	0.55	3.55	3.32	3.24	3.01	1.86	1.97	1.28	2.49	2.53	
PbO	0.11	0.10	0.13	0.13	0.13	0.14	0.17	0.21	0.28	0.19	0.24	0.15	0.17	0.09	0.07	
ThO2	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	
UO2	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	0.40	0.00	
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
Bi2O3	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.34	0.36	0.66	0.34	0.52	0.36	0.04	0.10	0.06	0.14	0.06	0.05	0.00	0.36	0.00	
CaO																
Total	99.74	99.54	100.07	99.91	100.64	100.37	99.82	99.46	100.13	99.49	100.39	99.15	101.15	99.56	100.13	
Structural formulae based on 6 oxygens																
Fe	0.637	0.637	0.624	0.614	0.634	0.570	0.369	0.336	0.323	0.326	0.310	0.335	0.308	0.337	0.332	
Mn	0.314	0.312	0.315	0.336	0.311	0.377	0.644	0.660	0.679	0.684	0.687	0.663	0.664	0.614	0.629	
Ti	0.078	0.077	0.079	0.073	0.072	0.073	0.013	0.030	0.025	0.012	0.012	0.011	0.009	0.050	0.057	
Nb	0.851	0.880	0.867	0.891	0.891	0.890	1.153	1.366	1.416	1.109	1.151	1.181	1.070	0.883	0.944	
Ta	1.057	1.042	1.047	1.038	1.034	1.040	0.752	0.535	0.491	0.805	0.795	0.764	0.903	1.014	0.961	
Sn	0.010	0.010	0.011	0.009	0.009	0.009	0.002	0.006	0.003	0.002	0.003	0.002	0.002	0.009	0.010	
W	0.023	0.013	0.010	0.010	0.011	0.010	0.063	0.056	0.054	0.054	0.033	0.035	0.023	0.046	0.046	
Pb	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.005	0.004	0.004	0.003	0.003	0.002	0.001	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.021	0.022	0.041	0.021	0.032	0.022	0.002	0.006	0.003	0.009	0.003	0.003	0.000	0.023	0.000	
Ca																
Total	2.994	2.994	2.998	2.994	2.995	2.993	3.001	2.998	3.001	3.004	2.999	2.998	2.983	2.985	2.982	
Mn/(Mn+Fe)	0.331	0.329	0.336	0.354	0.329	0.398	0.636	0.663	0.678	0.677	0.689	0.664	0.683	0.645	0.655	
Ta/(Ta+Nb)	0.554	0.542	0.547	0.538	0.537	0.539	0.395	0.281	0.257	0.421	0.408	0.393	0.458	0.535	0.504	
Comments:	QL - QT same grain QK is nearby QL - QT & is assoc. with earlier crystallized cassiterite						YA - YD same grain from miarolitic cavity				YE - YT same grain core					

Columbite-Tantalite Group

Treelined Lake Complex												
94-84A												
	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT
FeO	6.28	6.25	6.52	6.46	6.41	6.47	6.50	6.31	6.24	6.24	6.21	5.41
MnO	11.13	10.91	11.89	11.73	11.69	11.51	11.52	11.08	11.08	12.09	10.85	10.93
TiO2	0.74	0.68	0.44	0.55	0.59	0.62	0.59	0.89	0.89	0.51	0.24	0.92
Nb2O5	36.19	37.66	47.49	47.01	47.24	46.29	46.17	38.32	38.16	50.50	37.30	30.63
Ta2O5	40.31	40.57	28.53	30.61	31.41	31.67	31.94	39.45	40.11	28.03	42.99	50.91
SnO2	0.22	0.16	0.10	0.21	0.16	0.21	0.20	0.31	0.25	0.10	0.11	0.22
WO3	5.69	4.06	5.32	3.85	3.04	3.63	3.63	3.66	3.52	2.89	2.59	1.62
PbO	0.17	0.16	0.22	0.27	0.22	0.20	0.21	0.17	0.19	0.23	0.20	0.14
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Sc2O3	0.13	0.15	0.02	0.03	0.14	0.02	0.11	0.15	0.14	0.10	0.01	0.01
CaO												
Total	100.87	100.62	100.52	100.71	100.89	100.61	100.85	100.35	100.56	100.70	100.50	100.80

Structural formulae based on 6 oxygens

Fe	0.355	0.352	0.350	0.347	0.344	0.349	0.350	0.354	0.350	0.330	0.353	0.316
Mn	0.636	0.622	0.646	0.638	0.634	0.629	0.628	0.630	0.629	0.648	0.625	0.647
Ti	0.037	0.035	0.021	0.027	0.028	0.030	0.029	0.045	0.045	0.024	0.012	0.048
Nb	1.104	1.146	1.377	1.366	1.369	1.350	1.344	1.162	1.157	1.444	1.146	0.967
Ta	0.740	0.742	0.498	0.535	0.547	0.556	0.559	0.719	0.731	0.482	0.794	0.967
Sn	0.006	0.004	0.003	0.005	0.004	0.005	0.005	0.008	0.007	0.002	0.003	0.006
W	0.099	0.071	0.088	0.064	0.050	0.061	0.061	0.064	0.061	0.047	0.046	0.029
Pb	0.003	0.003	0.004	0.005	0.004	0.003	0.004	0.003	0.003	0.004	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.007	0.009	0.001	0.002	0.008	0.001	0.006	0.009	0.008	0.005	0.000	0.000
Ca												
Total	2.988	2.983	2.987	2.988	2.989	2.984	2.986	2.993	2.990	2.987	2.983	2.985
Mn/(Mn+Fe)	0.642	0.639	0.649	0.648	0.649	0.643	0.642	0.640	0.643	0.663	0.639	0.672
Ta/(Ta+Nb)	0.401	0.393	0.265	0.281	0.286	0.292	0.294	0.382	0.387	0.250	0.409	0.500

Comments: YI - YQ traverse along grain
banded zonation unlike any
seen in Separation Rapids pegmatites

Columbite-Tantalite Group

	East Beryl pegmatite 94-304				East Beryl pegmatite 94-304A								E Beryl peg. 94-304C	
	NC	ND	NE	NF	EA	EB	EE	EF	EK	EL	EN	KA	KG	
FeO	5.46	4.91	7.17	5.38	5.20	4.31	5.27	5.48	7.24	6.68	6.63	13.48	12.89	
MnO	14.65	14.86	14.33	14.54	11.60	12.66	11.65	11.45	11.26	12.25	11.57	4.17	3.87	
TiO2	2.87	1.98	1.76	2.77	1.40	1.69	1.52	1.49	2.45	1.94	1.50	0.55	0.70	
Nb2O5	61.63	63.65	63.54	63.51	43.22	42.35	43.71	44.83	61.77	63.95	55.14	45.51	29.22	
Ta2O5	12.12	12.53	12.47	11.46	35.88	36.11	34.49	34.32	11.99	11.34	21.89	34.54	50.57	
SnO2	0.51	0.18	0.14	0.48	0.12	0.20	0.22	0.14	0.42	0.40	0.49	0.49	1.10	
WO3	0.53	0.68	0.42	0.76	0.44	1.16	1.13	0.93	1.36	1.21	0.49	0.74	0.08	
PbO	0.64	0.62	0.43	0.51	0.15	0.07	0.65	0.29	0.53	0.28	0.20	0.43	0.53	
ThO2	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	
UO2	1.47	0.73	0.08	0.21	0.00	0.00	0.56	0.00	0.65	0.00	0.04	0.25	0.00	
Sb2O3					0.14	0.00	0.00	0.11	0.09	0.10	0.02	0.00	0.00	
Bi2O3					0.00	0.00	0.40	0.09	0.04	0.38	0.00	0.51	0.42	
Sc2O3	0.00	0.02	0.03	0.02	0.31	0.00	0.10	1.39	1.02	0.00	0.32	0.00	0.11	
CaO	0.00	0.00	0.00	0.00										
Total	99.91	100.18	100.34	99.62	98.44	98.55	99.69	100.51	98.81	98.53	98.29	100.66	99.51	
Structural formulae based on 6 oxygens														
Fe	0.272	0.243	0.354	0.265	0.288	0.240	0.290	0.295	0.362	0.334	0.346	0.736	0.771	
Mn	0.738	0.745	0.716	0.726	0.651	0.712	0.649	0.623	0.570	0.620	0.612	0.231	0.234	
Ti	0.128	0.088	0.078	0.123	0.070	0.085	0.075	0.072	0.110	0.087	0.071	0.027	0.038	
Nb	1.658	1.704	1.695	1.693	1.296	1.271	1.300	1.303	1.668	1.727	1.557	1.343	0.945	
Ta	0.196	0.202	0.200	0.184	0.647	0.652	0.617	0.600	0.195	0.184	0.372	0.613	0.983	
Sn	0.012	0.004	0.003	0.011	0.003	0.005	0.006	0.004	0.010	0.009	0.012	0.013	0.031	
W	0.008	0.010	0.006	0.012	0.008	0.020	0.019	0.015	0.021	0.019	0.008	0.012	0.002	
Pb	0.010	0.010	0.007	0.008	0.003	0.001	0.012	0.005	0.008	0.005	0.003	0.007	0.010	
Th	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.019	0.010	0.001	0.003	0.000	0.000	0.008	0.000	0.009	0.000	0.001	0.004	0.000	
Sb					0.004	0.000	0.000	0.003	0.002	0.003	0.001	0.000	0.000	
Bi					0.000	0.000	0.007	0.001	0.001	0.006	0.000	0.009	0.008	
Sc	0.000	0.001	0.002	0.001	0.018	0.000	0.006	0.078	0.053	0.000	0.017	0.000	0.007	
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	3.043	3.019	3.063	3.026	2.987	2.986	2.990	2.999	3.008	2.994	2.999	2.994	3.029	
Mn/(Mn+Fe)	0.731	0.754	0.669	0.732	0.693	0.748	0.691	0.679	0.612	0.650	0.639	0.239	0.233	
Ta/(Ta+Nb)	0.106	0.106	0.106	0.098	0.333	0.339	0.322	0.315	0.105	0.096	0.193	0.313	0.510	
Comments:	NC & ND same grain	NE & NF same grain			EA - EF same grain assoc. with zircon radiating texture				EK - EN same grain core core rim			incls. in cass.		

Columbite-Tantalite Group

Pegmatite 9															
94-318															
	VG	VH	VS	VU	VV	BB	BC1	BC2	BC3	BC4	BC5	BC6	BC7	BC8	BC9
FeO	14.65	14.91	13.90	15.03	14.33	14.63	15.70	14.82	14.80	14.59	14.85	15.89	16.01	16.04	16.02
MnO	2.42	2.43	2.11	2.37	2.46	1.74	1.87	1.81	1.75	1.76	1.76	1.86	1.91	1.88	1.88
TiO2	1.32	1.24	0.87	1.12	0.99	0.92	1.03	0.88	0.83	0.94	0.90	1.04	1.11	1.08	1.08
Nb2O5	29.07	33.34	21.02	29.62	31.37	26.34	39.87	27.34	26.14	26.05	26.71	39.72	40.18	39.60	39.55
Ta2O5	49.60	46.49	61.09	50.01	49.62	53.32	39.03	52.35	54.15	53.46	53.68	38.80	37.77	38.30	38.66
SnO2	0.33	0.33	0.44	0.28	0.33	0.17	0.16	0.20	0.16	0.19	0.22	0.21	0.21	0.18	0.20
WO3	0.78	0.94	0.24	0.78	0.68	1.86	1.63	1.77	1.82	1.86	1.86	2.30	2.55	2.35	2.40
PbO	0.31	0.28	0.18	0.11	0.32	0.09	0.17	0.09	0.12	0.08	0.16	0.24	0.20	0.18	0.20
ThO2	0.01	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.14	0.13	0.13	0.05	0.11	0.00	0.02	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.01
Sb2O3	0.08	0.06	0.06	0.06	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3						0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Sc2O3	0.07	0.07	0.05	0.05	0.05	0.00	0.04	0.17	0.01	0.00	0.01	0.06	0.03	0.07	0.01
CaO	0.15	0.15	0.00	0.07	0.00	0.10	0.00	0.01	0.00	0.11	0.02	0.00	0.00	0.02	0.02
Total	98.93	100.38	100.11	99.56	100.36	99.18	99.52	99.44	99.78	99.04	100.20	100.18	99.97	99.78	100.03

Structural formulae based on 6 oxygens

Fe	0.873	0.859	0.864	0.889	0.838	0.886	0.882	0.890	0.894	0.886	0.891	0.887	0.893	0.898	0.896
Mn	0.146	0.142	0.133	0.142	0.146	0.107	0.107	0.110	0.107	0.108	0.107	0.105	0.108	0.107	0.107
Ti	0.071	0.064	0.049	0.060	0.052	0.050	0.052	0.048	0.045	0.051	0.049	0.052	0.055	0.054	0.054
Nb	0.937	1.038	0.706	0.947	0.992	0.863	1.210	0.888	0.854	0.855	0.866	1.199	1.211	1.199	1.196
Ta	0.961	0.871	1.234	0.962	0.944	1.050	0.713	1.023	1.064	1.056	1.047	0.705	0.685	0.698	0.703
Sn	0.009	0.009	0.013	0.008	0.009	0.005	0.004	0.006	0.005	0.005	0.006	0.006	0.006	0.005	0.005
W	0.014	0.017	0.005	0.014	0.012	0.035	0.028	0.033	0.034	0.035	0.035	0.040	0.044	0.041	0.042
Pb	0.006	0.005	0.004	0.002	0.006	0.002	0.003	0.002	0.002	0.002	0.003	0.004	0.004	0.003	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.002	0.002	0.002	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Sb	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.004	0.003	0.003	0.003	0.000	0.003	0.010	0.001	0.000	0.001	0.003	0.002	0.004	0.000
Ca	0.011	0.011	0.000	0.005	0.000	0.008	0.000	0.001	0.000	0.008	0.001	0.000	0.000	0.001	0.001
Total	3.038	3.024	3.014	3.036	3.006	3.006	3.001	3.010	3.005	3.007	3.006	3.003	3.007	3.011	3.008
Mn/(Mn+Fe)	0.143	0.142	0.133	0.138	0.148	0.108	0.108	0.110	0.107	0.109	0.107	0.106	0.108	0.106	0.106
Ta/(Ta+Nb)	0.507	0.456	0.636	0.504	0.488	0.549	0.371	0.535	0.555	0.552	0.547	0.370	0.361	0.368	0.370

Comments: VG & VH same grain associated with large cassiterite grains
BB & BC3 very close together core
BC traverse 128 µm has a Sn-W rich rim - ixiolite?

Columbite-Tantalite Group

	Pegmatite 9 94-318											Near Lou's pegmatite 94-355			
	BC10	BC11	BC12	BC13	BC14	BC15	BC16	BH	BD	BE	BG	SA	SB	SC	SD
FeO	15.93	15.74	15.58	15.94	15.93	15.91	16.26	15.15	15.73	14.29	14.30	17.90	17.79	17.80	17.46
MnO	1.92	1.85	1.82	1.87	1.88	1.96	1.95	1.84	1.87	2.11	2.11	2.24	2.34	2.35	2.67
TiO2	1.05	1.05	1.25	1.35	1.21	1.15	1.19	1.78	1.25	1.03	0.94	0.73	0.70	0.73	0.74
Nb2O5	39.18	38.81	37.96	40.86	41.33	43.83	45.58	33.16	37.91	24.65	26.28	71.17	70.39	71.19	70.66
Ta2O5	38.86	40.97	41.43	38.43	37.10	34.75	32.95	45.36	41.13	56.50	54.60	6.35	6.39	6.46	6.38
SnO2	0.18	0.21	0.42	0.38	0.36	0.27	0.19	0.31	0.17	0.31	0.30	0.01	0.00	0.03	0.00
WO3	2.40	1.53	1.14	1.29	1.16	1.24	1.36	2.12	2.00	1.11	1.16	0.48	0.38	0.52	0.57
PbO	0.23	0.24	0.20	0.16	0.18	0.29	0.24	0.18	0.14	0.04	0.12	0.37	0.34	0.38	0.35
ThO2	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
UO2	0.07	0.02	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	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
Sc2O3	0.13	0.04	0.00	0.04	0.21	0.00	0.08	0.00	0.10	0.20	0.05	0.22	0.22	0.34	0.18
CaO	0.02	0.04	0.01	0.00	0.04	0.04	0.01	0.04	0.03	0.00	0.00				
Total	99.96	100.52	99.80	100.33	99.41	99.45	99.82	99.98	100.35	100.24	99.86	99.48	98.55	99.79	99.01
Structural formulae based on 6 oxygens															
Fe	0.893	0.882	0.880	0.882	0.886	0.876	0.883	0.871	0.884	0.865	0.862	0.868	0.871	0.860	0.851
Mn	0.109	0.105	0.104	0.105	0.106	0.109	0.107	0.107	0.107	0.129	0.129	0.110	0.116	0.115	0.132
Ti	0.053	0.053	0.064	0.067	0.061	0.057	0.058	0.092	0.063	0.056	0.051	0.032	0.031	0.032	0.033
Nb	1.187	1.175	1.159	1.222	1.243	1.304	1.339	1.031	1.151	0.806	0.857	1.865	1.863	1.861	1.862
Ta	0.708	0.746	0.761	0.692	0.671	0.622	0.582	0.848	0.751	1.112	1.070	0.100	0.102	0.102	0.101
Sn	0.005	0.006	0.011	0.010	0.010	0.007	0.005	0.009	0.005	0.009	0.009	0.000	0.000	0.001	0.000
W	0.042	0.027	0.020	0.022	0.020	0.021	0.023	0.038	0.035	0.021	0.022	0.007	0.006	0.008	0.009
Pb	0.004	0.004	0.004	0.003	0.003	0.005	0.004	0.003	0.003	0.001	0.002	0.006	0.005	0.006	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.008	0.002	0.000	0.002	0.012	0.000	0.005	0.000	0.006	0.012	0.003	0.011	0.011	0.017	0.009
Ca	0.001	0.003	0.001	0.000	0.003	0.003	0.001	0.003	0.002	0.000	0.000				
Total	3.011	3.004	3.004	3.006	3.014	3.004	3.007	3.003	3.006	3.010	3.005	3.000	3.005	3.001	3.001
Mn/(Mn+Fe)	0.109	0.107	0.106	0.106	0.107	0.111	0.108	0.109	0.108	0.130	0.130	0.113	0.118	0.118	0.134
Ta/(Ta+Nb)	0.374	0.388	0.396	0.361	0.351	0.323	0.303	0.451	0.395	0.580	0.555	0.051	0.052	0.052	0.052
Comments:	rim											SA & SB	SC & SD		
												same grain	same grain		
												quartz-rich dyke in petalite zone			

Columbite-Tantalite Group

Pegmatite 7															
94-Peg 7B															
	QG	WA	PC	PF	PG3	PG4	PG5	PG6	PG8	PD	PG1	PG9	PG10	WR	WS
FeO	8.73	10.35	9.64	9.12	8.99	9.54	9.02	8.30	9.43	9.20	9.30	7.43	8.39	12.96	13.04
MnO	6.32	5.74	6.27	6.10	6.18	6.69	6.38	6.13	6.61	7.59	7.36	6.15	7.73	3.19	3.23
TiO2	1.16	1.09	0.92	0.97	0.96	1.02	0.99	1.04	1.02	0.75	0.84	1.03	0.82	2.81	2.79
Nb2O5	26.85	23.77	27.54	26.19	25.26	24.30	24.12	25.31	26.72	38.23	35.48	31.32	41.29	26.99	28.10
Ta2O5	53.62	52.97	52.68	53.55	53.53	53.46	54.20	54.34	53.38	41.77	44.99	48.15	39.29	50.43	49.26
SnO2	1.13	2.29	0.89	1.16	1.13	1.46	2.00	0.75	0.64	0.24	0.28	0.92	0.22	1.86	1.97
WO3	0.94	2.15	1.39	1.86	1.61	1.74	2.05	1.32	1.63	0.85	0.91	1.31	1.17	0.01	0.17
PbO	0.15	0.15	0.13	0.15	0.25	0.13	0.08	0.05	0.12	0.35	0.18	0.19	0.20	0.27	0.19
ThO2	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
UO2	0.00	0.14	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.17
Sb2O3		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06
Bi2O3			0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00		
Sc2O3		0.24	0.29	0.34	0.27	0.24	0.28	0.31	0.05	0.46	0.58	0.50	0.48	0.80	0.78
CaO	1.56	0.38	0.25	0.72	1.38	0.67	0.67	1.91	0.11	0.21	0.10	2.13	0.72	0.08	0.09
Total	100.46	99.27	100.01	100.15	99.59	99.24	99.79	99.46	99.73	99.64	100.03	99.21	100.30	99.53	99.85

Structural formulae based on 6 oxygens

Fe	0.518	0.631	0.574	0.545	0.542	0.580	0.547	0.500	0.566	0.521	0.532	0.434	0.464	0.762	0.760
Mn	0.380	0.354	0.379	0.369	0.377	0.412	0.391	0.374	0.402	0.435	0.426	0.364	0.433	0.190	0.191
Ti	0.062	0.060	0.049	0.052	0.052	0.056	0.054	0.056	0.055	0.038	0.043	0.054	0.041	0.149	0.146
Nb	0.861	0.783	0.887	0.847	0.824	0.798	0.790	0.824	0.868	1.170	1.096	0.989	1.235	0.858	0.886
Ta	1.035	1.049	1.021	1.042	1.050	1.057	1.068	1.064	1.043	0.769	0.836	0.915	0.707	0.964	0.934
Sn	0.032	0.067	0.025	0.033	0.033	0.042	0.058	0.021	0.018	0.006	0.008	0.026	0.006	0.052	0.055
W	0.017	0.041	0.026	0.034	0.030	0.033	0.039	0.025	0.030	0.015	0.016	0.024	0.020	0.000	0.003
Pb	0.003	0.003	0.003	0.003	0.005	0.003	0.002	0.001	0.002	0.006	0.003	0.004	0.004	0.005	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.003
Sb		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002
Bi			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Sc		0.015	0.018	0.021	0.017	0.015	0.017	0.019	0.003	0.027	0.034	0.031	0.028	0.049	0.047
Ca	0.119	0.030	0.019	0.055	0.106	0.052	0.052	0.147	0.008	0.015	0.007	0.159	0.051	0.006	0.007
Total	3.027	3.034	3.002	3.002	3.036	3.047	3.016	3.031	2.998	3.003	3.002	3.000	2.987	3.039	3.036
Mn/(Mn+Fe)	0.423	0.360	0.397	0.404	0.411	0.415	0.417	0.428	0.415	0.455	0.445	0.456	0.483	0.200	0.201
Ta/(Ta+Nb)	0.546	0.573	0.535	0.552	0.560	0.570	0.575	0.564	0.546	0.397	0.433	0.480	0.364	0.529	0.513

Comments:	cassiterite-rich sample	PG traverse across 145 µm patchy euhedral crystal	PD - PG10 euhedral crystals with patchy replacement	WR & WS incl. in cassiterite
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Columbite-Tantalite Group

	Pegmatite 7				Pegmatite 8			Pegmatite 11					
	94-Peg 7X				94-Peg 8A			95-117A					
	LR	LS	LT	LU	CC	CD	CE	VE	VF	VG	VH	VI	VJ
FeO	9.61	5.49	6.66	7.30	13.26	13.77	13.19	11.17	9.47	9.70	9.85	9.90	9.45
MnO	7.22	4.66	4.90	5.41	5.46	5.58	5.68	6.15	5.90	6.01	5.83	5.82	5.79
TiO ₂	0.85	1.14	1.24	1.06	0.53	0.40	0.63	3.04	0.74	0.73	1.52	1.24	0.58
Nb ₂ O ₅	34.40	27.89	27.40	24.57	52.74	60.63	54.43	45.64	21.08	25.28	23.59	26.81	19.13
Ta ₂ O ₅	44.96	48.00	48.76	53.49	26.18	17.69	23.37	31.34	61.22	57.62	57.61	53.43	65.25
SnO ₂	0.58	2.07	1.03	1.52	0.16	0.08	0.23	0.86	0.23	0.16	0.31	0.30	0.21
WO ₃	2.17	1.32	3.09	2.49	0.85	1.49	1.26	1.40	1.21	0.88	1.53	1.01	0.66
PbO	0.18	0.19	0.16	0.18	0.43	0.68	0.38	0.26	0.03	0.10	0.07	0.07	0.00
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb ₂ O ₃	0.00	0.77	0.00	0.00	0.02	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.06	0.00	0.00	0.00
Sc ₂ O ₃	0.55	0.38	0.40	0.42	0.00	0.09	0.23	0.24	0.00	0.06	0.10	0.22	0.08
CaO	0.07	7.10	4.91	3.68									
Total	100.61	99.00	98.55	100.12	99.63	100.55	99.28	100.11	99.86	100.61	100.41	98.80	101.15

Structural formulae based on 6 oxygens

Fe	0.549	0.322	0.394	0.436	0.702	0.698	0.691	0.595	0.589	0.586	0.597	0.598	0.590
Mn	0.417	0.276	0.294	0.327	0.293	0.286	0.301	0.332	0.372	0.368	0.357	0.356	0.366
Ti	0.044	0.060	0.066	0.057	0.025	0.018	0.030	0.145	0.041	0.040	0.083	0.067	0.032
Nb	1.062	0.883	0.877	0.792	1.508	1.661	1.541	1.315	0.709	0.826	0.772	0.876	0.645
Ta	0.835	0.914	0.939	1.038	0.450	0.291	0.398	0.543	1.239	1.133	1.134	1.050	1.324
Sn	0.016	0.058	0.029	0.043	0.004	0.002	0.006	0.022	0.007	0.005	0.009	0.009	0.006
W	0.038	0.024	0.057	0.046	0.014	0.023	0.020	0.023	0.023	0.017	0.029	0.019	0.013
Pb	0.003	0.004	0.003	0.003	0.007	0.011	0.006	0.005	0.001	0.002	0.001	0.001	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.022	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Sc	0.032	0.023	0.025	0.026	0.000	0.005	0.012	0.013	0.000	0.004	0.006	0.014	0.005
Ca	0.005	0.533	0.372	0.281									
Total	3.002	3.117	3.056	3.050	3.004	2.999	3.008	2.993	2.982	2.981	2.988	2.990	2.981
Mn/(Mn+Fe)	0.432	0.462	0.427	0.429	0.294	0.291	0.304	0.358	0.387	0.386	0.375	0.373	0.383
Ta/(Ta+Nb)	0.440	0.509	0.517	0.567	0.230	0.149	0.205	0.292	0.636	0.578	0.595	0.545	0.672

Comments: LR & LS same grain LT & LU same grain CC - CE same grain patchy zonation VG & VH same grain VI & VJ same grain
cassiterite-rich sample

Columbite-Tantalite Group

	Pegmatite 11		Pegmatite 11		SW Beryl pegmatite					SW Beryl pegmatite					
	95-117B		95-117C		96-9					96-11A					
	RK	RM	XA	XB	FA	GA	GB	GF	GG	AE	AF	AK	AL	AM	AN
FeO	11.69	12.03	10.15	10.50	13.87	12.97	14.14	14.30	14.12	15.45	16.48	16.02	16.22	15.27	16.18
MnO	5.74	4.24	6.05	6.51	1.01	0.94	1.08	1.03	1.07	3.59	3.15	3.46	3.65	2.89	3.11
TiO2	2.85	2.27	0.78	0.81	1.71	0.53	1.81	1.79	1.46	0.68	0.76	0.80	0.64	0.68	0.65
Nb2O5	45.06	35.06	29.69	38.03	25.32	17.83	26.10	27.42	26.79	54.96	55.85	55.40	55.30	49.55	54.72
Ta2O5	30.70	43.15	52.41	42.46	55.21	64.68	55.04	53.49	54.27	23.53	22.41	23.28	22.62	27.69	23.36
SnO2	0.66	0.51	0.20	0.13	1.15	1.59	0.61	0.43	0.71	0.00	0.18	0.08	0.07	0.00	0.14
WO3	2.18	1.07	0.95	1.02	0.49	0.34	0.25	0.32	0.25	0.90	1.39	1.20	0.76	0.94	1.27
PbO	0.23	0.17	0.11	0.19	0.16	0.11	0.05	0.08	0.14	0.73	0.00	0.00	0.00	1.02	0.55
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.03	0.00	0.00	0.00	0.00	0.01	0.05	0.01	0.00	0.00	0.00	0.56	0.00	0.55	0.09
Sb2O3	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	0.07
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.00	0.03	0.13	0.00
Sc2O3	0.14	0.02	0.00	0.01	0.25	0.13	0.21	0.24	0.09	0.29	0.04	0.16	0.52	0.00	0.40
CaO					0.00	0.01	0.02	0.01	0.02						
Total	99.28	98.51	100.34	99.65	99.17	99.12	99.34	99.11	98.90	100.12	100.63	100.97	99.80	98.69	100.54

Structural formulae based on 6 oxygens

Fe	0.630	0.691	0.600	0.596	0.840	0.831	0.851	0.856	0.853	0.805	0.849	0.825	0.841	0.829	0.839
Mn	0.313	0.247	0.362	0.374	0.062	0.061	0.066	0.063	0.066	0.189	0.164	0.181	0.192	0.159	0.163
Ti	0.138	0.117	0.041	0.042	0.093	0.031	0.098	0.096	0.080	0.032	0.035	0.037	0.030	0.033	0.030
Nb	1.311	1.089	0.949	1.168	0.829	0.618	0.849	0.887	0.875	1.547	1.556	1.542	1.549	1.455	1.535
Ta	0.537	0.806	1.007	0.784	1.087	1.348	1.077	1.041	1.067	0.398	0.376	0.390	0.381	0.489	0.394
Sn	0.017	0.014	0.006	0.004	0.033	0.048	0.017	0.012	0.020	0.000	0.005	0.002	0.002	0.000	0.004
W	0.036	0.019	0.017	0.018	0.009	0.007	0.005	0.006	0.005	0.014	0.022	0.019	0.012	0.016	0.020
Pb	0.004	0.003	0.002	0.003	0.003	0.002	0.001	0.002	0.003	0.012	0.000	0.000	0.000	0.018	0.009
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.002	0.000
Sc	0.008	0.001	0.000	0.000	0.015	0.009	0.013	0.015	0.006	0.015	0.002	0.009	0.028	0.000	0.022
Ca					0.000	0.001	0.001	0.001	0.001						
Total	2.995	2.988	2.984	2.990	2.973	2.955	2.979	2.979	2.975	3.013	3.015	3.012	3.035	3.010	3.019
Mn/(Mn+Fe)	0.332	0.263	0.376	0.386	0.069	0.068	0.072	0.068	0.071	0.190	0.162	0.180	0.186	0.161	0.163
Ta/(Ta+Nb)	0.291	0.425	0.515	0.402	0.567	0.686	0.559	0.540	0.549	0.205	0.194	0.202	0.197	0.252	0.204

Comments:

XA & XB
same grain

FA, GA & GB columbite with ferrotapiolite rim
primary
core

AK - AN same grain
core core inter rim
oscillatory zoned

Columbite-Tantalite Group

	SW Beryl pegmatite 96-11A					Peg. 12 96-13B	East Beryl pegmatite 96-24						
	KA	KB	KC	KH	KI	MN	VA	VB	VC	VD	VE	VF	VG
FeO	15.59	15.69	15.38	16.74	16.62	1.83	7.25	6.32	5.97	5.78	5.83	5.31	4.02
MnO	3.78	3.57	3.82	2.87	2.80	15.12	10.82	11.46	11.78	11.98	11.96	12.37	13.26
TiO2	0.71	0.66	0.69	0.55	0.40	0.53	0.12	0.15	0.16	0.16	0.15	0.18	0.13
Nb2O5	54.95	54.84	50.71	56.40	56.79	39.95	47.25	46.08	45.25	45.19	45.89	43.97	40.75
Ta2O5	24.11	24.51	27.48	21.92	22.30	38.11	33.13	34.16	35.99	35.84	34.95	36.88	39.97
SnO2	0.07	0.07	0.00	0.12	0.07	0.60	0.06	0.04	0.07	0.02	0.06	0.05	0.05
WO3	1.46	1.50	1.09	0.97	0.65	1.72	0.54	0.46	0.40	0.44	0.47	0.70	0.59
PbO	0.00	0.00	0.00	0.62	0.48	0.16	0.24	0.14	0.21	0.19	0.17	0.19	0.14
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.02
Bi2O3	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
Sc2O3	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	0.01	0.00	0.00	0.01	0.01	0.04	0.04	0.01	0.00	0.03	0.00	0.00	0.01
Total	100.67	100.84	99.22	100.19	100.12	98.04	99.51	98.82	99.82	99.59	99.48	99.65	98.93

Structural formulae based on 6 oxygens

Fe	0.806	0.812	0.820	0.867	0.860	0.104	0.395	0.349	0.328	0.318	0.320	0.294	0.228
Mn	0.198	0.187	0.206	0.150	0.147	0.872	0.597	0.640	0.656	0.669	0.665	0.694	0.761
Ti	0.033	0.031	0.033	0.025	0.019	0.027	0.006	0.007	0.008	0.008	0.008	0.009	0.006
Nb	1.537	1.534	1.462	1.578	1.589	1.230	1.393	1.374	1.345	1.345	1.363	1.317	1.248
Ta	0.405	0.412	0.477	0.369	0.375	0.706	0.587	0.613	0.644	0.642	0.624	0.664	0.736
Sn	0.002	0.002	0.000	0.003	0.002	0.016	0.002	0.001	0.002	0.000	0.001	0.001	0.001
W	0.023	0.024	0.018	0.016	0.010	0.030	0.009	0.008	0.007	0.007	0.008	0.012	0.010
Pb	0.000	0.000	0.000	0.010	0.008	0.003	0.004	0.003	0.004	0.003	0.003	0.003	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.003	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.001	0.000	0.001
Ca	0.001	0.000	0.000	0.001	0.001	0.003	0.002	0.000	0.000	0.002	0.000	0.000	0.001
Total	3.005	3.001	3.020	3.019	3.012	2.992	3.002	2.995	2.993	2.995	2.994	2.995	2.995
Mn/(Mn+Fe)	0.197	0.187	0.201	0.148	0.146	0.893	0.602	0.647	0.667	0.678	0.675	0.702	0.770
Ta/(Ta+Nb)	0.209	0.212	0.246	0.190	0.191	0.365	0.297	0.308	0.324	0.323	0.314	0.335	0.371

Comments:	KA - KC same grain oscillatory zoned	incl. in cass. ML	VA & VB same grain core rim	rim	VC - VG same grain core	rim
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Columbite-Tantalite Group

	Big Whopper pegmatite 96-29A								Big Whopper pegmatite 96-29B							
	CB	CB	CG	CC	CE	CF	SA	SB	AA	AB	AC	AG	AD	AE	AJ	AK
FeO	6.71	6.71	6.39	5.91	7.07	7.09	4.45	4.68	8.39	7.14	8.73	8.12	9.10	10.51	9.08	8.98
MnO	12.15	12.15	12.23	11.98	11.01	11.01	10.73	9.96	7.05	6.00	7.10	6.52	7.52	7.94	6.79	6.84
TiO2	0.52	0.52	0.55	0.56	0.65	0.67	0.01	0.00	0.17	0.28	0.28	0.18	0.36	0.54	0.00	0.32
Nb2O5	54.74	54.74	51.56	45.92	47.83	47.17	17.85	9.60	18.59	14.49	25.96	14.53	20.59	38.43	14.39	16.17
Ta2O5	25.23	25.23	28.63	34.15	31.68	32.39	67.45	76.36	65.75	67.05	55.94	68.90	60.00	40.22	70.08	66.45
SnO2	0.18	0.18	0.18	0.24	0.26	0.28	0.06	0.04	0.16	2.32	0.31	0.40	0.16	0.14	0.09	0.00
WO3	0.18	0.18	0.31	0.18	0.23	0.25	0.24	0.30	0.32	0.36	0.49	0.30	0.31	0.82	0.10	0.49
PbO	0.31	0.31	0.29	0.28	0.27	0.28	0.05	0.08	0.08	0.03	0.08	0.15	0.47	0.07	0.00	0.08
ThO2	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
UO2	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	0.07	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.08	0.00	0.26
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.52	0.11	0.00
Sc2O3	0.00	0.00	0.10	0.00	0.04	0.10	0.00	0.00	0.00	0.09	0.00	0.00	0.38	0.00	0.00	0.53
CaO							0.02	0.02	0.00	1.38	0.01	0.02				
Total	100.02	100.02	100.25	99.21	99.03	99.24	100.87	101.04	100.51	99.13	98.91	99.14	99.56	99.35	100.64	100.12
Structural formulae based on 6 oxygens																
Fe	0.350	0.350	0.338	0.324	0.384	0.386	0.282	0.311	0.531	0.464	0.536	0.533	0.572	0.598	0.588	0.574
Mn	0.643	0.643	0.655	0.666	0.606	0.607	0.689	0.671	0.452	0.395	0.441	0.433	0.478	0.458	0.446	0.443
Ti	0.024	0.024	0.026	0.027	0.032	0.033	0.001	0.000	0.010	0.016	0.016	0.010	0.020	0.028	0.000	0.019
Nb	1.546	1.546	1.474	1.362	1.405	1.387	0.612	0.345	0.635	0.509	0.861	0.515	0.699	1.182	0.504	0.559
Ta	0.429	0.429	0.492	0.609	0.560	0.573	1.391	1.652	1.352	1.418	1.116	1.470	1.226	0.744	1.476	1.381
Sn	0.004	0.004	0.005	0.006	0.007	0.007	0.002	0.001	0.005	0.072	0.009	0.013	0.005	0.004	0.003	0.000
W	0.003	0.003	0.005	0.003	0.004	0.004	0.005	0.006	0.006	0.007	0.009	0.006	0.006	0.014	0.002	0.010
Pb	0.005	0.005	0.005	0.005	0.005	0.005	0.001	0.002	0.002	0.001	0.002	0.003	0.009	0.001	0.000	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.008
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.009	0.002	0.000
Sc	0.000	0.000	0.005	0.000	0.002	0.006	0.000	0.000	0.000	0.006	0.000	0.000	0.025	0.000	0.000	0.035
Ca							0.002	0.001	0.000	0.115	0.001	0.001				
Total	3.004	3.004	3.006	3.003	3.005	3.008	2.984	2.990	2.992	3.003	2.991	2.986	3.056	3.043	3.021	3.030
Mn/(Mn+Fe)	0.647	0.647	0.660	0.673	0.612	0.611	0.709	0.683	0.460	0.460	0.452	0.448	0.456	0.434	0.431	0.435
Ta/(Ta+Nb)	0.217	0.217	0.250	0.309	0.285	0.292	0.694	0.827	0.680	0.736	0.565	0.740	0.637	0.386	0.746	0.712
Comments:	two sections two different compositions	attached to cass. CD	CE & CF same grain	SA & SB same grain	AA - AC same grain									high Bi	high Bi	

Columbite-Tantalite Group

Big Whopper pegmatite
96-29B

	BA	BB	BC	BD	BE	BF	BG	BI	BJ	BM	BN	BQ
FeO	6.57	6.30	0.68	3.14	7.93	8.25	8.34	7.85	8.30	8.91	9.01	8.55
MnO	8.25	8.53	14.12	11.90	6.75	6.68	6.54	7.88	7.50	6.87	6.90	6.49
TiO2	0.21	0.14	0.09	0.15	0.27	0.27	0.16	0.58	0.83	0.46	0.35	0.59
Nb2O5	13.03	13.43	12.86	14.14	15.15	14.99	12.59	22.27	25.59	22.04	23.72	16.32
Ta2O5	70.96	69.87	71.51	70.22	67.63	68.77	70.42	60.57	56.34	61.11	58.73	66.47
SnO2	0.31	0.92	0.03	0.29	0.21	0.29	0.58	0.03	0.39	0.00	0.15	0.37
WO3	0.33	0.00	0.61	0.20	0.20	0.00	0.29	0.56	0.35	0.13	0.42	0.04
PbO	0.00	0.34	0.67	0.03	0.42	0.00	0.65	0.00	0.00	0.00	0.22	0.68
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
UO2	0.15	0.00	0.08	0.19	0.00	0.00	0.44	0.04	0.05	0.00	0.00	0.23
Sb2O3	0.00	0.00	0.11	0.19	0.14	0.07	0.00	0.17	0.00	0.00	0.01	0.00
Bi2O3	0.57	0.55	0.00	0.07	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.60	0.00	0.00	0.09	0.00	0.40	0.22	0.62	0.00	0.66	0.65
CaO												
Total	100.40	100.68	100.77	100.52	98.80	99.33	100.43	100.17	99.95	99.52	100.17	100.50

Structural formulae based on 6 oxygens

Fe	0.431	0.410	0.045	0.204	0.520	0.538	0.548	0.484	0.501	0.555	0.551	0.545
Mn	0.548	0.561	0.937	0.783	0.449	0.441	0.434	0.492	0.458	0.434	0.428	0.419
Ti	0.013	0.008	0.005	0.008	0.016	0.016	0.010	0.032	0.045	0.026	0.019	0.034
Nb	0.461	0.472	0.455	0.496	0.537	0.529	0.447	0.743	0.834	0.743	0.785	0.563
Ta	1.512	1.477	1.523	1.483	1.442	1.458	1.503	1.215	1.105	1.238	1.168	1.379
Sn	0.010	0.028	0.001	0.009	0.007	0.009	0.018	0.001	0.011	0.000	0.004	0.011
W	0.007	0.000	0.012	0.004	0.004	0.000	0.006	0.011	0.006	0.003	0.008	0.001
Pb	0.000	0.007	0.014	0.001	0.009	0.000	0.014	0.000	0.000	0.000	0.004	0.014
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
U	0.003	0.000	0.001	0.003	0.000	0.000	0.008	0.001	0.001	0.000	0.000	0.004
Sb	0.000	0.000	0.004	0.006	0.004	0.002	0.000	0.005	0.000	0.000	0.000	0.000
Bi	0.012	0.011	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.041	0.000	0.000	0.006	0.000	0.027	0.014	0.039	0.000	0.042	0.043
Ca												
Total	2.995	3.015	2.998	2.999	2.995	2.993	3.014	2.998	3.001	2.998	3.010	3.014
Mn/(Mn+Fe)	0.560	0.578	0.955	0.793	0.463	0.450	0.442	0.504	0.478	0.439	0.437	0.435
Ta/(Ta+Nb)	0.766	0.758	0.770	0.749	0.729	0.734	0.771	0.621	0.570	0.625	0.598	0.710

Comments: BA - BI same grain, BA - BG primary, BI & BJ secondary
 core inter inter inter rim rim rim
 high Bi high Bi

Columbite-Tantalite Group

Big Whopper pegmatite
96-29B

	HA	HB	HC	HD1	HD2	HD3	HD4	HD5	HD6	HD7	HD8	HD9	HD10	HE	HF
FeO	8.22	3.16	5.96	7.56	2.08	0.23	0.36	4.76	6.13	6.65	7.48	6.82	6.73	8.12	8.22
MnO	6.93	11.61	9.00	7.51	13.01	14.68	14.33	10.14	8.83	8.15	8.61	8.00	8.05	6.78	7.03
TiO2															
Nb2O5	14.97	13.19	13.97	15.47	15.42	14.10	13.40	13.78	13.73	12.81	27.56	13.31	12.66	14.30	17.12
Ta2O5	68.38	70.86	69.82	67.95	68.31	69.98	70.49	70.03	69.62	70.84	53.82	69.60	70.54	69.14	66.12
SnO2	0.13	0.21	0.20	0.15	0.16	0.23	0.19	0.17	0.55	0.70	0.33	0.61	0.60	0.49	0.11
WO3	0.30	0.39	0.30	0.35	0.33	0.40	0.28	0.27	0.22	0.24	0.46	0.26	0.23	0.24	0.28
PbO	0.05	0.00	0.01	0.04	0.01	0.06	0.06	0.01	0.08	0.00	0.12	0.03	0.01	0.06	0.12
ThO2	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
UO2	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
Sb2O3	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.04	0.00	0.02	0.02	0.05	0.04	0.00	0.01
Sc2O3	0.03	0.06	0.12	0.05	0.00	0.00	0.08	0.03	0.03	0.05	0.04	0.09	0.00	0.08	0.05
CaO	0.02	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.05	0.02	0.00	0.00
Total	99.19	99.56	99.49	99.25	99.43	99.77	99.32	99.31	99.43	99.59	99.33	98.92	99.01	99.42	99.17

Structural formulae based on 6 oxygens

Fe	0.537	0.208	0.390	0.492	0.135	0.015	0.024	0.313	0.402	0.438	0.451	0.451	0.447	0.531	0.531
Mn	0.458	0.774	0.597	0.495	0.857	0.971	0.956	0.675	0.587	0.544	0.525	0.536	0.541	0.449	0.459
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nb	0.529	0.469	0.495	0.544	0.542	0.498	0.477	0.490	0.487	0.457	0.897	0.476	0.454	0.506	0.597
Ta	1.453	1.517	1.488	1.439	1.444	1.487	1.510	1.498	1.485	1.519	1.054	1.497	1.522	1.470	1.388
Sn	0.004	0.007	0.006	0.005	0.005	0.007	0.006	0.005	0.017	0.022	0.010	0.019	0.019	0.015	0.003
W	0.006	0.008	0.006	0.007	0.007	0.008	0.006	0.006	0.005	0.005	0.009	0.005	0.005	0.005	0.006
Pb	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.002	0.000	0.002	0.001	0.000	0.001	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Sc	0.002	0.004	0.008	0.003	0.000	0.000	0.006	0.002	0.002	0.003	0.003	0.006	0.000	0.005	0.003
Ca	0.002	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.005	0.001	0.000	0.000
Total	3.011	2.996	3.003	3.004	3.002	2.999	2.998	3.000	3.015	3.004	3.044	3.008	3.006	3.008	3.006
Mn/(Mn+Fe)	0.460	0.788	0.605	0.502	0.864	0.985	0.976	0.683	0.593	0.554	0.538	0.543	0.548	0.458	0.464
Ta/(Ta+Nb)	0.733	0.764	0.750	0.726	0.727	0.749	0.760	0.754	0.753	0.769	0.540	0.759	0.770	0.744	0.699

Comments: HA - HI same grain HD = 163 µm traverse away from patchy zoned part of grain
slightly banded and with some patchy alteration

Columbite-Tantalite Group

Big Whopper pegmatite																	
96-29B																	
	HG1	HG2	HG3	HG4	HG5	HG6	HG7	HG8	HG9	HG10	HI	HJ	HK	HL1	HL2	HL3	HL4
FeO	8.02	7.91	8.10	8.12	8.19	7.77	7.73	7.90	8.28	8.72	8.29	8.50	8.77	8.74	8.75	8.38	9.42
MnO	7.04	7.02	7.31	7.35	7.48	7.00	7.27	7.24	7.24	6.94	6.65	6.53	6.52	6.66	6.73	6.70	7.06
TiO2														0.43	0.35	0.18	0.50
Nb2O5	15.36	14.05	19.47	20.13	21.71	21.41	15.57	16.87	20.83	21.60	13.97	15.65	18.19	20.69	21.64	16.44	32.37
Ta2O5	68.19	69.84	62.77	62.55	61.29	63.72	67.91	65.88	61.68	60.99	69.42	68.02	64.90	62.29	61.29	67.77	49.99
SnO2	0.20	0.09	0.36	0.20	0.19	0.74	0.51	0.88	0.28	0.22	0.17	0.13	0.35	0.61	0.17	0.13	0.18
WO3	0.29	0.27	0.34	0.26	0.23	0.36	0.28	0.28	0.29	0.29	0.30	0.28	0.35	0.31	0.32	0.27	0.47
PbO	0.11	0.07	0.12	0.03	0.10	0.06	0.05	0.04	0.17	0.14	0.04	0.03	0.04	0.08	0.15	0.00	0.19
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.00	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
Bi2O3	0.03	0.03	0.00	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05	0.00	0.00
Sc2O3	0.02	0.00	0.20	0.00	0.02	0.06	0.08	0.00	0.00	0.02	0.02	0.12	0.00	0.09	0.04	0.00	0.09
CaO	0.00	0.01	0.06	0.01	0.00	0.59	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.04	0.02	0.01	0.00
Total	99.40	99.41	99.09	99.07	99.68	102.19	99.60	99.37	99.17	99.30	99.07	99.36	99.65	99.93	99.50	99.88	100.27

Structural formulae based on 6 oxygens

Fe	0.522	0.520	0.514	0.514	0.511	0.474	0.501	0.508	0.522	0.546	0.546	0.553	0.558	0.546	0.547	0.540	0.551
Mn	0.464	0.467	0.470	0.471	0.473	0.432	0.477	0.472	0.462	0.440	0.443	0.430	0.420	0.422	0.427	0.437	0.418
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.020	0.010	0.026
Nb	0.541	0.499	0.668	0.689	0.732	0.706	0.546	0.587	0.710	0.732	0.497	0.550	0.625	0.700	0.732	0.572	1.023
Ta	1.444	1.491	1.295	1.288	1.243	1.264	1.431	1.379	1.264	1.243	1.486	1.438	1.342	1.267	1.247	1.419	0.950
Sn	0.006	0.003	0.011	0.006	0.006	0.021	0.016	0.027	0.008	0.006	0.005	0.004	0.010	0.018	0.005	0.004	0.005
W	0.006	0.005	0.007	0.005	0.004	0.007	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.006	0.006	0.005	0.009
Pb	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.003	0.003	0.001	0.001	0.001	0.002	0.003	0.000	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000
Sc	0.001	0.000	0.013	0.000	0.001	0.004	0.006	0.000	0.000	0.001	0.001	0.008	0.000	0.006	0.002	0.000	0.005
Ca	0.000	0.001	0.005	0.001	0.000	0.046	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.003	0.001	0.001	0.000
Total	3.004	3.001	3.025	3.019	3.021	3.007	3.004	3.013	3.020	3.020	3.006	3.000	3.024	2.993	2.992	2.988	2.990
Mn/(Mn+Fe)	0.471	0.473	0.477	0.478	0.481	0.477	0.488	0.482	0.470	0.446	0.448	0.438	0.430	0.436	0.438	0.447	0.431
Ta/(Ta+Nb)	0.728	0.749	0.660	0.651	0.629	0.642	0.724	0.701	0.640	0.629	0.749	0.723	0.682	0.644	0.630	0.713	0.482

Comments: HG = 224 µm traverse in
patchy zoned part of grain

HJ & HK HL traverse across 120 µm grain
same grain slightly patchy
limited patchy alteration at margin

Columbite-Tantalite Group

	Big Whopper pegmatite													Big Whopper	
	96-29C													96-29D	
	AA	AB	DA	DB	DC	DH	DI	DK	DL	DM	DN	DP	DQ	RL1	RL2
FeO	0.99	0.88	0.65	0.51	0.63	0.70	0.73	0.52	0.54	0.55	0.45	0.51	0.65	7.14	10.26
MnO	15.49	15.65	15.84	16.81	15.93	16.22	16.42	16.07	15.99	16.40	14.26	16.12	15.56	7.13	6.94
TiO2	0.30	0.19	0.11	0.10	0.24	0.15	0.16	0.02	0.09	0.05	0.19	0.12	0.15	0.57	0.66
Nb2O5	31.78	32.12	31.14	40.95	33.32	35.48	38.24	34.01	33.71	37.35	14.20	33.00	28.94	25.14	40.68
Ta2O5	51.04	50.80	52.30	41.34	49.25	45.58	44.07	48.58	49.39	45.31	70.07	49.93	54.31	55.94	37.47
SnO2	0.00	0.23	0.07	0.06	0.16	0.06	0.10	0.05	0.09	0.02	0.36	0.07	0.14	1.15	0.33
WO3	0.67	0.40	0.24	0.35	0.48	0.33	0.53	0.26	0.28	0.24	0.21	0.37	0.29	0.83	0.68
PbO	0.00	0.00	0.15	0.19	0.07	0.15	0.23	0.20	0.09	0.21	0.02	0.14	0.16	0.14	0.19
ThO2	0.00	0.20	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.02	0.01	0.00	0.03	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.00	0.26	0.00	0.06	0.00	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.14	0.12
CaO														1.41	0.02
Total	100.27	100.71	100.49	100.39	100.08	98.66	100.56	99.74	100.18	100.13	99.76	100.28	100.20	99.58	97.31
Structural formulae based on 6 oxygens															
Fe	0.058	0.051	0.038	0.028	0.037	0.041	0.041	0.030	0.031	0.031	0.030	0.030	0.039	0.434	0.586
Mn	0.920	0.924	0.945	0.953	0.941	0.959	0.942	0.951	0.943	0.951	0.943	0.954	0.942	0.438	0.401
Ti	0.016	0.010	0.006	0.005	0.012	0.008	0.008	0.001	0.005	0.003	0.011	0.007	0.008	0.031	0.034
Nb	1.008	1.013	0.992	1.239	1.050	1.119	1.171	1.074	1.062	1.155	0.501	1.042	0.935	0.825	1.255
Ta	0.974	0.964	1.002	0.752	0.934	0.865	0.812	0.923	0.936	0.843	1.487	0.948	1.055	1.105	0.695
Sn	0.000	0.007	0.002	0.002	0.004	0.002	0.003	0.001	0.003	0.001	0.011	0.002	0.004	0.033	0.009
W	0.012	0.007	0.004	0.006	0.009	0.006	0.009	0.005	0.005	0.004	0.004	0.007	0.005	0.016	0.012
Pb	0.000	0.000	0.003	0.003	0.001	0.003	0.004	0.004	0.002	0.004	0.000	0.003	0.003	0.003	0.003
Th	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.016	0.000	0.003	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.009	0.007
Ca														0.110	0.002
Total	2.987	2.994	2.992	2.992	2.989	3.002	2.994	2.991	2.986	2.991	2.987	2.992	2.992	3.004	3.004
Mn/(Mn+Fe)	0.941	0.947	0.961	0.971	0.962	0.959	0.958	0.969	0.968	0.968	0.970	0.970	0.960	0.503	0.407
Ta/(Ta+Nb)	0.491	0.488	0.503	0.378	0.471	0.436	0.409	0.462	0.468	0.422	0.748	0.476	0.530	0.572	0.357
Comments:	AA & AB same grain	DA - DC same grain core to rim occurring in clusters and with oscillatory zonation				DH & DI same grain		DK & DL same grain						inclusions in cassiterite	

Columbite-Tantalite Group

	Big Whopper pegmatite 96-29F						Big Whopper pegmatite 96-29G					
	RA	RB	RC	RD	RE	RF	FI	EH	EI	EJ	EK	EM
FeO	1.90	1.51	1.28	2.11	2.19	2.15	1.40	12.62	12.73	12.64	12.60	10.84
MnO	15.84	15.85	15.30	16.51	16.26	15.01	15.83	6.66	6.87	6.85	6.84	6.04
TiO2	0.28	0.11	0.29	0.40	0.54	0.65	0.44	0.27	0.26	0.25	0.27	0.21
Nb2O5	44.27	38.92	31.14	50.17	52.55	38.13	43.21	52.92	56.37	58.18	57.22	29.75
Ta2O5	36.00	42.43	50.62	29.90	27.19	40.93	35.59	27.38	23.38	21.23	22.01	52.28
SnO2	0.00	0.18	0.00	0.12	0.12	0.11	0.02	0.06	0.08	0.03	0.06	0.09
WO3	0.20	0.49	0.03	1.15	1.01	1.34	2.32	0.49	0.39	0.39	0.42	0.34
PbO	0.18	0.00	0.42	0.00	0.49	0.49	0.27	0.27	0.28	0.25	0.29	0.14
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.03	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.12	0.38	0.08	0.21	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.30	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.38	0.17	0.77	0.00	0.00	1.17	0.04	0.13	0.11	0.07	0.00	0.00
CaO							0.04	0.00	0.01	0.00	0.00	0.02
Total	99.06	100.09	100.25	100.58	100.56	100.12	99.12	100.81	100.46	99.91	99.71	99.71

Structural formulae based on 6 oxygens

Fe	0.105	0.086	0.075	0.112	0.115	0.121	0.078	0.662	0.658	0.651	0.653	0.647
Mn	0.888	0.909	0.910	0.888	0.866	0.855	0.891	0.354	0.360	0.357	0.359	0.365
Ti	0.014	0.006	0.015	0.019	0.026	0.033	0.022	0.013	0.012	0.012	0.012	0.011
Nb	1.325	1.191	0.988	1.440	1.493	1.159	1.298	1.500	1.576	1.620	1.603	0.960
Ta	0.648	0.781	0.966	0.516	0.465	0.748	0.643	0.467	0.393	0.355	0.371	1.015
Sn	0.000	0.005	0.000	0.003	0.003	0.003	0.000	0.002	0.002	0.001	0.001	0.003
W	0.003	0.009	0.001	0.019	0.016	0.023	0.040	0.008	0.006	0.006	0.007	0.006
Pb	0.003	0.000	0.008	0.000	0.008	0.009	0.005	0.005	0.005	0.004	0.005	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.003	0.011	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.005	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.022	0.010	0.047	0.000	0.000	0.069	0.002	0.007	0.006	0.004	0.000	0.000
Ca							0.003	0.000	0.001	0.000	0.000	0.001
Total	3.009	3.005	3.022	3.002	2.998	3.022	2.983	3.016	3.018	3.010	3.012	3.011
Mn/(Mn+Fe)	0.894	0.914	0.924	0.888	0.883	0.876	0.920	0.348	0.353	0.354	0.355	0.361
Ta/(Ta+Nb)	0.328	0.396	0.494	0.264	0.237	0.392	0.331	0.237	0.200	0.180	0.188	0.514

Comments:	RA - RD	RE & RF	EH & EI	EJ - EM
	same grain	same grain	same grain	same grain
	oscillatory zoned core to rim		core rim	primary secondary

Columbite-Tantalite Group

Big Whopper pegmatite															
96-29G															
	CA	CB	CC	CD	CE	CF	CG	CH	CK	EE	EF	EG	EH	EI	EJ
FeO	9.12	10.77	10.67	10.71	9.97	10.75	9.86	9.91	10.34	11.41	9.46	11.08	9.85	5.82	10.56
MnO	8.16	8.22	8.51	8.62	8.06	7.85	6.94	7.64	8.47	8.08	8.14	8.03	7.60	12.81	8.37
TiO2	0.32	0.24	0.51	0.12	0.61	0.44	0.74	0.61	0.34	0.29	0.37	0.42	0.42	0.28	0.29
Nb2O5	38.37	59.88	57.01	59.08	44.78	51.85	33.92	39.56	52.71	59.02	39.57	55.20	35.50	51.49	52.57
Ta2O5	43.04	19.85	22.37	20.99	34.80	27.65	44.56	41.43	26.61	19.99	41.24	23.49	45.88	28.14	27.32
SnO2	0.00	0.02	0.00	0.00	0.39	0.17	0.00	0.07	0.00	0.14	0.02	0.23	0.00	0.12	0.00
WO3	0.85	0.40	0.93	0.53	1.32	0.85	1.73	1.68	0.87	0.55	0.95	0.98	0.59	1.08	0.53
PbO	0.16	0.65	0.39	0.48	0.42	0.37	0.60	0.34	0.69	0.18	0.08	0.20	0.00	0.39	0.00
ThO2	0.21	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
UO2	0.00	0.42	0.04	0.00	0.66	0.00	0.51	0.00	0.20	0.38	0.00	0.34	0.00	0.10	0.11
Sb2O3	0.14	0.00	0.00	0.23	0.07	0.00	0.04	0.04	0.05	0.07	0.00	0.00	0.00	0.11	0.00
Bi2O3	0.06	0.19	0.00	0.00	0.00	0.47	0.31	0.00	0.05	0.25	0.00	0.18	0.04	0.26	0.13
Se2O3	0.40	0.00	0.00	0.25	0.00	0.37	0.91	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00
CaO															
Total	100.81	100.63	100.43	101.01	101.08	100.76	100.12	101.28	100.34	100.59	99.82	100.15	99.87	100.62	99.88
Structural formulae based on 6 oxygens															
Fe	0.514	0.550	0.550	0.546	0.543	0.566	0.569	0.552	0.546	0.582	0.534	0.578	0.568	0.308	0.559
Mn	0.465	0.425	0.444	0.445	0.444	0.419	0.406	0.431	0.453	0.418	0.465	0.424	0.443	0.687	0.448
Ti	0.016	0.011	0.024	0.006	0.030	0.021	0.038	0.030	0.016	0.013	0.019	0.020	0.022	0.014	0.014
Nb	1.169	1.653	1.588	1.627	1.318	1.476	1.058	1.192	1.505	1.628	1.207	1.555	1.106	1.474	1.503
Ta	0.789	0.330	0.375	0.348	0.616	0.474	0.836	0.751	0.457	0.332	0.757	0.398	0.860	0.485	0.470
Sn	0.000	0.000	0.000	0.000	0.010	0.004	0.000	0.002	0.000	0.003	0.001	0.006	0.000	0.003	0.000
W	0.015	0.006	0.015	0.008	0.022	0.014	0.031	0.029	0.014	0.009	0.017	0.016	0.011	0.018	0.009
Pb	0.003	0.011	0.006	0.008	0.007	0.006	0.011	0.006	0.012	0.003	0.001	0.003	0.000	0.007	0.000
Th	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.006	0.000	0.000	0.010	0.000	0.008	0.000	0.003	0.005	0.000	0.005	0.000	0.001	0.002
Sb	0.004	0.000	0.000	0.006	0.002	0.000	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.003	0.000
Bi	0.001	0.003	0.000	0.000	0.000	0.008	0.006	0.000	0.001	0.004	0.000	0.003	0.001	0.004	0.002
Sc	0.023	0.000	0.000	0.013	0.000	0.020	0.055	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000
Ca															
Total	3.001	2.995	3.002	3.006	3.003	3.008	3.019	2.995	3.008	3.012	3.001	3.007	3.009	3.004	3.007
Mn/(Mn+Fe)	0.475	0.436	0.447	0.449	0.450	0.425	0.416	0.439	0.453	0.418	0.466	0.423	0.439	0.690	0.445
Ta/(Ta+Nb)	0.403	0.166	0.191	0.176	0.319	0.243	0.441	0.387	0.233	0.169	0.385	0.204	0.437	0.247	0.238
Comments:											EE - EG same grain core/inte: rim rim		EH & EI same grain core rim odd comp.		

Columbite-Tantalite Group

Big Whopper pegmatite														
96-29G														
	EK	EL	EM	EN	EO	EQ	GA	GB	GC	GD	GE	GF	GG	GH
FeO	10.17	10.39	10.49	9.03	5.25	11.19	11.66	12.66	12.53	12.41	12.55	12.43	11.91	3.52
MnO	8.68	8.59	8.62	10.11	13.55	8.82	7.17	6.80	6.80	6.68	6.62	6.57	6.97	15.06
TiO2	0.63	0.24	0.44	0.11	0.02	0.29								
Nb2O5	51.20	53.70	50.86	51.61	52.13	58.36	52.39	58.33	57.39	55.03	53.97	52.91	53.57	54.28
Ta2O5	25.92	25.55	28.26	28.34	28.28	20.07	27.77	21.06	22.41	25.46	26.00	27.13	26.77	24.17
SnO2	0.43	0.25	0.18	0.15	0.24	0.14	0.02	0.17	0.05	0.06	0.09	0.03	0.07	0.05
WO3	1.65	0.20	0.51	0.50	0.60	0.78	0.60	0.45	0.46	0.50	0.45	0.51	0.50	0.99
PbO	0.35	0.15	0.55	0.00	0.26	0.55	0.17	0.34	0.28	0.21	0.26	0.24	0.23	0.27
ThO2	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
UO2	0.24	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.23	0.11	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.61	0.26	0.23	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.00
CaO							0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.04
Total	99.51	100.00	100.16	100.08	100.36	100.44	100.06	100.10	100.17	100.61	100.19	100.14	100.34	98.70
Structural formulae based on 6 oxygens														
Fe	0.542	0.545	0.557	0.478	0.278	0.574	0.617	0.651	0.647	0.646	0.659	0.655	0.625	0.186
Mn	0.468	0.456	0.464	0.543	0.727	0.458	0.384	0.354	0.356	0.352	0.351	0.351	0.370	0.807
Ti	0.030	0.011	0.021	0.005	0.001	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nb	1.474	1.522	1.461	1.478	1.492	1.618	1.498	1.621	1.602	1.548	1.530	1.508	1.520	1.552
Ta	0.449	0.436	0.488	0.488	0.487	0.335	0.478	0.352	0.376	0.431	0.443	0.465	0.457	0.416
Sn	0.011	0.006	0.005	0.004	0.006	0.003	0.001	0.004	0.001	0.001	0.002	0.001	0.002	0.001
W	0.027	0.003	0.008	0.008	0.010	0.012	0.010	0.007	0.007	0.008	0.007	0.008	0.008	0.016
Pb	0.006	0.003	0.009	0.000	0.004	0.009	0.003	0.006	0.005	0.004	0.004	0.004	0.004	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.004	0.002	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.033	0.014	0.013	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.000	0.000
Ca							0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003
Total	3.015	3.019	3.027	3.018	3.005	3.027	3.016	3.021	3.017	3.014	3.023	3.021	3.016	3.015
Mn/(Mn+Fe)	0.464	0.456	0.454	0.531	0.723	0.444	0.384	0.352	0.355	0.353	0.348	0.349	0.372	0.812
Ta/(Ta+Nb)	0.233	0.223	0.250	0.248	0.246	0.171	0.242	0.178	0.190	0.218	0.225	0.236	0.231	0.211
Comments:	EK & EL same grain			EN & EO			GB - GH same grain as EH & EI							
	core rim			same grain			rim	rim	rim	core	core	core	rim	odd comp.

Columbite-Tantalite Group

	Big Whopper pegmatite						Big Whopper pegmatite						SW Beryl pegmatite		
	96-29G						96-31						96053A		
	GI	GJ	GK	GL	GM	GN	DA	DB	DC	BD	BE	SE	SJ	SK	
FeO	12.35	12.53	11.46	11.30	11.51	11.70	9.12	9.14	9.36	10.00	9.86	13.57	13.13	13.35	
MnO	6.85	6.85	6.15	6.12	6.46	7.46	8.37	8.21	8.57	9.46	9.21	2.37	3.60	3.30	
TiO2							0.32	0.58	0.38	0.83	0.74	0.72	0.74	0.46	
Nb2O5	56.49	57.89	37.97	36.22	41.32	57.45	45.57	44.36	49.51	61.45	59.32	29.21	27.49	28.01	
Ta2O5	23.18	21.48	43.76	45.25	38.96	21.92	35.43	36.43	30.92	16.64	18.68	51.79	54.71	52.81	
SnO2	0.09	0.09	0.10	0.10	0.06	0.06	0.00	0.18	0.00	0.17	0.16	0.86	0.53	0.35	
WO3	0.42	0.43	0.42	0.41	0.41	0.50	0.43	0.00	0.52	0.69	0.56	0.17	0.14	0.14	
PbO	0.27	0.28	0.20	0.16	0.23	0.22	0.16	0.31	0.00	0.35	0.37	0.07	0.08	0.13	
ThO2	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	
UO2	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sb2O3	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.02	0.00	0.00	0.00	
Bi2O3	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	
Sc2O3	0.00	0.08	0.00	0.05	0.00	0.04	0.00	0.00	0.30	0.08	0.10	0.11	0.00	0.07	
CaO	0.00	0.01	0.02	0.02	0.00	0.03						0.01	0.03	0.02	
Total	99.89	99.90	100.35	99.91	99.29	99.67	99.44	99.22	99.71	99.67	99.02	98.88	100.41	98.62	
Structural formulae based on 6 oxygens															
Fe	0.642	0.646	0.651	0.650	0.647	0.605	0.502	0.506	0.502	0.505	0.506	0.814	0.784	0.809	
Mn	0.360	0.358	0.354	0.357	0.368	0.391	0.466	0.460	0.466	0.484	0.479	0.144	0.218	0.203	
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.029	0.018	0.038	0.034	0.039	0.040	0.025	
Nb	1.587	1.614	1.166	1.126	1.256	1.607	1.355	1.328	1.436	1.679	1.647	0.947	0.888	0.918	
Ta	0.392	0.360	0.808	0.846	0.713	0.369	0.634	0.656	0.539	0.274	0.312	1.010	1.063	1.041	
Sn	0.002	0.002	0.003	0.003	0.002	0.001	0.000	0.005	0.000	0.004	0.004	0.024	0.015	0.010	
W	0.007	0.007	0.007	0.007	0.007	0.008	0.007	0.000	0.009	0.011	0.009	0.003	0.003	0.003	
Pb	0.005	0.005	0.004	0.003	0.004	0.004	0.003	0.006	0.000	0.006	0.006	0.001	0.002	0.003	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.000	0.004	0.000	0.003	0.000	0.002	0.000	0.000	0.017	0.004	0.005	0.007	0.000	0.004	
Ca	0.000	0.000	0.001	0.002	0.000	0.002						0.001	0.002	0.002	
Total	3.016	3.020	3.021	3.023	3.031	3.017	2.985	2.990	2.991	3.005	3.003	2.991	3.014	3.018	
Mn/(Mn+Fe)	0.360	0.356	0.352	0.354	0.362	0.392	0.482	0.476	0.481	0.489	0.486	0.150	0.217	0.200	
Ta/(Ta+Nb)	0.198	0.183	0.409	0.429	0.362	0.187	0.319	0.331	0.273	0.140	0.159	0.516	0.545	0.531	

Comments:

SJ & SK same grain
incls. in cassiterite

Columbite-Tantalite Group

SW Beryl pegmatite 96-53B														
	JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN
FeO	15.17	13.73	13.31	11.16	14.39	11.73	10.77	10.87	11.19	12.06	12.66	12.66	10.86	10.81
MnO	4.35	4.80	4.25	6.34	4.83	3.92	4.23	4.12	4.56	4.18	5.12	4.82	5.20	5.11
TiO2	0.65	1.08	0.19	0.13	0.76	0.26	0.15	0.15	0.37	0.38	0.34	0.19	0.07	0.01
Nb2O5	62.18	50.98	40.74	37.48	60.30	22.36	17.28	17.61	22.47	30.13	41.53	37.96	25.96	25.56
Ta2O5	16.80	28.29	41.05	44.00	19.58	60.75	66.79	66.48	60.76	51.39	39.70	43.78	57.42	57.53
SnO2	0.00	0.23	0.09	0.00	0.03	0.07	0.09	0.24	0.36	0.35	0.00	0.06	0.13	0.00
WO3	0.62	0.62	0.26	0.47	0.48	0.47	0.45	0.08	0.37	0.01	0.14	0.09	0.18	0.36
PbO	0.70	0.00	0.64	0.31	0.23	0.51	0.03	0.02	0.00	0.42	0.32	0.32	0.07	0.00
ThO2	0.15	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.08	0.00	0.00
UO2	0.00	0.09	0.30	0.52	0.00	0.00	0.00	0.05	0.00	0.63	0.00	0.00	0.00	0.03
Sb2O3	0.04	0.16	0.01	0.16	0.15	0.12	0.00	0.21	0.00	0.00	0.00	0.05	0.14	0.00
Bi2O3	0.00	0.10	0.08	0.00	0.10	0.00	0.00	0.38	0.00	0.00	0.05	0.00	0.00	0.00
Se2O3	0.00	0.68	0.00	0.31	0.00	0.52	0.00	0.08	0.13	0.00	0.00	0.00	0.02	0.79
CaO														
Total	100.65	100.77	100.92	101.07	100.85	100.71	99.79	100.29	100.20	99.84	99.85	99.99	100.04	100.20
Structural formulae based on 6 oxygens														
Fe	0.763	0.719	0.745	0.633	0.727	0.723	0.692	0.694	0.691	0.720	0.709	0.723	0.662	0.656
Mn	0.222	0.255	0.241	0.364	0.247	0.24	0.275	0.267	0.285	0.253	0.290	0.279	0.321	0.314
Ti	0.029	0.051	0.010	0.007	0.035	0.014	0.008	0.008	0.020	0.020	0.017	0.010	0.004	0.001
Nb	1.690	1.444	1.233	1.150	1.647	0.745	0.599	0.608	0.750	0.973	1.258	1.172	0.855	0.838
Ta	0.275	0.482	0.748	0.812	0.322	1.218	1.394	1.381	1.221	0.998	0.723	0.813	1.138	1.135
Sn	0.000	0.006	0.003	0.000	0.001	0.002	0.003	0.007	0.011	0.010	0.000	0.002	0.004	0.000
W	0.010	0.010	0.005	0.008	0.008	0.009	0.009	0.002	0.007	0.000	0.002	0.002	0.003	0.007
Pb	0.011	0.000	0.012	0.006	0.004	0.010	0.001	0.000	0.000	0.008	0.006	0.006	0.001	0.000
Th	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.001	0.000	0.000
U	0.000	0.001	0.004	0.008	0.000	0.000	0.000	0.001	0.000	0.010	0.000	0.000	0.000	0.000
Sb	0.001	0.004	0.000	0.005	0.004	0.004	0.000	0.007	0.000	0.000	0.000	0.001	0.004	0.000
Bi	0.000	0.002	0.001	0.000	0.002	0.000	0.000	0.007	0.000	0.000	0.001	0.000	0.000	0.000
Sc	0.000	0.037	0.000	0.019	0.000	0.033	0.000	0.005	0.008	0.000	0.000	0.000	0.001	0.050
Ca														
Total	3.002	3.011	3.002	3.013	2.994	3.003	2.981	2.988	2.994	2.998	3.006	3.007	2.993	3.001
Mn/(Mn+Fe)	0.225	0.262	0.244	0.365	0.254	0.253	0.284	0.278	0.292	0.260	0.290	0.278	0.327	0.324
Ta/(Ta+Nb)	0.140	0.250	0.377	0.414	0.163	0.620	0.699	0.694	0.619	0.506	0.365	0.410	0.571	0.575
Comments:	JA - JD same grain			JE - JG same grain				JH - JN same grain						
	primary			secondary				primary				secondary		

Columbite-Tantalite Group

	SW Beryl pegmatite Pegmatite 14					S. R. pluton		SW Beryl pegmatite			
	96-55		96-57B			96-72B		96-76			
	MN	MO	CB	LI	LJ	KJ	KK	MG	MK	ML	MS
FeO	15.75	15.68	15.84	12.66	11.83	16.97	17.20	12.29	12.66	12.33	11.16
MnO	3.93	3.97	3.87	5.08	5.36	1.71	1.65	5.77	6.29	6.83	5.50
TiO2	0.43	0.34	0.40	1.68	1.58	0.84	1.12	0.63	0.70	0.61	0.20
Nb2O5	63.00	61.87	60.73	45.87	40.04	50.00	52.27	48.92	58.60	58.23	36.02
Ta2O5	16.27	17.75	18.62	32.37	39.76	27.51	25.66	30.51	19.61	19.93	45.51
SnO2	0.14	0.00	0.11	0.48	0.57	0.43	0.18	0.17	0.18	0.16	0.10
WO3	0.28	0.50	0.17	0.62	0.75	2.00	1.55	0.39	0.74	0.65	0.28
PbO	0.65	0.30	0.00	0.30	0.31	0.22	0.24	0.17	0.27	0.32	0.15
ThO2	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.23	0.22	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Sb2O3	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.19	0.00	0.41	0.56	0.60	0.11	0.15	0.00	0.20	0.18	0.02
CaO						0.03	0.01	0.00	0.00	0.02	0.03
Total	100.65	100.41	100.41	100.37	100.78	99.83	100.03	98.84	99.25	99.24	98.99
Structural formulae based on 6 oxygens											
Fe	0.789	0.791	0.800	0.681	0.652	0.903	0.903	0.666	0.651	0.635	0.648
Mn	0.199	0.203	0.198	0.277	0.299	0.092	0.088	0.317	0.328	0.357	0.324
Ti	0.019	0.016	0.018	0.081	0.078	0.040	0.053	0.031	0.032	0.028	0.011
Nb	1.706	1.687	1.659	1.334	1.194	1.439	1.483	1.433	1.629	1.623	1.132
Ta	0.265	0.291	0.306	0.566	0.713	0.476	0.438	0.537	0.328	0.334	0.860
Sn	0.003	0.000	0.003	0.012	0.015	0.011	0.005	0.004	0.004	0.004	0.003
W	0.004	0.008	0.003	0.010	0.013	0.033	0.025	0.007	0.012	0.010	0.005
Pb	0.010	0.005	0.000	0.005	0.006	0.004	0.004	0.003	0.004	0.005	0.003
Th	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.010	0.000	0.022	0.032	0.034	0.006	0.008	0.000	0.011	0.009	0.001
Ca						0.002	0.001	0.000	0.000	0.001	0.002
Total	3.007	3.001	3.012	3.011	3.004	3.007	3.007	2.997	2.999	3.007	2.988
Mn/(Mn+Fe)	0.202	0.204	0.198	0.289	0.315	0.092	0.088	0.322	0.335	0.360	0.333
Ta/(Ta+Nb)	0.134	0.147	0.156	0.298	0.374	0.249	0.228	0.273	0.168	0.171	0.432
Comments:	MN & MO same grain					KJ & KK same grain					

Columbite-Tantalite Group

	SW Beryl pegmatite 96-76A										SW Beryl pegmatite 96-81				
	TB	TC	TD	TE	TF	TG	TH	TJ	TN	TO	NA	NB	NC	ND	NM
FeO	11.15	11.48	11.29	11.69	11.40	11.44	11.13	11.49	11.07	11.38	13.66	13.49	13.59	13.75	13.27
MnO	5.32	5.40	5.46	5.66	5.56	5.49	5.33	5.60	5.72	5.36	1.57	1.58	1.63	1.59	1.52
TiO ₂	0.17	0.22	0.18	0.34	0.22	0.30	0.17	0.13	0.04	0.42	0.00	0.00	0.00	0.00	0.00
Nb ₂ O ₅	35.12	39.16	39.37	42.24	40.52	40.57	34.99	39.98	37.64	37.77	26.64	25.17	25.34	27.04	22.16
Ta ₂ O ₅	46.79	42.83	42.36	38.52	40.60	40.14	46.97	42.19	44.26	43.58	57.30	58.18	58.00	57.05	61.12
SnO ₂	0.21	0.15	0.19	0.19	0.59	0.72	0.37	0.12	0.13	0.23	0.00	0.09	0.00	0.21	0.34
WO ₃	0.23	0.22	0.16	0.33	0.29	0.19	0.20	0.15	0.19	0.23	0.25	0.43	0.18	0.36	0.01
PbO	0.19	0.13	0.17	0.16	0.23	0.21	0.15	0.21	0.16	0.24	0.07	0.45	0.00	0.00	0.61
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.40
UO ₂	0.00	0.00	0.00	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.30	0.49	0.00	0.00	0.17
Sb ₂ O ₃	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.19	0.18	0.58
Se ₂ O ₃	0.00	0.11	0.05	0.00	0.02	0.10	0.08	0.03	0.00	0.00	0.00	0.00	0.69	0.00	0.00
CaO	0.02	0.01	0.03	0.03	0.03	0.04	0.03	0.01	0.01	0.00					
Total	99.19	99.69	99.25	99.16	99.50	99.25	99.41	99.91	99.23	99.20	99.87	99.90	100.10	100.18	100.18
Structural formulae based on 6 oxygens															
Fe	0.650	0.652	0.643	0.656	0.644	0.646	0.648	0.650	0.637	0.653	0.833	0.832	0.830	0.834	0.834
Mn	0.314	0.310	0.315	0.321	0.318	0.314	0.314	0.321	0.334	0.311	0.097	0.098	0.101	0.098	0.097
Ti	0.009	0.011	0.009	0.017	0.011	0.015	0.009	0.007	0.002	0.022	0.000	0.000	0.000	0.000	0.000
Nb	1.108	1.202	1.213	1.280	1.238	1.240	1.101	1.222	1.172	1.172	0.879	0.839	0.837	0.887	0.752
Ta	0.888	0.791	0.785	0.702	0.746	0.738	0.889	0.776	0.829	0.813	1.137	1.167	1.152	1.125	1.248
Sn	0.006	0.004	0.005	0.005	0.016	0.019	0.010	0.003	0.004	0.006	0.000	0.003	0.000	0.006	0.010
W	0.004	0.004	0.003	0.006	0.005	0.003	0.004	0.003	0.003	0.004	0.005	0.008	0.003	0.007	0.000
Pb	0.003	0.002	0.003	0.003	0.004	0.004	0.003	0.004	0.003	0.004	0.001	0.009	0.000	0.000	0.012
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.007
U	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.005	0.008	0.000	0.000	0.003
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.003	0.011
Sc	0.000	0.007	0.003	0.000	0.001	0.006	0.005	0.002	0.000	0.000	0.000	0.000	0.044	0.000	0.000
Ca	0.002	0.001	0.002	0.002	0.002	0.003	0.002	0.001	0.001	0.000					
Total	2.984	2.984	2.982	2.992	2.986	2.989	2.985	2.987	2.986	2.986	2.960	2.964	2.978	2.960	2.974
Mn/(Mn+Fe)	0.326	0.323	0.329	0.329	0.330	0.327	0.327	0.331	0.344	0.323	0.104	0.106	0.108	0.105	0.104
Ta/(Ta+Nb)	0.445	0.397	0.393	0.354	0.376	0.373	0.447	0.388	0.414	0.410	0.564	0.582	0.579	0.559	0.624
Comments:	TC - TE same grain			TF & TG same grain			NA - ND same cluster assoc. with later tapiolite NE - NH odd structural formulae								

Columbite-Tantalite Group

	SW Beryl pegmatite 96-81						SW Beryl pegmatite 96-81X			East Beryl peg. 96-82A	
	NR	NS	NT	GK	GL	GM	GA	GB	GC	CA	CB
FeO	13.30	12.96	13.07	13.75	13.94	13.42	13.22	13.49	13.81	10.30	10.46
MnO	1.75	1.69	1.74	1.48	0.98	1.09	0.69	0.73	0.78	6.29	5.89
TiO2	0.07	0.11	0.00	0.40	0.76	0.66	0.25	0.34	0.53	0.18	0.21
Nb2O5	22.68	18.97	21.68	26.72	18.64	18.98	26.18	25.84	30.23	30.98	28.76
Ta2O5	61.64	64.71	63.10	56.36	65.74	63.42	58.67	57.03	53.39	50.92	53.56
SnO2	0.08	0.56	0.02	0.05	0.32	0.31	0.03	1.11	0.20	0.03	0.00
WO3	0.00	0.60	0.26	0.25	0.28	0.27	0.42	0.80	0.24	0.37	0.40
PbO	0.27	0.28	0.01	0.12	0.05	0.06	0.05	0.11	0.09	0.00	0.50
ThO2	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Sb2O3	0.25	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.12
Bi2O3	0.19	0.44	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.65	0.00	0.02	0.13	0.00	0.00	0.11	0.00	0.09
CaO				0.01	0.00	0.03	0.03	0.02	0.02		
Total	100.23	100.52	100.63	99.14	100.72	98.39	99.53	99.47	99.40	99.28	99.99
Structural formulae based on 6 oxygens											
Fe	0.828	0.822	0.810	0.840	0.876	0.859	0.810	0.826	0.825	0.614	0.628
Mn	0.110	0.109	0.109	0.092	0.062	0.071	0.043	0.045	0.047	0.379	0.358
Ti	0.004	0.006	0.000	0.022	0.043	0.038	0.014	0.019	0.028	0.010	0.011
Nb	0.763	0.650	0.727	0.882	0.633	0.657	0.867	0.855	0.976	0.997	0.933
Ta	1.248	1.334	1.272	1.120	1.343	1.320	1.169	1.135	1.037	0.986	1.045
Sn	0.002	0.017	0.001	0.001	0.010	0.010	0.001	0.032	0.006	0.001	0.000
W	0.000	0.012	0.005	0.005	0.005	0.005	0.008	0.015	0.004	0.007	0.007
Pb	0.005	0.006	0.000	0.002	0.001	0.001	0.001	0.002	0.002	0.000	0.010
Th	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Sb	0.008	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.004
Bi	0.004	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.042	0.000	0.001	0.009	0.000	0.000	0.007	0.000	0.006
Ca				0.001	0.000	0.003	0.002	0.002	0.002		
Total	2.972	2.970	2.968	2.965	2.973	2.972	2.915	2.932	2.934	2.998	3.002
Mn/(Mn+Fe)	0.118	0.117	0.119	0.098	0.067	0.076	0.050	0.052	0.054	0.382	0.363
Ta/(Ta+Nb)	0.621	0.672	0.636	0.559	0.680	0.668	0.574	0.570	0.515	0.497	0.528
Comments:	NS & NT		GK - GM							CA & CB	
	same grain		same grain							same grain	
	mantled by ferrotapolite NU & NV										

Columbite-Tantalite Group

	East Beryl pegmatite 96-82B							SW Beryl peg. 96-85		SW Beryl pegmatite 96-86				
	MA	MB	MC	MD	ME	MF	MG	GC	GD	FL	QF	AC	AD	AE
FeO	13.77	13.96	13.83	13.88	13.77	12.64	11.76	17.60	17.80	9.46	10.00	10.54	10.28	9.27
MnO	4.32	4.30	4.29	4.41	4.37	4.35	4.27	2.70	2.84	7.12	7.67	7.13	7.21	6.41
TiO2	0.52	0.57	0.58	0.61	0.63	0.52	0.65	0.63	0.64	0.43	0.39	1.27	1.03	1.07
Nb2O5	48.08	49.34	47.90	49.65	48.61	36.39	28.05	67.20	67.92	44.48	44.45	48.07	45.23	25.48
Ta2O5	32.01	30.71	32.53	29.81	31.66	45.59	55.02	9.96	9.78	35.26	35.80	31.14	35.41	56.37
SnO2	0.08	0.11	0.08	0.08	0.08	0.13	0.21	0.03	0.25	0.19	0.14	0.33	0.30	0.36
WO3	0.59	0.72	0.57	1.04	0.94	0.54	0.56	0.73	0.36	0.59	0.60	0.76	0.74	0.72
PbO	0.15	0.19	0.24	0.23	0.22	0.15	0.02	0.15	0.23	0.39	0.12	0.25	0.24	0.08
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.16	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.12	0.00	0.00	0.02	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.04
Sc2O3	0.01	0.03	0.03	0.00	0.13	0.06	0.14	0.34	0.20	0.00	0.04	0.10	0.14	0.07
CaO	0.00	0.00	0.00	0.00	0.00	0.01	0.00			0.03	0.00	0.00	0.01	0.00
Total	99.55	99.93	100.06	99.71	100.39	100.37	100.68	99.97	100.14	98.11	99.21	99.60	100.59	99.87
Structural formulae based on 6 oxygens														
Fe	0.746	0.749	0.747	0.744	0.738	0.722	0.700	0.865	0.871	0.529	0.553	0.567	0.557	0.561
Mn	0.237	0.234	0.235	0.239	0.237	0.252	0.257	0.135	0.141	0.404	0.430	0.388	0.396	0.393
Ti	0.025	0.027	0.028	0.030	0.030	0.027	0.035	0.028	0.028	0.022	0.020	0.061	0.050	0.058
Nb	1.408	1.431	1.398	1.439	1.408	1.124	0.902	1.786	1.797	1.346	1.329	1.397	1.326	0.834
Ta	0.564	0.536	0.571	0.520	0.552	0.847	1.065	0.159	0.156	0.642	0.644	0.544	0.625	1.110
Sn	0.002	0.003	0.002	0.002	0.002	0.004	0.006	0.001	0.006	0.005	0.004	0.008	0.008	0.010
W	0.010	0.012	0.010	0.017	0.016	0.010	0.010	0.011	0.005	0.010	0.010	0.013	0.012	0.013
Pb	0.003	0.003	0.004	0.004	0.004	0.003	0.000	0.002	0.004	0.007	0.002	0.004	0.004	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
U	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.003	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Sc	0.001	0.002	0.002	0.000	0.007	0.003	0.009	0.017	0.010	0.000	0.002	0.005	0.008	0.005
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000			0.002	0.000	0.000	0.000	0.000
Total	2.995	2.996	2.996	2.996	2.994	2.992	2.984	3.015	3.020	2.969	2.995	2.990	2.987	2.987
Mn/(Mn+Fe)	0.241	0.238	0.239	0.243	0.243	0.259	0.269	0.135	0.139	0.433	0.437	0.407	0.416	0.412
Ta/(Ta+Nb)	0.286	0.272	0.290	0.265	0.281	0.430	0.541	0.082	0.080	0.323	0.326	0.280	0.320	0.571
Comments:	all from same large grain				MB - MG traverse from core to thin rim region (F & G)				inclusion in gnt.					

Columbite-Tantalite Group

SW Beryl pegmatite 96-86A															
	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	LA2	LA3	LA4	LA5	LA6
FeO	2.77	2.71	2.66	2.67	3.24	2.71	2.74	4.43	2.77	4.64	3.02	2.64	2.52	2.45	2.59
MnO	14.66	14.68	14.70	14.55	14.13	13.67	13.71	12.72	13.72	13.23	12.83	13.50	13.40	13.66	13.59
TiO2	0.17	0.21	0.10	0.22	0.21	0.01	0.33	0.33	0.21	0.30	0.36	0.29	0.29	0.40	0.30
Nb2O5	35.95	36.43	37.22	36.73	37.72	28.83	28.77	39.10	28.19	39.25	27.00	29.76	28.21	30.25	28.62
Ta2O5	45.19	45.02	43.90	44.30	42.16	53.16	53.65	41.25	53.30	41.34	55.11	53.16	54.38	51.87	53.29
SnO2	0.19	0.29	0.29	0.00	0.20	0.10	0.32	0.20	0.31	0.00	0.30	0.17	0.16	0.18	0.12
WO3	0.37	0.66	0.54	0.85	1.01	0.49	0.69	0.72	0.98	0.61	0.58	0.60	0.77	0.94	0.72
PbO	0.16	0.40	0.00	0.19	0.00	0.36	0.00	0.43	0.34	0.18	0.01	0.14	0.17	0.08	0.07
ThO2	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
UO2	0.00	0.00	0.03	0.20	0.00	0.21	0.00	0.01	0.04	0.17	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.20	0.17	0.22	0.28	0.05	0.20	0.00	0.00	0.00	0.00	0.01
Bi2O3	0.23	0.00	0.54	0.10	0.50	0.28	0.20	0.57	0.49	0.17	0.00	0.00	0.06	0.00	0.00
Sc2O3	0.00	0.00	0.05	0.00	0.00	0.49	0.00	0.47	0.00	0.00	0.08	0.09	0.00	0.00	0.04
CaO											0.00	0.02	0.01	0.01	0.01
Total	99.67	100.40	100.03	99.83	99.37	100.48	100.65	100.52	100.39	100.09	99.28	100.35	99.96	99.83	99.35
Structural formulae based on 6 oxygens															
Fe	0.160	0.155	0.152	0.154	0.186	0.162	0.163	0.250	0.166	0.262	0.183	0.156	0.151	0.145	0.156
Mn	0.857	0.851	0.852	0.847	0.820	0.826	0.826	0.726	0.833	0.757	0.788	0.811	0.815	0.821	0.828
Ti	0.009	0.011	0.005	0.012	0.011	0.000	0.018	0.017	0.011	0.015	0.019	0.015	0.016	0.021	0.016
Nb	1.122	1.127	1.152	1.140	1.169	0.930	0.924	1.191	0.914	1.199	0.886	0.954	0.916	0.970	0.930
Ta	0.848	0.838	0.817	0.827	0.786	1.032	1.037	0.756	1.039	0.760	1.087	1.025	1.062	1.001	1.042
Sn	0.005	0.008	0.008	0.000	0.005	0.003	0.009	0.005	0.009	0.000	0.009	0.005	0.004	0.005	0.003
W	0.007	0.012	0.010	0.015	0.018	0.009	0.013	0.013	0.018	0.011	0.011	0.011	0.014	0.017	0.013
Pb	0.003	0.007	0.000	0.004	0.000	0.007	0.000	0.008	0.007	0.003	0.000	0.003	0.003	0.001	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.001	0.003	0.000	0.003	0.000	0.000	0.001	0.003	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.006	0.005	0.006	0.008	0.001	0.006	0.000	0.000	0.000	0.000	0.000
Bi	0.004	0.000	0.010	0.002	0.009	0.005	0.004	0.010	0.009	0.003	0.000	0.000	0.001	0.000	0.000
Sc	0.000	0.000	0.003	0.000	0.000	0.030	0.000	0.028	0.000	0.000	0.005	0.006	0.000	0.000	0.002
Ca											0.000	0.001	0.001	0.001	0.001
Total	3.015	3.010	3.008	3.003	3.009	3.013	3.000	3.010	3.008	3.018	2.988	2.987	2.984	2.983	2.994
Mn/(Mn+Fe)	0.843	0.846	0.849	0.847	0.815	0.837	0.835	0.744	0.834	0.743	0.811	0.838	0.843	0.850	0.842
Ta/(Ta+Nb)	0.431	0.426	0.415	0.420	0.402	0.526	0.529	0.388	0.532	0.388	0.551	0.518	0.537	0.508	0.528
Comments:	HA & HB same grain HA - HE homogeneous					HF - HH same grain lighter BSE			HI & HJ same grain lighter BSE		grain 1 all unzoned				

Columbite-Tantalite Group

SW Beryl pegmatite 96-86A															
	LA7	LA8	LA9	LA10	LA11	LA12	LA13	LA14	LA15	LA16	LA17	LA18	LA19	LA20	LA21
FeO	2.53	2.57	2.61	2.55	2.53	2.43	2.55	2.59	2.59	2.57	2.59	3.31	3.10	3.41	3.07
MnO	13.42	13.37	13.61	13.41	13.46	13.65	13.43	13.48	13.42	13.47	13.08	12.70	12.87	12.74	13.09
TiO2	0.27	0.29	0.25	0.27	0.28	0.31	0.24	0.24	0.24	0.23	0.24	0.28	0.22	0.24	0.24
Nb2O5	28.25	28.29	28.27	28.38	28.47	28.38	28.52	28.62	28.20	28.67	28.39	28.54	28.78	28.32	28.64
Ta2O5	54.15	53.70	53.66	53.98	53.80	53.99	53.96	53.80	53.92	54.28	53.66	54.05	54.11	54.08	54.39
SnO2	0.15	0.19	0.17	0.21	0.18	0.13	0.14	0.13	0.11	0.16	0.15	0.16	0.19	0.18	0.15
WO3	0.74	0.78	0.75	0.78	0.79	0.71	0.68	0.76	0.66	0.63	0.71	0.78	0.62	0.71	0.70
PbO	0.15	0.09	0.07	0.22	0.12	0.13	0.13	0.12	0.15	0.06	0.10	0.11	0.09	0.16	0.09
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.06	0.06	0.00	0.00
Bi2O3	0.00	0.00	0.07	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.05	0.00	0.02	0.00	0.00	0.00	0.09	0.04	0.11	0.04	0.00	0.00	0.08	0.02
CaO	0.00	0.01	0.02	0.00	0.01	0.04	0.02	0.02	0.02	0.00	0.13	0.01	0.02	0.00	0.01
Total	99.66	99.33	99.48	99.80	99.64	99.77	99.68	99.85	99.34	100.17	99.23	100.00	100.04	99.92	100.40

Structural formulae based on 6 oxygens

Fe	0.152	0.155	0.157	0.153	0.152	0.146	0.153	0.155	0.156	0.153	0.157	0.198	0.186	0.205	0.183
Mn	0.818	0.816	0.830	0.816	0.820	0.830	0.818	0.818	0.820	0.815	0.800	0.771	0.780	0.774	0.791
Ti	0.015	0.015	0.014	0.014	0.015	0.017	0.013	0.013	0.013	0.012	0.013	0.015	0.012	0.013	0.013
Nb	0.919	0.922	0.920	0.922	0.925	0.921	0.926	0.927	0.920	0.926	0.926	0.924	0.931	0.919	0.924
Ta	1.060	1.053	1.051	1.055	1.051	1.054	1.055	1.048	1.058	1.055	1.053	1.053	1.053	1.055	1.055
Sn	0.004	0.005	0.005	0.006	0.005	0.004	0.004	0.004	0.003	0.005	0.004	0.005	0.005	0.005	0.004
W	0.014	0.015	0.014	0.014	0.015	0.013	0.013	0.014	0.012	0.012	0.013	0.014	0.012	0.013	0.013
Pb	0.003	0.002	0.001	0.004	0.002	0.002	0.003	0.002	0.003	0.001	0.002	0.002	0.002	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000
Bi	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.003	0.000	0.001	0.000	0.000	0.000	0.005	0.003	0.007	0.002	0.000	0.000	0.005	0.001
Ca	0.000	0.001	0.002	0.000	0.001	0.003	0.002	0.001	0.002	0.000	0.010	0.001	0.001	0.000	0.001
Total	2.985	2.987	2.996	2.986	2.986	2.990	2.986	2.989	2.990	2.985	2.983	2.985	2.983	2.992	2.987
Mn/(Mn+Fe)	0.843	0.841	0.841	0.842	0.843	0.850	0.842	0.840	0.840	0.842	0.836	0.795	0.808	0.791	0.812
Ta/(Ta+Nb)	0.535	0.533	0.533	0.534	0.532	0.534	0.532	0.531	0.535	0.532	0.532	0.533	0.531	0.535	0.533

Comments:

grain 1
all unzoned

Columbite-Tantalite Group

SW Beryl pegmatite 96-86A														
	LA22	LA23	LA24	LA25	LA26	LA27	LA28	LA29	LA30	LA31	LA32	LA33	LA34	LA35
FeO	2.79	2.66	2.62	2.66	2.54	2.62	2.65	2.63	2.64	2.71	2.49	2.52	2.63	2.83
MnO	13.36	13.49	13.54	13.50	13.37	13.63	13.55	13.48	13.53	13.25	12.68	13.60	13.48	13.58
TiO2	0.27	0.22	0.21	0.22	0.23	0.24	0.21	0.26	0.27	0.29	0.27	0.30	0.31	0.19
Nb2O5	28.41	28.39	29.48	29.02	27.59	29.12	28.82	28.62	28.22	28.26	27.20	28.53	29.07	32.15
Ta2O5	54.36	54.15	54.03	54.25	53.34	54.07	54.15	54.16	54.12	54.26	55.18	53.82	54.05	51.59
SnO2	0.21	0.19	0.17	0.18	0.18	0.17	0.14	0.20	0.21	0.20	0.17	0.09	0.08	0.03
WO3	0.71	0.68	0.65	0.70	0.89	0.73	0.67	0.73	0.63	0.76	0.69	0.69	0.64	0.39
PbO	0.11	0.13	0.07	0.12	0.21	0.07	0.07	0.18	0.15	0.11	0.21	0.12	0.10	0.15
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.10	0.01	0.07	0.06	0.05	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.00
CaO	0.02	0.02	0.02	0.02	0.00	0.01	0.02	0.01	0.03	0.01	0.40	0.00	0.00	0.01
Total	100.24	100.03	100.79	100.74	98.43	100.72	100.27	100.27	99.89	99.87	99.33	99.68	100.36	100.92

Structural formulae based on 6 oxygens

Fe	0.167	0.159	0.155	0.158	0.155	0.156	0.158	0.157	0.158	0.163	0.151	0.151	0.157	0.165
Mn	0.809	0.819	0.812	0.812	0.826	0.819	0.819	0.816	0.822	0.806	0.780	0.827	0.813	0.803
Ti	0.015	0.012	0.011	0.012	0.012	0.013	0.011	0.014	0.015	0.015	0.015	0.016	0.016	0.010
Nb	0.919	0.920	0.944	0.932	0.910	0.934	0.930	0.925	0.915	0.918	0.892	0.926	0.936	1.015
Ta	1.057	1.055	1.041	1.048	1.059	1.043	1.051	1.053	1.056	1.060	1.089	1.051	1.047	0.979
Sn	0.006	0.005	0.005	0.005	0.005	0.005	0.004	0.006	0.006	0.006	0.005	0.003	0.002	0.001
W	0.013	0.013	0.012	0.013	0.017	0.013	0.012	0.014	0.012	0.014	0.013	0.013	0.012	0.007
Pb	0.002	0.003	0.001	0.002	0.004	0.001	0.001	0.004	0.003	0.002	0.004	0.002	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.006	0.000	0.004	0.004	0.003	0.000	0.000	0.006	0.000	0.001	0.000	0.000	0.000
Ca	0.002	0.001	0.001	0.001	0.000	0.000	0.001	0.001	0.002	0.001	0.031	0.000	0.000	0.001
Total	2.989	2.993	2.983	2.986	2.993	2.988	2.988	2.987	2.995	2.984	2.982	2.990	2.984	2.984
Mn/(Mn+Fe)	0.829	0.837	0.840	0.837	0.842	0.840	0.838	0.839	0.839	0.832	0.837	0.845	0.839	0.829
Ta/(Ta+Nb)	0.535	0.534	0.524	0.529	0.538	0.528	0.531	0.532	0.536	0.536	0.550	0.532	0.528	0.491

Comments:

grain 1
all unzoned

Columbite-Tantalite Group

SW Beryl pegmatite 96-86A															
	LA36	LA37	LA38	LA39	LA40	LA41	LA42	LA43	LA44	LA45	LA46	LA47	LA48	LA49	LA50
FeO	2.84	2.81	2.85	2.85	2.92	2.85	3.14	3.38	3.43	3.43	3.45	2.94	3.06	3.19	3.32
MnO	13.63	13.73	13.60	13.45	13.09	13.11	13.99	13.89	13.80	13.89	13.83	13.02	13.58	13.00	12.73
TiO2	0.23	0.23	0.29	0.29	0.33	0.29	0.28	0.28	0.27	0.26	0.29	0.33	0.33	0.34	0.29
Nb2O5	31.69	33.52	31.88	30.56	28.77	28.35	39.68	40.29	42.07	41.04	41.54	27.04	35.27	29.26	27.45
Ta2O5	51.60	50.48	50.10	52.10	54.41	54.22	42.77	40.57	40.12	41.42	40.48	56.65	47.72	54.08	56.11
SnO2	0.08	0.02	0.03	0.06	0.07	0.06	0.06	0.02	0.06	0.04	0.04	0.07	0.07	0.07	0.13
WO3	0.57	0.45	0.55	0.53	0.60	0.61	0.49	0.49	0.44	0.40	0.53	0.73	0.55	0.63	0.63
PbO	0.11	0.16	0.08	0.16	0.09	0.13	0.21	0.17	0.27	0.11	0.21	0.07	0.15	0.08	0.07
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.05	0.00
Bi2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.04
Sc2O3	0.00	0.01	0.00	0.01	0.06	0.09	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
CaO	0.02	0.03	0.04	0.03	0.06	0.04	0.02	0.04	0.03	0.03	0.04	0.00	0.00	0.02	0.00
Total	100.76	101.45	99.43	100.06	100.39	99.79	100.63	99.13	100.57	100.62	100.41	100.88	100.76	100.71	100.76
Structural formulae based on 6 oxygens															
Fe	0.166	0.162	0.168	0.169	0.174	0.171	0.176	0.191	0.190	0.191	0.192	0.176	0.176	0.189	0.199
Mn	0.808	0.802	0.813	0.807	0.790	0.797	0.796	0.796	0.776	0.785	0.780	0.790	0.790	0.781	0.772
Ti	0.012	0.012	0.016	0.016	0.017	0.016	0.014	0.014	0.013	0.013	0.014	0.018	0.017	0.018	0.016
Nb	1.003	1.045	1.018	0.978	0.927	0.920	1.205	1.233	1.263	1.237	1.251	0.876	1.095	0.938	0.889
Ta	0.982	0.947	0.962	1.003	1.054	1.059	0.781	0.747	0.724	0.751	0.734	1.104	0.891	1.043	1.093
Sn	0.002	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.002	0.001	0.001	0.002	0.002	0.002	0.004
W	0.010	0.008	0.010	0.010	0.011	0.011	0.008	0.009	0.008	0.007	0.009	0.014	0.010	0.012	0.012
Pb	0.002	0.003	0.002	0.003	0.002	0.003	0.004	0.003	0.005	0.002	0.004	0.001	0.003	0.002	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Sc	0.000	0.000	0.000	0.001	0.004	0.006	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.002	0.002	0.003	0.002	0.005	0.003	0.001	0.003	0.002	0.002	0.003	0.000	0.000	0.001	0.000
Total	2.988	2.983	2.993	2.990	2.985	2.988	2.988	2.997	2.987	2.990	2.989	2.982	2.983	2.986	2.985
Mn/(Mn+Fe)	0.829	0.832	0.828	0.827	0.820	0.823	0.819	0.806	0.803	0.804	0.803	0.818	0.818	0.805	0.795
Ta/(Ta+Nb)	0.495	0.475	0.486	0.506	0.532	0.535	0.393	0.377	0.365	0.378	0.370	0.558	0.449	0.527	0.551
Comments:	grain 1 all unzoned			grain 1 unzoned			grain 1 patchy zonation				grain 1 unzoned				

Columbite-Tantalite Group

SW Beryl pegmatite 96-86A														
	LA51	LA52	LA53	LA54	LA55	LA56	LA57	LA58	LA59	LA60	LA61	LA62	LA63	LA64
FeO	3.32	3.46	3.48	3.61	3.71	3.67	3.92	4.09	4.23	4.66	4.75	4.30	4.14	3.81
MnO	14.03	13.85	13.83	13.75	13.58	13.55	13.41	13.37	13.06	12.68	12.49	13.03	13.25	13.59
TiO2	0.25	0.22	0.26	0.25	0.29	0.32	0.27	0.25	0.27	0.26	0.27	0.29	0.28	0.27
Nb2O5	40.35	42.46	41.34	41.59	41.95	40.78	40.94	41.31	41.55	41.35	39.29	41.74	42.06	42.19
Ta2O5	41.41	40.11	40.59	40.73	40.37	41.53	41.07	40.51	40.91	40.93	43.05	40.35	40.03	40.18
SnO2	0.07	0.09	0.07	0.10	0.05	0.08	0.05	0.09	0.00	0.05	0.09	0.08	0.06	0.03
WO3	0.45	0.48	0.42	0.53	0.45	0.54	0.39	0.56	0.44	0.43	0.45	0.41	0.45	0.38
PbO	0.11	0.14	0.17	0.17	0.17	0.18	0.19	0.20	0.19	0.14	0.18	0.14	0.20	0.21
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00
Bi2O3	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
Sc2O3	0.07	0.00	0.04	0.01	0.05	0.00	0.00	0.02	0.04	0.00	0.00	0.04	0.09	0.06
CaO	0.04	0.03	0.03	0.02	0.04	0.02	0.03	0.03	0.01	0.03	0.03	0.05	0.02	0.03
Total	100.09	100.85	100.24	100.75	100.65	100.67	100.26	100.44	100.70	100.53	100.60	100.43	100.57	100.73

Structural formulae based on 6 oxygens

Fe	0.186	0.191	0.194	0.201	0.206	0.205	0.219	0.228	0.235	0.260	0.267	0.239	0.229	0.211
Mn	0.798	0.776	0.782	0.774	0.763	0.766	0.760	0.755	0.736	0.716	0.712	0.734	0.744	0.762
Ti	0.012	0.011	0.013	0.013	0.014	0.016	0.014	0.012	0.013	0.013	0.014	0.014	0.014	0.013
Nb	1.225	1.269	1.248	1.249	1.258	1.230	1.239	1.245	1.249	1.246	1.196	1.255	1.261	1.263
Ta	0.756	0.721	0.737	0.736	0.728	0.754	0.748	0.735	0.740	0.742	0.788	0.730	0.722	0.724
Sn	0.002	0.002	0.002	0.003	0.001	0.002	0.001	0.002	0.000	0.001	0.002	0.002	0.002	0.001
W	0.008	0.008	0.007	0.009	0.008	0.009	0.007	0.010	0.008	0.007	0.008	0.007	0.008	0.007
Pb	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.002	0.003	0.003	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.000	0.002	0.000	0.003	0.000	0.000	0.001	0.003	0.000	0.000	0.002	0.005	0.003
Ca	0.003	0.002	0.002	0.001	0.002	0.001	0.002	0.002	0.001	0.002	0.002	0.004	0.001	0.002
Total	2.996	2.984	2.992	2.989	2.987	2.987	2.992	2.995	2.987	2.989	2.992	2.990	2.991	2.990
Mn/(Mn+Fe)	0.811	0.802	0.801	0.794	0.788	0.789	0.776	0.768	0.758	0.734	0.727	0.754	0.764	0.783
Ta/(Ta+Nb)	0.382	0.362	0.371	0.371	0.367	0.380	0.376	0.371	0.372	0.373	0.397	0.368	0.364	0.364

Comments:	grain 1 patchy zonation	grain 1 patchy zonation
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Columbite-Tantalite Group

SW Beryl pegmatite 96-86A																
	LA65	LA66	LA67	LA68	LA69	LB	LC	LD	LE	LF	LG	LA	KA	KB	KC	
FeO	3.03	3.00	3.42	4.29	5.00	2.66	2.96	2.75	5.19	4.40	5.78	3.69	2.60	4.90	2.62	
MnO	13.17	12.61	13.63	13.02	11.44	13.12	12.43	12.99	12.34	12.99	11.25	12.08	13.27	12.18	13.45	
TiO2	0.29	0.18	0.15	0.20	0.38	0.24	0.22	0.21	0.19	0.18	0.26	0.27	0.22	0.36	0.20	
Nb2O5	30.32	22.38	39.54	42.72	39.46	25.45	22.83	24.97	43.02	43.29	35.07	25.63	28.85	39.81	28.93	
Ta2O5	54.49	62.19	43.23	40.07	42.10	58.72	61.41	58.55	39.36	39.01	46.50	57.34	54.13	41.83	53.95	
SnO2	0.07	0.06	0.04	0.09	0.08	0.09	0.08	0.05	0.02	0.04	0.06	0.19	0.13	0.07	0.14	
WO3	0.47	0.46	0.34	0.41	0.51	0.53	0.51	0.51	0.39	0.36	0.53	0.68	0.76	0.55	0.70	
PbO	0.16	0.09	0.18	0.18	0.10	0.08	0.12	0.07	0.19	0.21	0.15	0.07	0.18	0.22	0.18	
ThO2	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	
UO2	0.05	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sb2O3	0.04	0.00	0.00	0.02	0.00	0.02	0.04	0.02	0.01	0.01	0.01	0.02	0.00	0.01	0.01	
Bi2O3	0.00	0.02	0.00	0.00	0.06	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.25	0.05	0.00	0.00	0.16	0.00	0.12	0.00	0.00	0.09	0.04	0.00	0.13	0.00	0.00	
CaO	0.06	0.03	0.04	0.01	0.11	0.02	0.05	0.01	0.05	0.04	0.04	0.02	0.01	0.01	0.00	
Total	102.39	101.08	100.56	101.02	99.48	100.92	100.78	100.12	100.78	100.62	99.69	99.98	100.27	99.93	100.18	
Structural formulae based on 6 oxygens																
Fe	0.176	0.185	0.192	0.237	0.283	0.161	0.182	0.168	0.287	0.243	0.335	0.225	0.155	0.276	0.156	
Mn	0.775	0.786	0.778	0.728	0.657	0.804	0.774	0.804	0.690	0.726	0.660	0.745	0.802	0.696	0.814	
Ti	0.015	0.010	0.007	0.010	0.019	0.013	0.012	0.012	0.010	0.009	0.014	0.015	0.012	0.018	0.011	
Nb	0.953	0.744	1.204	1.275	1.209	0.833	0.759	0.825	1.284	1.291	1.098	0.844	0.931	1.214	0.934	
Ta	1.030	1.244	0.792	0.719	0.776	1.156	1.228	1.163	0.707	0.700	0.876	1.136	1.051	0.767	1.048	
Sn	0.002	0.002	0.001	0.002	0.002	0.003	0.002	0.002	0.001	0.001	0.002	0.005	0.004	0.002	0.004	
W	0.008	0.009	0.006	0.007	0.009	0.010	0.010	0.010	0.007	0.006	0.009	0.013	0.014	0.010	0.013	
Pb	0.003	0.002	0.003	0.003	0.002	0.002	0.002	0.001	0.003	0.004	0.003	0.001	0.003	0.004	0.003	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.015	0.003	0.000	0.000	0.009	0.000	0.007	0.000	0.000	0.005	0.003	0.000	0.008	0.000	0.000	
Ca	0.005	0.002	0.003	0.001	0.008	0.001	0.004	0.001	0.003	0.003	0.003	0.001	0.000	0.001	0.000	
Total	2.983	2.987	2.986	2.982	2.977	2.982	2.982	2.985	2.991	2.988	3.003	2.985	2.980	2.988	2.985	
Mn/(Mn+Fe)	0.815	0.810	0.802	0.755	0.699	0.833	0.810	0.827	0.707	0.749	0.663	0.768	0.838	0.716	0.839	
Ta/(Ta+Nb)	0.519	0.626	0.397	0.361	0.391	0.581	0.618	0.585	0.355	0.352	0.444	0.574	0.530	0.387	0.529	
Comments:	grain 1 unzoned	grain 1 patchy zonation					grain 1 unzoned									

Columbite-Tantalite Group

SW Beryl pegmatite 96-86A															
	KD	KE	KF	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP	KQ	KR
FeO	2.57	5.22	4.05	4.63	3.72	2.63	5.01	5.14	4.37	4.18	3.77	3.96	2.76	5.51	5.81
MnO	13.33	11.74	13.28	12.19	13.28	13.32	11.99	12.08	11.90	12.17	11.71	11.88	12.54	11.49	10.66
TiO2	0.25	0.56	0.28	0.36	0.20	0.22	0.31	0.30	0.29	0.28	0.18	0.37	0.27	0.47	0.43
Nb2O5	28.99	40.01	43.82	39.64	41.32	29.15	39.56	41.05	30.98	31.62	21.55	29.49	20.67	40.43	33.28
Ta2O5	53.66	40.81	36.50	41.37	39.91	53.49	41.56	39.77	51.19	51.43	62.05	52.23	62.88	40.85	48.90
SnO2	0.17	0.15	0.05	0.07	0.04	0.17	0.04	0.03	0.04	0.04	0.09	0.09	0.10	0.07	0.15
WO3	0.75	0.68	0.65	0.61	0.40	0.76	0.50	0.44	0.47	0.50	0.43	0.73	0.34	0.53	0.54
PbO	0.17	0.23	0.22	0.15	0.16	0.07	0.13	0.20	0.18	0.18	0.10	0.21	0.15	0.09	0.06
ThO2	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
UO2	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
Sb2O3	0.01	0.00	0.00	0.05	0.02	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	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
Se2O3	0.04	0.04	0.04	0.00	0.00	0.09	0.00	0.05	0.03	0.09	0.00	0.05	0.10	0.00	0.05
CaO	0.01	0.02	0.02	0.05	0.04	0.00	0.04	0.03	0.01	0.02	0.02	0.09	0.02	0.03	0.02
Total	99.96	99.46	98.90	99.09	99.08	99.92	99.13	99.08	99.47	100.51	99.91	99.09	99.80	99.47	99.89

Structural formulae based on 6 oxygens

Fe	0.154	0.295	0.226	0.263	0.210	0.157	0.285	0.290	0.260	0.245	0.236	0.238	0.173	0.311	0.339
Mn	0.807	0.671	0.749	0.701	0.759	0.806	0.690	0.690	0.716	0.723	0.741	0.722	0.797	0.656	0.629
Ti	0.013	0.029	0.014	0.018	0.010	0.012	0.016	0.015	0.015	0.015	0.010	0.020	0.015	0.024	0.022
Nb	0.937	1.221	1.320	1.218	1.260	0.941	1.216	1.252	0.995	1.003	0.728	0.956	0.701	1.232	1.049
Ta	1.044	0.749	0.661	0.764	0.732	1.039	0.768	0.730	0.989	0.981	1.260	1.019	1.283	0.749	0.927
Sn	0.005	0.004	0.001	0.002	0.001	0.005	0.001	0.001	0.001	0.001	0.003	0.003	0.003	0.002	0.004
W	0.014	0.012	0.011	0.011	0.007	0.014	0.009	0.008	0.009	0.009	0.008	0.014	0.007	0.009	0.010
Pb	0.003	0.004	0.004	0.003	0.003	0.001	0.002	0.004	0.003	0.003	0.002	0.004	0.003	0.002	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.003	0.002	0.002	0.000	0.000	0.006	0.000	0.003	0.002	0.006	0.000	0.003	0.006	0.000	0.003
Ca	0.001	0.001	0.001	0.003	0.003	0.000	0.003	0.002	0.001	0.001	0.001	0.007	0.001	0.002	0.002
Total	2.981	2.988	2.990	2.985	2.986	2.982	2.990	2.994	2.990	2.988	2.989	2.985	2.989	2.985	2.987
Mn/(Mn+Fe)	0.840	0.695	0.769	0.727	0.784	0.837	0.708	0.704	0.734	0.747	0.759	0.752	0.821	0.679	0.650
Ta/(Ta+Nb)	0.527	0.380	0.334	0.386	0.368	0.525	0.387	0.368	0.498	0.495	0.634	0.516	0.647	0.378	0.469

Comments:

grain 1
unzoned

Columbite-Tantalite Group

	SW Beryl pegmatite 96-86A								SW Beryl pegmatite 96-86B					
	KS	KT	KU	KV	KW	KX	KY	KZ	JC	JD	JF	JG	JH	JI
FeO	4.54	4.57	5.38	5.69	4.41	3.36	4.76	2.63	11.68	12.04	11.40	13.27	14.03	10.04
MnO	11.45	11.68	11.86	11.02	12.64	13.25	12.07	14.28	8.99	8.47	9.22	7.37	6.28	10.28
TiO2	0.39	0.30	0.28	0.38	0.35	0.16	0.22	0.20	0.53	0.45	0.45	0.64	0.63	0.42
Nb2O5	27.39	30.43	39.25	35.29	40.12	36.04	36.51	37.02	64.83	64.37	65.36	64.91	63.81	63.05
Ta2O5	55.09	52.32	41.73	46.03	41.65	45.22	45.30	44.45	12.68	13.05	12.29	11.87	13.76	15.01
SnO2	0.05	0.13	0.05	0.08	0.02	0.09	0.07	0.13	0.23	0.19	0.06	0.00	0.26	0.00
WO3	0.42	0.53	0.47	0.49	0.46	0.75	0.72	0.80	0.24	0.41	0.37	0.30	0.35	0.08
PbO	0.06	0.11	0.21	0.16	0.15	0.13	0.13	0.17	0.49	0.24	0.37	0.37	0.48	0.58
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.42	0.00	0.27	0.00
Sb2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.15	0.00	0.10	0.00	0.01
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.22	0.00	0.00
Sc2O3	0.10	0.02	0.01	0.07	0.01	0.00	0.00	0.00	0.68	0.00	0.00	0.31	0.00	0.00
CaO	0.01	0.02	0.03	0.01	0.01	0.01	0.00	0.01						
Total	99.49	100.12	99.27	99.21	99.80	99.03	99.77	99.68	100.47	100.11	99.93	99.36	99.88	99.47

Structural formulae based on 6 oxygens

Fe	0.274	0.270	0.306	0.331	0.248	0.195	0.274	0.151	0.577	0.601	0.567	0.662	0.703	0.507
Mn	0.701	0.700	0.684	0.648	0.721	0.779	0.703	0.830	0.450	0.429	0.465	0.372	0.319	0.526
Ti	0.021	0.016	0.014	0.020	0.018	0.008	0.011	0.010	0.024	0.020	0.020	0.029	0.028	0.019
Nb	0.895	0.974	1.207	1.108	1.223	1.131	1.135	1.148	1.732	1.738	1.758	1.750	1.727	1.720
Ta	1.083	1.008	0.772	0.869	0.763	0.853	0.847	0.829	0.204	0.212	0.199	0.193	0.224	0.246
Sn	0.001	0.004	0.001	0.002	0.001	0.003	0.002	0.004	0.006	0.005	0.001	0.000	0.006	0.000
W	0.008	0.010	0.008	0.009	0.008	0.014	0.013	0.014	0.004	0.006	0.006	0.005	0.005	0.001
Pb	0.001	0.002	0.004	0.003	0.003	0.002	0.002	0.003	0.008	0.004	0.006	0.006	0.008	0.009
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.006	0.000	0.004	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.004	0.000	0.002	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.003	0.000	0.000
Sc	0.006	0.001	0.000	0.004	0.001	0.000	0.000	0.000	0.035	0.000	0.000	0.016	0.000	0.000
Ca	0.001	0.002	0.002	0.001	0.001	0.001	0.000	0.001						
Total	2.992	2.987	2.999	2.993	2.986	2.986	2.987	2.991	3.041	3.028	3.027	3.037	3.024	3.029
Mn/(Mn+Fe)	0.719	0.721	0.691	0.662	0.744	0.800	0.720	0.846	0.438	0.416	0.450	0.360	0.312	0.509
Ta/(Ta+Nb)	0.547	0.508	0.390	0.440	0.384	0.430	0.427	0.419	0.105	0.109	0.102	0.099	0.115	0.125

Comments:

grain 1
unzoned

Columbite-Tantalite Group

	SW Beryl pegmatite 96-86B				Marko's pegmatite 96-AT1						
	MA1	MA2	MA3	MA4	SG	SM	TA	TB	TC	TR26	TR27
FeO	9.48	9.56	9.48	9.45	7.86	11.01	10.90	9.58	7.86	9.33	11.01
MnO	10.02	10.04	10.04	9.70	10.20	6.56	5.83	9.01	10.20	8.95	7.03
TiO2	0.54	0.58	0.59	0.50	1.02	0.55	0.69	0.66	1.02	0.79	0.87
Nb2O5	62.74	62.25	61.57	58.67	50.12	44.92	43.35	53.79	50.12	55.11	53.22
Ta2O5	15.88	16.02	16.18	19.84	29.26	35.58	36.20	25.39	29.26	25.13	26.90
SnO2	0.11	0.11	0.14	0.10	0.18	0.08	0.13	0.06	0.18	0.10	0.11
WO3	0.65	0.67	0.78	0.66	0.72	0.69	0.66	0.72	0.72	0.86	0.72
PbO	0.28	0.30	0.30	0.23	0.21	0.16	0.17	0.32	0.28	0.27	0.28
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.11	0.00	0.00	0.00	0.16	0.01	0.04	0.11	0.23	0.07	0.22
CaO	0.00	0.00	0.00	0.01	0.03	0.03	0.03	0.03	0.03	0.04	0.03
Total	99.80	99.54	99.08	99.14	99.74	99.55	98.21	99.64	99.89	100.61	100.37

Structural formulae based on 6 oxygens

Fe	0.477	0.483	0.482	0.487	0.418	0.605	0.611	0.503	0.418	0.483	0.576
Mn	0.510	0.514	0.517	0.506	0.550	0.366	0.331	0.479	0.549	0.470	0.372
Ti	0.025	0.026	0.027	0.023	0.049	0.027	0.035	0.031	0.049	0.037	0.041
Nb	1.706	1.700	1.692	1.635	1.442	1.335	1.313	1.527	1.440	1.543	1.504
Ta	0.260	0.263	0.268	0.333	0.506	0.636	0.659	0.433	0.506	0.423	0.457
Sn	0.003	0.003	0.003	0.003	0.005	0.002	0.004	0.002	0.005	0.002	0.003
W	0.010	0.010	0.012	0.010	0.012	0.012	0.011	0.012	0.012	0.014	0.012
Pb	0.004	0.005	0.005	0.004	0.004	0.003	0.003	0.005	0.005	0.005	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.006	0.000	0.000	0.000	0.009	0.001	0.002	0.006	0.013	0.004	0.012
Ca	0.000	0.000	0.000	0.000	0.002	0.002	0.002	0.002	0.002	0.003	0.002
Total	3.001	3.005	3.006	3.002	2.996	2.989	2.975	3.000	2.998	2.982	2.984
Mn/(Mn+Fe)	0.517	0.515	0.517	0.510	0.568	0.377	0.352	0.488	0.568	0.493	0.393
Ta/(Ta+Nb)	0.132	0.134	0.137	0.169	0.260	0.323	0.334	0.221	0.260	0.215	0.233

Comments: early columbite? core zone rim
mainly replaced light BSE
by microlite

Columbite-Tantalite Group

	Marko's peg. 96-AT1		Marko's peg. 96-AT5		Marko's pegmatite 96-AT6					Marko's pegmatite 96-AT7					
	TR29	TR47	BF	BI	CA	CB	CF	CG	CH	DA	DB	DD	DI	DJ	DK
FeO	9.08	7.34	2.39	2.35	8.22	9.94	7.98	9.35	8.37	11.08	10.97	11.31	10.47	8.71	10.98
MnO	9.12	10.86	12.81	12.57	9.85	8.32	10.08	8.86	9.94	7.54	7.39	7.06	7.97	8.10	7.28
TiO2	0.61	1.15	1.77	1.83	2.33	1.92	2.90	2.16	1.97	1.98	1.99	1.84	1.90	3.00	1.95
Nb2O5	51.43	52.96	24.02	24.38	53.38	56.56	52.39	55.11	56.49	59.74	59.59	58.93	60.80	51.76	60.83
Ta2O5	28.68	27.18	58.28	57.28	22.92	20.43	23.24	21.91	19.99	17.33	17.77	18.37	16.79	24.05	16.82
SnO2	0.11	0.36	0.58	0.58	0.36	0.27	0.43	0.30	0.31	0.20	0.08	0.14	0.14	0.77	0.10
WO3	0.74	0.65	0.60	0.66	1.12	1.07	1.21	1.16	1.14	0.90	1.02	1.05	1.06	1.03	1.09
PbO	0.26	0.28	0.19	0.08	0.32	0.25	0.42	0.25	0.33	0.28	0.26	0.29	0.30	0.40	0.33
ThO2	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
UO2	0.00	0.00	0.00	0.02	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00
Sb2O3	0.00	0.00	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
Bi2O3	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
Sc2O3	0.06	0.14	0.00	0.00	0.40	0.34	0.25	0.22	0.30	0.41	0.38	0.36	0.39	0.75	0.37
CaO	0.02	0.03	0.03	0.05	0.01	0.03	0.07	0.03	0.18	0.06	0.08	0.07	0.08	0.38	0.08
Total	100.08	100.92	100.68	99.79	98.90	99.12	99.14	99.34	99.02	99.52	99.52	99.41	99.89	99.07	99.83
Structural formulae based on 6 oxygens															
Fe	0.481	0.382	0.144	0.142	0.428	0.511	0.415	0.482	0.430	0.559	0.554	0.574	0.525	0.453	0.551
Mn	0.489	0.572	0.782	0.770	0.519	0.433	0.531	0.463	0.517	0.385	0.378	0.363	0.405	0.427	0.370
Ti	0.029	0.054	0.096	0.100	0.109	0.089	0.136	0.100	0.091	0.090	0.090	0.084	0.086	0.140	0.088
Nb	1.473	1.489	0.782	0.798	1.502	1.571	1.473	1.537	1.570	1.629	1.627	1.617	1.647	1.455	1.649
Ta	0.494	0.460	1.142	1.127	0.388	0.341	0.393	0.367	0.334	0.284	0.292	0.303	0.274	0.407	0.274
Sn	0.003	0.009	0.017	0.017	0.009	0.007	0.011	0.007	0.008	0.005	0.002	0.003	0.003	0.019	0.002
W	0.012	0.010	0.011	0.012	0.018	0.017	0.020	0.019	0.018	0.014	0.016	0.017	0.016	0.017	0.017
Pb	0.004	0.005	0.004	0.002	0.005	0.004	0.007	0.004	0.005	0.004	0.004	0.005	0.005	0.007	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.003	0.007	0.000	0.000	0.022	0.018	0.014	0.012	0.016	0.021	0.020	0.019	0.020	0.041	0.019
Ca	0.001	0.002	0.002	0.004	0.001	0.002	0.004	0.002	0.012	0.004	0.005	0.004	0.005	0.025	0.005
Total	2.991	2.990	2.979	2.972	3.000	2.993	3.006	2.993	3.002	2.996	2.988	2.990	2.986	2.992	2.981
Mn/(Mn+Fe)	0.504	0.600	0.844	0.844	0.548	0.459	0.561	0.490	0.546	0.408	0.406	0.387	0.435	0.485	0.402
Ta/(Ta+Nb)	0.251	0.236	0.593	0.586	0.205	0.178	0.211	0.193	0.175	0.149	0.152	0.158	0.142	0.218	0.143
Comments:	Sb betafite/ Sb microlite traverse		BF & BI same grain incl. in cass.			CA - CH same grain contains microlite inclusions patchy zonation - replacement texture						DA - DK same grain contains microlite inclusions patchy zonation - replacement texture			

Columbite-Tantalite Group

Marko's pegmatite															
96-AT8															
	EA	EB	EC	ED	EF	EG	EH	EK	EL	EM	EN	EO	EP	EQ	ES
FeO	2.93	3.12	3.10	3.17	2.73	2.63	2.79	2.74	2.86	2.74	2.56	2.60	2.42	2.83	2.81
MnO	14.11	14.04	13.85	13.67	13.35	13.03	13.32	13.45	12.43	12.82	12.73	12.87	12.62	12.67	12.52
TiO2	1.86	2.05	1.98	2.49	0.83	1.00	0.94	1.47	3.09	1.37	0.63	0.75	0.66	2.37	2.59
Nb2O5	42.87	41.39	42.10	41.21	29.14	24.24	30.55	30.47	28.63	23.34	20.26	21.60	19.75	28.31	26.24
Ta2O5	36.17	36.50	35.91	36.16	52.73	58.15	50.47	50.05	48.94	58.78	62.24	61.26	62.57	50.32	51.81
SnO2	0.48	0.49	0.71	0.58	0.40	0.50	0.00	0.29	1.17	0.43	0.50	0.24	0.37	0.67	0.36
WO3	1.07	0.77	0.53	1.18	0.82	0.70	0.56	0.66	0.59	0.41	0.58	0.73	0.49	0.86	1.28
PbO	0.59	0.53	0.00	0.46	0.00	0.29	0.26	0.00	0.57	0.00	0.19	0.00	0.68	0.25	0.36
ThO2	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.07	0.00	0.06	0.29	0.42	0.00	0.53	0.00	0.00	0.00	0.63	0.12	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.05	0.00	0.00	0.03	0.09	0.00	0.00	0.15	0.19	0.03	0.14	0.00	0.00	0.00	0.02
Sc2O3	0.00	0.55	0.67	0.00	0.00	0.23	1.10	0.09	0.00	0.00	0.39	0.00	0.00	0.43	1.01
CaO															
Total	100.11	99.43	98.92	98.98	100.16	101.05	100.52	99.36	98.99	99.91	100.23	100.04	100.19	98.83	99.01
Structural formulae based on 6 oxygens															
Fe	0.160	0.172	0.170	0.175	0.162	0.159	0.163	0.161	0.169	0.167	0.159	0.161	0.153	0.167	0.167
Mn	0.783	0.784	0.772	0.766	0.802	0.797	0.787	0.801	0.743	0.792	0.803	0.807	0.805	0.760	0.753
Ti	0.092	0.102	0.098	0.124	0.044	0.054	0.049	0.078	0.164	0.075	0.035	0.042	0.037	0.126	0.139
Nb	1.269	1.234	1.253	1.233	0.934	0.791	0.963	0.969	0.913	0.770	0.682	0.723	0.672	0.906	0.843
Ta	0.644	0.654	0.643	0.651	1.016	1.141	0.957	0.958	0.939	1.166	1.261	1.234	1.281	0.969	1.001
Sn	0.012	0.013	0.019	0.015	0.011	0.014	0.000	0.008	0.033	0.012	0.015	0.007	0.011	0.019	0.010
W	0.018	0.013	0.009	0.020	0.015	0.013	0.010	0.012	0.011	0.008	0.011	0.014	0.010	0.016	0.024
Pb	0.010	0.009	0.000	0.008	0.000	0.006	0.005	0.000	0.011	0.000	0.004	0.000	0.014	0.005	0.007
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.001	0.000	0.001	0.005	0.006	0.000	0.008	0.000	0.000	0.000	0.011	0.002	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.003	0.003	0.000	0.003	0.000	0.000	0.000	0.000
Sc	0.000	0.031	0.038	0.000	0.000	0.015	0.067	0.005	0.000	0.000	0.025	0.000	0.000	0.026	0.063
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	2.989	3.012	3.002	2.994	2.987	2.994	3.010	2.996	2.994	2.992	2.999	2.988	2.992	2.996	3.007
Mn/(Mn+Fe)	0.830	0.820	0.819	0.814	0.832	0.834	0.829	0.832	0.815	0.826	0.835	0.834	0.841	0.819	0.818
Ta/(Ta+Nb)	0.337	0.347	0.339	0.345	0.521	0.591	0.498	0.497	0.507	0.602	0.649	0.630	0.656	0.517	0.543
Comments:	EA & EB same grain				EF - EH same grain			EK & EL same grain			EM - EP same grain				

Columbite-Tantalite Group

	Marko's pegmatite 96-AT9							Marko's pegmatite 96-AT10							
	MA	MB	MD	ME	MF	MG	MH	TA	TB	TC	TE	TG	TH	TJ	TK
FeO	11.44	12.93	10.75	11.72	10.27	11.03	10.71	4.66	4.70	5.07	4.70	3.64	3.82	4.63	4.68
MnO	6.78	6.13	7.42	6.18	7.43	7.75	7.46	13.05	13.09	12.88	13.04	14.40	13.97	13.32	12.97
TiO2	2.76	0.80	2.79	3.52	3.17	1.09	2.58	1.87	1.82	1.94	1.57	1.43	1.64	1.78	2.03
Nb2O5	56.23	56.12	56.37	53.00	56.64	55.45	57.13	51.34	52.88	51.59	51.97	53.43	52.64	52.31	52.67
Ta2O5	20.24	22.61	19.83	22.11	20.08	22.95	19.54	26.14	25.54	25.05	25.94	24.39	25.99	25.22	25.00
SnO2	0.27	0.04	0.26	0.42	0.31	0.13	0.40	0.38	0.41	0.45	0.24	0.30	0.43	0.43	0.43
WO3	0.86	0.68	0.82	0.94	0.88	0.96	0.87	1.11	1.05	1.09	1.18	1.10	1.11	1.10	1.11
PbO	0.43	0.28	0.34	0.34	0.36	0.27	0.29	0.30	0.28	0.28	0.23	0.29	0.27	0.30	0.25
ThO2	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
UO2	0.00	0.00	0.00	0.18	0.22	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.07
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Bi2O3	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
Sc2O3	0.31	0.17	0.47	0.35	0.47	0.35	0.57	0.15	0.30	0.27	0.15	0.19	0.17	0.13	0.21
CaO	0.00	0.00	0.00	0.03	0.03	0.00	0.02	0.02	0.04	0.15	0.05	0.02	0.03	0.04	0.04
Total	99.31	99.75	99.03	98.77	99.85	99.98	99.57	99.05	100.12	98.76	99.06	99.20	100.11	99.25	99.46
Structural formulae based on 6 oxygens															
Fe	0.585	0.670	0.549	0.606	0.520	0.570	0.544	0.246	0.244	0.267	0.248	0.191	0.199	0.243	0.244
Mn	0.351	0.321	0.384	0.324	0.381	0.406	0.384	0.698	0.689	0.688	0.697	0.764	0.738	0.708	0.686
Ti	0.127	0.037	0.128	0.164	0.144	0.051	0.118	0.089	0.085	0.092	0.074	0.068	0.077	0.084	0.095
Nb	1.554	1.572	1.557	1.483	1.551	1.549	1.568	1.465	1.486	1.470	1.482	1.513	1.484	1.485	1.487
Ta	0.336	0.381	0.329	0.372	0.331	0.386	0.323	0.449	0.432	0.429	0.445	0.415	0.441	0.431	0.424
Sn	0.006	0.001	0.006	0.010	0.008	0.003	0.010	0.010	0.010	0.011	0.006	0.007	0.011	0.011	0.011
W	0.014	0.011	0.013	0.015	0.014	0.015	0.014	0.018	0.017	0.018	0.019	0.018	0.018	0.018	0.018
Pb	0.007	0.005	0.006	0.006	0.006	0.004	0.005	0.005	0.005	0.005	0.004	0.005	0.005	0.005	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.016	0.009	0.025	0.019	0.025	0.019	0.030	0.008	0.016	0.015	0.008	0.010	0.009	0.007	0.011
Ca	0.000	0.000	0.000	0.002	0.002	0.000	0.001	0.001	0.003	0.010	0.003	0.001	0.002	0.003	0.003
Total	2.996	3.007	2.997	3.002	2.983	3.003	2.995	2.990	2.986	3.005	2.987	2.992	2.984	2.994	2.985
Mn/(Mn+Fe)	0.375	0.324	0.412	0.348	0.423	0.416	0.414	0.739	0.738	0.720	0.738	0.800	0.787	0.745	0.737
Ta/(Ta+Nb)	0.178	0.195	0.175	0.201	0.176	0.199	0.171	0.234	0.225	0.226	0.231	0.215	0.229	0.225	0.222
Comments:	MA - ME		MF - MH same grain				TA & TB				TJ & TK				
	same grain		unzoned mottled complex				same grain				same grain				
	unzoned	unzoned mottled		rim	core										

Columbite-Tantalite Group

	Marko's peg. 96-AT16				Marko's peg. 96-AT19B		School of Fish pegmatite 97-1							
	PA	PB	PC	PD	DS	DZ	CC	CD	QD	QH	QE	QF	QG	
FeO	7.84	7.56	6.36	7.92	4.27	5.35	8.60	9.00	7.05	7.11	8.21	8.51	7.02	
MnO	10.11	10.67	11.67	10.36	11.02	10.27	7.17	6.80	10.67	10.43	8.19	8.20	9.57	
TiO ₂	1.96	1.68	2.29	1.63	0.96	1.29	0.70	0.64	0.50	0.53	1.09	1.15	0.69	
Nb ₂ O ₅	51.87	53.50	51.84	54.84	21.38	23.78	26.01	28.21	47.64	46.10	40.92	40.42	38.03	
Ta ₂ O ₅	25.57	24.41	24.83	23.83	60.64	57.63	55.53	53.94	32.85	33.93	39.71	39.32	42.30	
SnO ₂	0.43	0.32	0.44	0.24	0.59	0.32	0.19	0.28	0.61	0.53	0.44	0.43	0.44	
WO ₃	1.11	1.10	1.11	1.02	1.13	1.10	0.10	0.22	0.19	0.21	0.16	0.13	0.22	
PbO	0.24	0.24	0.24	0.24	0.00	0.00	0.10	0.12	0.14	0.15	0.15	0.27	0.10	
ThO ₂	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	
UO ₂	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	
Sc ₂ O ₃	0.23	0.28	0.28	0.29	0.08	0.22	0.00	0.00	0.12	0.04	0.00	0.04	0.11	
CaO	0.01	0.00	0.02	0.01			0.03	0.01	0.06	0.05	0.06	0.01	0.06	
Total	99.37	99.76	99.07	100.38	100.08	100.34	98.44	99.21	99.82	99.07	98.94	98.47	98.54	
Structural formulae based on 6 oxygens														
Fe	0.411	0.393	0.333	0.408	0.264	0.324	0.528	0.543	0.381	0.390	0.461	0.481	0.403	
Mn	0.537	0.562	0.619	0.540	0.689	0.631	0.445	0.415	0.585	0.580	0.466	0.469	0.556	
Ti	0.092	0.078	0.108	0.076	0.053	0.070	0.039	0.034	0.025	0.026	0.055	0.059	0.036	
Nb	1.471	1.504	1.468	1.526	0.714	0.780	0.863	0.919	1.393	1.367	1.243	1.235	1.179	
Ta	0.436	0.413	0.423	0.399	1.219	1.137	1.108	1.057	0.578	0.605	0.726	0.723	0.789	
Sn	0.011	0.008	0.011	0.006	0.018	0.009	0.006	0.008	0.016	0.014	0.012	0.012	0.012	
W	0.018	0.018	0.018	0.016	0.022	0.021	0.002	0.004	0.003	0.003	0.003	0.002	0.004	
Pb	0.004	0.004	0.004	0.004	0.000	0.000	0.002	0.002	0.002	0.003	0.003	0.005	0.002	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.013	0.015	0.015	0.016	0.005	0.014	0.000	0.000	0.007	0.002	0.000	0.002	0.007	
Ca	0.001	0.000	0.001	0.000	0.000	0.000	0.002	0.001	0.004	0.003	0.004	0.001	0.004	
Total	2.994	2.995	3.001	2.991	2.984	2.992	2.995	2.984	2.993	2.993	2.973	2.988	2.990	
Mn/(Mn+Fe)	0.566	0.588	0.650	0.570	0.723	0.661	0.458	0.434	0.605	0.598	0.503	0.494	0.580	
Ta/(Ta+Nb)	0.229	0.215	0.224	0.207	0.630	0.593	0.562	0.535	0.293	0.307	0.369	0.369	0.401	
Comments:	PA & PD same grain				isolated grains associated with wodginite/microlite		incl. in cass.	incl. in cass.	QD - QH same grain QD & QH core					

Columbite-Tantalite Group

East Beryl pegmatite										
97-1A										
	NF1	NF2	NF3	NF4	NF5	NF6	NF7	NF8	NF9	NF10
FeO	0.46	1.35	1.49	2.14	1.28	1.40	1.30	1.42	2.02	2.06
MnO	14.31	13.86	13.73	13.07	13.93	13.90	13.87	13.77	13.34	13.37
TiO2	0.00	0.05	0.10	0.04	0.04	0.06	0.00	0.02	0.02	0.08
Nb2O5	14.69	17.60	17.57	17.71	18.07	17.99	17.24	17.83	19.03	19.44
Ta2O5	69.20	66.14	65.49	65.68	65.71	65.73	66.35	65.63	64.56	64.30
SnO2	0.03	0.07	0.06	0.09	0.04	0.16	0.06	0.02	0.04	0.05
WO3	0.35	0.41	0.37	0.55	0.43	0.49	0.58	0.43	0.45	0.46
PbO	0.03	0.08	0.13	0.04	0.02	0.03	0.05	0.00	0.14	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.04	0.02	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Bi2O3	0.01	0.00	0.00	0.00	0.00	0.01	0.05	0.01	0.00	0.00
Sc2O3	0.01	0.00	0.00	0.14	0.06	0.00	0.00	0.06	0.18	0.10
CaO	0.01	0.01	0.03	0.01	0.00	0.01	0.00	0.01	0.01	0.01
Total	99.11	99.62	98.99	99.46	99.59	99.78	99.56	99.21	99.77	99.86

Structural formulae based on 6 oxygens

Fe	0.030	0.086	0.096	0.137	0.082	0.090	0.083	0.091	0.128	0.130
Mn	0.951	0.900	0.896	0.849	0.902	0.899	0.904	0.896	0.857	0.856
Ti	0.000	0.003	0.006	0.002	0.002	0.003	0.000	0.001	0.001	0.004
Nb	0.521	0.610	0.612	0.614	0.625	0.621	0.600	0.619	0.653	0.664
Ta	1.476	1.379	1.373	1.369	1.366	1.365	1.388	1.371	1.332	1.322
Sn	0.001	0.002	0.002	0.003	0.001	0.005	0.002	0.001	0.001	0.001
W	0.007	0.008	0.007	0.011	0.008	0.010	0.012	0.009	0.009	0.009
Pb	0.001	0.002	0.003	0.001	0.000	0.001	0.001	0.000	0.003	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sc	0.001	0.000	0.000	0.009	0.004	0.000	0.000	0.004	0.012	0.007
Ca	0.001	0.001	0.002	0.001	0.000	0.001	0.000	0.001	0.001	0.001
Total	2.989	2.993	2.999	2.995	2.991	2.994	2.992	2.993	2.997	2.994
Mn/(Mn+Fe)	0.969	0.913	0.903	0.861	0.917	0.909	0.916	0.907	0.870	0.868
Ta/(Ta+Nb)	0.739	0.693	0.692	0.691	0.686	0.687	0.698	0.689	0.671	0.666

Comments: contains wodginite inclusion

93-265 locality

Columbite-Tantalite Group

East Beryl pegmatite										
97-1A										
	NC1	NC2	NC3	NC4	NC5	NC6	NC7	NC8	ND1	ND2
FeO	1.76	1.26	2.75	1.26	1.36	1.34	1.44	1.53	1.00	1.05
MnO	12.57	13.25	12.23	13.26	13.41	13.56	13.19	12.97	13.63	13.46
TiO2	0.05	0.04	0.00	0.08	0.04	0.09	0.12	0.12	0.07	0.04
Nb2O5	17.28	16.96	18.78	17.85	18.11	18.16	17.81	19.14	16.72	16.03
Ta2O5	67.08	67.82	66.43	67.19	66.93	66.88	67.11	65.74	68.12	68.96
SnO2	0.07	0.13	0.05	0.02	0.05	0.03	0.06	0.03	0.06	0.00
WO3	0.46	0.54	0.39	0.32	0.33	0.40	0.38	0.35	0.29	0.30
PbO	0.01	0.00	0.04	0.07	0.03	0.01	0.09	0.04	0.05	0.05
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.02
Bi2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.08	0.03	0.00	0.00	0.09	0.08	0.00	0.10	0.03
CaO	0.02	0.02	0.01	0.01	0.03	0.01	0.21	0.01	0.03	0.03
Total	99.30	100.12	100.72	100.06	100.28	100.57	100.50	99.92	100.07	99.96

Structural formulae based on 6 oxygens

Fe	0.114	0.081	0.174	0.080	0.086	0.085	0.092	0.097	0.064	0.068
Mn	0.822	0.860	0.782	0.858	0.864	0.870	0.849	0.833	0.887	0.881
Ti	0.003	0.002	0.000	0.005	0.002	0.005	0.007	0.007	0.004	0.002
Nb	0.603	0.588	0.641	0.617	0.623	0.622	0.612	0.656	0.580	0.560
Ta	1.407	1.414	1.364	1.396	1.385	1.378	1.386	1.356	1.422	1.449
Sn	0.002	0.004	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.000
W	0.009	0.011	0.008	0.006	0.007	0.008	0.007	0.007	0.006	0.006
Pb	0.000	0.000	0.001	0.001	0.001	0.000	0.002	0.001	0.001	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.005	0.002	0.000	0.000	0.006	0.005	0.000	0.007	0.002
Ca	0.001	0.001	0.001	0.001	0.002	0.001	0.017	0.001	0.002	0.002
Total	2.961	2.967	2.974	2.964	2.971	2.976	2.978	2.959	2.975	2.971
Mn/(Mn+Fe)	0.878	0.914	0.818	0.914	0.909	0.911	0.903	0.896	0.932	0.928
Ta/(Ta+Nb)	0.700	0.706	0.680	0.694	0.690	0.689	0.694	0.674	0.710	0.721

Comments: unzoned and apparently homogeneous
apart from dark (BSE) regions along fracture lines

Columbite-Tantalite Group

East Beryl pegmatite														
97-1A														
	ND3	ND4	ND5	ND6	ND7	ND8	NE1	NE2	NE3	NE4	NE5	NE6	NE7	NE8
FeO	0.50	0.44	0.44	1.34	4.15	1.14	3.99	3.40	2.88	3.41	3.70	5.61	4.00	3.29
MnO	13.83	14.07	14.24	13.06	10.28	13.63	13.38	14.21	14.18	13.88	13.71	12.22	13.69	14.19
TiO2	0.00	0.00	0.00	0.02	0.02	0.00	0.30	0.28	0.08	0.15	0.16	0.29	0.32	0.21
Nb2O5	14.63	16.18	16.57	17.25	16.80	21.35	48.58	52.20	44.92	49.10	48.61	51.96	52.53	52.42
Ta2O5	70.54	69.29	68.48	67.83	67.71	63.35	31.76	28.39	36.91	32.32	32.98	28.58	28.01	28.57
SnO2	0.04	0.05	0.11	0.06	0.07	0.05	0.07	0.05	0.07	0.05	0.08	0.07	0.01	0.03
WO3	0.24	0.25	0.27	0.42	0.42	0.36	0.80	0.68	0.36	0.42	0.46	0.95	0.83	0.72
PbO	0.02	0.06	0.02	0.04	0.10	0.07	0.29	0.26	0.19	0.29	0.17	0.21	0.21	0.30
ThO2	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
UO2	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
Sb2O3	0.02	0.00	0.01	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Bi2O3	0.00	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.07	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.08
CaO	0.00	0.01	0.00	0.00	0.02	0.04	0.02	0.03	0.01	0.01	0.02	0.00	0.00	0.02
Total	99.82	100.42	100.13	100.06	99.59	100.07	99.20	99.48	99.59	99.67	99.89	99.89	99.60	99.84
Structural formulae based on 6 oxygens														
Fe	0.033	0.028	0.028	0.086	0.268	0.071	0.217	0.181	0.159	0.184	0.200	0.298	0.212	0.175
Mn	0.915	0.916	0.927	0.848	0.673	0.864	0.736	0.766	0.793	0.760	0.751	0.657	0.736	0.763
Ti	0.000	0.000	0.000	0.001	0.001	0.000	0.015	0.013	0.004	0.007	0.008	0.014	0.015	0.010
Nb	0.516	0.562	0.576	0.598	0.587	0.722	1.426	1.502	1.342	1.435	1.421	1.492	1.507	1.504
Ta	1.497	1.449	1.432	1.415	1.423	1.289	0.561	0.491	0.663	0.568	0.580	0.494	0.483	0.493
Sn	0.001	0.002	0.003	0.002	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.002	0.000	0.001
W	0.005	0.005	0.005	0.008	0.008	0.007	0.013	0.011	0.006	0.007	0.008	0.016	0.014	0.012
Pb	0.000	0.001	0.000	0.001	0.002	0.001	0.005	0.004	0.003	0.005	0.003	0.004	0.004	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.004	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.005
Ca	0.000	0.001	0.000	0.000	0.001	0.003	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.002
Total	2.968	2.969	2.974	2.960	2.966	2.965	2.976	2.972	2.974	2.971	2.974	2.975	2.972	2.968
Mn/(Mn+Fe)	0.966	0.970	0.970	0.908	0.715	0.924	0.772	0.809	0.833	0.805	0.789	0.688	0.776	0.814
Ta/(Ta+Nb)	0.744	0.720	0.713	0.703	0.708	0.641	0.282	0.246	0.331	0.284	0.290	0.249	0.243	0.247
Comments:	insurgent patchy zoning at fractures weak oscillatory zoning elsewhere							wispy patchy zoning in a band across the traverse rest of grain is unzoned						

Columbite-Tantalite Group

	SW Beryl pegmatite 97-10A					SW Beryl pegmatite 97-16B						
	CA	MA	MB	MC	ME	EA	EB	EC	ED	EI	EJ	EK
FeO	5.20	5.53	5.46	5.48	6.39	10.95	11.88	11.15	10.94	11.17	11.59	12.26
MnO	10.44	9.78	8.95	9.06	8.72	4.40	4.91	4.33	4.23	4.61	4.71	5.02
TiO ₂	0.07	0.17	0.11	0.08	0.40	0.41	0.37	0.37	0.50	0.45	0.37	0.25
Nb ₂ O ₅	21.58	22.30	14.26	15.79	13.70	26.60	42.89	27.49	24.41	34.05	36.40	42.73
Ta ₂ O ₅	62.08	60.56	70.07	68.54	69.62	55.26	37.07	55.04	58.16	46.47	44.72	38.67
SnO ₂	0.16	0.10	0.18	0.12	0.17	0.83	0.13	0.14	0.29	0.18	0.22	0.06
WO ₃	0.22	0.19	0.19	0.24	0.20	0.47	0.46	0.50	0.48	0.51	0.55	0.39
PbO	0.07	0.09	0.03	0.07	0.06	0.10	0.22	0.12	0.09	0.22	0.13	0.19
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
Sc ₂ O ₃	0.00	0.16	0.02	0.00	0.12	0.01	0.00	0.02	0.07	0.05	0.10	0.00
CaO	0.03	0.02	0.01	0.01	0.06	0.03	0.09	0.03	0.09	0.42	0.42	0.02
Total	99.85	98.90	99.27	99.39	99.42	99.06	98.06	99.18	99.26	98.15	99.23	99.58
Structural formulae based on 6 oxygens												
Fe	0.325	0.347	0.358	0.357	0.418	0.668	0.670	0.677	0.674	0.658	0.668	0.684
Mn	0.661	0.621	0.595	0.597	0.578	0.272	0.281	0.266	0.264	0.275	0.275	0.284
Ti	0.004	0.010	0.006	0.005	0.023	0.022	0.019	0.020	0.028	0.024	0.019	0.013
Nb	0.729	0.756	0.506	0.555	0.485	0.877	1.308	0.903	0.813	1.085	1.135	1.290
Ta	1.262	1.235	1.497	1.450	1.482	1.096	0.680	1.087	1.165	0.891	0.839	0.702
Sn	0.005	0.003	0.006	0.004	0.005	0.024	0.004	0.004	0.009	0.005	0.006	0.001
W	0.004	0.004	0.004	0.005	0.004	0.009	0.008	0.009	0.009	0.009	0.010	0.007
Pb	0.001	0.002	0.001	0.001	0.001	0.002	0.004	0.002	0.002	0.004	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.011	0.001	0.000	0.008	0.001	0.000	0.001	0.004	0.003	0.006	0.000
Ca	0.003	0.002	0.001	0.000	0.005	0.003	0.007	0.002	0.007	0.032	0.031	0.001
Total	2.995	2.989	2.975	2.974	3.010	2.974	2.980	2.972	2.975	2.987	2.992	2.985
Mn/(Mn+Fe)	0.670	0.642	0.624	0.626	0.580	0.289	0.295	0.282	0.281	0.295	0.292	0.293
Ta/(Ta+Nb)	0.634	0.620	0.747	0.723	0.754	0.555	0.342	0.546	0.589	0.451	0.425	0.352
Comments:	MA - MC same grain core					EA & EB same grain		EC & ED same grain		EI - EK same grain patchy zoned		

Columbite-Tantalite Group

	School of Fish pegmatite 97-70							SW Beryl pegmatite 97-134A					
	EA	EI	EJ	EC	EE	EF	EH	DA	DB	DC	DD	DE	PF
FeO	7.40	5.67	5.87	11.08	11.41	10.09	11.27	17.16	17.25	16.04	16.51	15.91	16.17
MnO	10.20	11.17	10.65	6.48	6.92	6.07	6.70	2.81	2.67	3.46	3.65	3.53	3.59
TiO ₂	0.42	0.35	0.29	0.69	0.71	0.28	0.64	0.52	0.48	0.41	0.52	0.64	0.37
Nb ₂ O ₅	58.06	51.89	48.35	56.10	62.33	42.91	62.17	65.89	66.30	60.91	67.05	61.83	63.01
Ta ₂ O ₅	21.29	28.93	32.34	22.80	15.33	37.44	16.21	11.42	11.35	17.86	10.76	15.92	15.69
SnO ₂	0.00	0.03	0.03	0.12	0.17	0.05	0.12	0.11	0.09	0.10	0.04	0.13	0.06
WO ₃	0.54	0.35	0.37	0.33	0.34	0.42	0.27	0.44	0.36	0.52	0.39	0.55	0.47
PbO	0.30	0.24	0.23	0.24	0.32	0.14	0.32	0.33	0.33	0.30	0.35	0.35	0.33
ThO ₂	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
UO ₂	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
Sb ₂ O ₃	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi ₂ O ₃	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
Sc ₂ O ₃	0.00	0.00	0.00	0.21	0.21	0.01	0.17	0.14	0.01	0.00	0.08	0.02	0.08
CaO	0.06	0.09	0.12	0.02	0.01	0.06	0.03	0.00	0.00	0.01	0.01	0.00	0.01
Total	98.25	98.73	98.25	98.08	97.74	97.46	97.87	98.84	98.84	99.61	99.36	98.86	99.77
Structural formulae based on 6 oxygens													
Fe	0.386	0.304	0.322	0.583	0.583	0.572	0.577	0.857	0.861	0.817	0.817	0.810	0.815
Mn	0.539	0.607	0.591	0.345	0.359	0.349	0.347	0.142	0.135	0.179	0.183	0.182	0.183
Ti	0.020	0.017	0.014	0.032	0.033	0.014	0.029	0.023	0.022	0.019	0.023	0.029	0.017
Nb	1.639	1.505	1.433	1.595	1.723	1.316	1.721	1.779	1.789	1.677	1.795	1.701	1.716
Ta	0.361	0.505	0.577	0.390	0.255	0.691	0.270	0.186	0.184	0.296	0.173	0.263	0.257
Sn	0.000	0.001	0.001	0.003	0.004	0.001	0.003	0.003	0.002	0.002	0.001	0.003	0.001
W	0.009	0.006	0.006	0.005	0.005	0.007	0.004	0.007	0.006	0.008	0.006	0.009	0.007
Pb	0.005	0.004	0.004	0.004	0.005	0.003	0.005	0.005	0.005	0.005	0.005	0.006	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.012	0.011	0.001	0.009	0.007	0.001	0.000	0.004	0.001	0.004
Ca	0.004	0.006	0.008	0.002	0.001	0.005	0.002	0.000	0.000	0.001	0.001	0.000	0.001
Total	2.963	2.955	2.957	2.971	2.979	2.959	2.968	3.010	3.005	3.003	3.009	3.003	3.006
Mn/(Mn+Fe)	0.583	0.666	0.648	0.372	0.381	0.379	0.376	0.142	0.136	0.179	0.183	0.183	0.184
Ta/(Ta+Nb)	0.181	0.251	0.287	0.196	0.129	0.344	0.136	0.094	0.093	0.150	0.088	0.134	0.130
Comments:	EI & EJ			from	from	from	from	DA & DB		DC - DE			
	same grain			veinlet	veinlet	veinlet	veinlet	same grain		same grain			
	main part of sample is a different composition from veinlet							from cluster of columbite and cassiterite grains					

Columbite-Tantalite Group

	SW Beryl pegmatite 97-134A						Big Whopper pegmatite 97-185A				
	PG	PH	PI	PJ	PL	PM	DA	DB	DH	DI	DJ
FeO	16.03	14.59	15.92	14.51	14.67	16.01	14.57	14.13	14.59	14.44	13.49
MnO	3.54	3.20	3.63	3.12	3.16	3.52	5.33	5.72	5.55	5.61	5.82
TiO ₂	0.41	0.42	0.35	0.42	0.40	0.41	0.67	0.72	0.65	0.74	0.53
Nb ₂ O ₅	61.41	41.61	60.71	41.55	41.72	62.28	68.37	66.59	68.90	68.59	60.07
Ta ₂ O ₅	16.85	39.17	17.67	38.64	38.10	16.16	10.31	12.22	9.86	10.25	19.04
SnO ₂	0.08	0.10	0.04	0.06	0.14	0.06	0.01	0.06	0.08	0.06	0.04
WO ₃	0.48	0.48	0.40	0.39	0.39	0.48	0.64	0.47	0.58	0.55	0.73
PbO	0.32	0.20	0.28	0.20	0.19	0.28	0.35	0.32	0.35	0.35	0.30
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc ₂ O ₃	0.00	0.00	0.00	0.10	0.00	0.13	0.17	0.15	0.19	0.21	0.07
CaO	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01
Total	99.12	99.78	98.99	98.99	98.79	99.33	100.42	100.36	100.76	100.78	100.09
Structural formulae based on 6 oxygens											
Fe	0.817	0.816	0.815	0.816	0.826	0.811	0.711	0.695	0.709	0.702	0.686
Mn	0.183	0.181	0.188	0.178	0.180	0.180	0.264	0.285	0.273	0.276	0.300
Ti	0.019	0.021	0.016	0.021	0.020	0.019	0.029	0.032	0.028	0.032	0.024
Nb	1.693	1.258	1.681	1.264	1.270	1.706	1.804	1.771	1.809	1.802	1.652
Ta	0.279	0.712	0.294	0.707	0.698	0.266	0.164	0.195	0.156	0.162	0.315
Sn	0.002	0.003	0.001	0.002	0.004	0.001	0.000	0.001	0.002	0.001	0.001
W	0.008	0.008	0.006	0.007	0.007	0.008	0.010	0.007	0.009	0.008	0.011
Pb	0.005	0.004	0.005	0.004	0.003	0.005	0.005	0.005	0.006	0.005	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.006	0.000	0.007	0.009	0.007	0.010	0.011	0.004
Ca	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Total	3.006	3.004	3.007	3.004	3.010	3.003	2.995	2.999	3.001	2.999	2.999
Mn/(Mn+Fe)	0.183	0.182	0.187	0.179	0.179	0.182	0.270	0.291	0.278	0.282	0.304
Ta/(Ta+Nb)	0.142	0.362	0.149	0.359	0.355	0.135	0.083	0.099	0.079	0.082	0.160
Comments:	PF - PJ same grain		PL & PM same grain			DA & DB same grain core rim		DH & DI same grain			

Columbite-Tantalite Group

	Big Whopper 97-185A											Big Whopper peg. 97-185B		
	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	AA	AB	AC
FeO	14.13	13.47	14.05	14.18	14.34	13.79	13.91	13.64	14.26	14.17	14.36	7.46	6.41	7.74
MnO	5.78	5.76	5.87	5.76	5.80	5.45	6.02	5.66	5.77	5.94	5.70	10.02	8.26	10.53
TiO2	0.58	0.41	0.73	0.71	0.77	0.83	0.77	0.54	0.80	0.62	0.66	0.58	0.00	0.33
Nb2O5	67.57	58.56	66.84	66.77	69.50	57.62	66.51	60.07	67.78	68.08	68.19	44.31	12.29	51.25
Ta2O5	10.96	21.08	11.16	12.01	8.44	21.32	11.83	18.82	10.72	10.72	10.43	36.12	72.28	28.63
SnO2	0.08	0.07	0.09	0.04	0.03	0.13	0.13	0.07	0.02	0.12	0.05	0.26	0.26	0.13
WO3	0.50	0.61	0.72	0.71	0.83	1.09	0.61	0.94	0.75	0.68	0.37	0.71	0.11	0.68
PbO	0.31	0.29	0.31	0.34	0.35	0.30	0.32	0.26	0.31	0.35	0.34	0.29	0.05	0.30
ThO2	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
UO2	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
Sb2O3	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
Bi2O3	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
Sc2O3	0.14	0.01	0.07	0.09	0.19	0.00	0.00	0.00	0.21	0.15	0.07	0.00	0.03	0.00
CaO	0.01	0.01	0.01	0.00	0.00	0.01	0.03	0.02	0.01	0.00	0.00	0.01	0.04	0.03
Total	100.07	100.26	99.86	100.60	100.25	100.54	100.12	100.01	100.62	100.83	100.17	99.76	99.73	99.62

Structural formulae based on 6 oxygens

Fe	0.694	0.690	0.693	0.696	0.696	0.706	0.685	0.694	0.695	0.690	0.703	0.411	0.424	0.413
Mn	0.288	0.299	0.293	0.286	0.285	0.283	0.301	0.292	0.285	0.293	0.283	0.559	0.554	0.569
Ti	0.026	0.019	0.032	0.031	0.034	0.038	0.034	0.025	0.035	0.027	0.029	0.029	0.000	0.016
Nb	1.794	1.622	1.781	1.772	1.824	1.594	1.772	1.653	1.787	1.793	1.805	1.320	0.440	1.479
Ta	0.175	0.351	0.179	0.192	0.133	0.355	0.190	0.311	0.170	0.170	0.166	0.647	1.557	0.497
Sn	0.002	0.002	0.002	0.001	0.001	0.003	0.003	0.002	0.000	0.003	0.001	0.007	0.008	0.003
W	0.008	0.010	0.011	0.011	0.013	0.017	0.009	0.015	0.011	0.010	0.006	0.012	0.002	0.011
Pb	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.005	0.005	0.005	0.005	0.001	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.007	0.001	0.004	0.004	0.009	0.000	0.000	0.000	0.010	0.008	0.004	0.000	0.002	0.000
Ca	0.001	0.001	0.001	0.000	0.000	0.000	0.002	0.001	0.001	0.000	0.000	0.001	0.004	0.002
Total	3.000	2.999	3.001	2.999	3.000	3.001	3.001	2.997	3.001	3.001	3.001	2.990	2.992	2.995
Mn/(Mn+Fe)	0.293	0.302	0.297	0.291	0.291	0.286	0.305	0.296	0.291	0.298	0.287	0.577	0.566	0.579
Ta/(Ta+Nb)	0.089	0.178	0.091	0.098	0.068	0.182	0.097	0.159	0.087	0.086	0.084	0.329	0.780	0.252

Comments: close association of columbite with monazite & xenotime in this sample

AA - AC
same grain
core? mid rim

Columbite-Tantalite Group

	Big Whopper pegmatite 97-185B					Big Whopper pegmatite 97-186A									
	AD	AE	AF	AG	AL	DB	DD	DE	DF	DH	DI	DJ	DK	DL	HA
FeO	6.55	6.32	7.71	8.07	7.95	8.56	10.28	11.09	11.30	10.44	9.93	11.27	10.70	10.08	8.36
MnO	8.56	8.42	10.58	10.31	10.43	5.03	5.29	6.43	6.27	6.28	5.90	6.39	6.58	6.04	6.64
TiO ₂	0.00	0.01	0.29	0.23	0.41	0.58	1.26	0.35	0.30	0.12	0.29	0.25	0.20	0.44	0.00
Nb ₂ O ₅	16.38	15.15	50.42	51.93	51.72	26.65	24.51	44.74	47.83	35.57	25.44	46.35	40.72	28.40	21.20
Ta ₂ O ₅	67.64	68.35	29.39	28.37	28.13	54.16	54.88	35.58	32.06	46.05	56.99	34.17	40.16	53.73	63.71
SnO ₂	0.12	0.07	0.07	0.11	0.15	0.61	0.99	0.10	0.12	0.12	0.13	0.07	0.06	0.12	0.19
WO ₃	0.12	0.15	0.65	0.61	0.57	0.50	1.24	0.43	0.38	0.27	0.35	0.46	0.33	0.69	0.23
PbO	0.06	0.04	0.21	0.27	0.26	0.14	0.09	0.21	0.21	0.10	0.12	0.24	0.19	0.12	0.05
ThO ₂	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
UO ₂	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb ₂ O ₃	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc ₂ O ₃	0.15	0.07	0.15	0.00	0.00	0.19	0.11	0.01	0.06	0.03	0.00	0.05	0.00	0.04	0.01
CaO	0.00	0.06	0.01	0.00	0.00	2.22	0.00	0.00	0.02	0.02	0.04	0.03	0.03	0.01	0.04
Total	99.57	98.66	99.47	99.91	99.62	98.64	98.66	98.94	98.54	99.00	99.19	99.28	98.97	99.67	100.42
Structural formulae based on 6 oxygens															
Fe	0.423	0.415	0.413	0.429	0.423	0.519	0.630	0.615	0.619	0.608	0.610	0.619	0.606	0.605	0.523
Mn	0.560	0.561	0.574	0.555	0.562	0.309	0.328	0.361	0.348	0.370	0.367	0.355	0.377	0.367	0.420
Ti	0.000	0.001	0.014	0.011	0.020	0.032	0.069	0.017	0.015	0.006	0.016	0.012	0.010	0.024	0.000
Nb	0.572	0.538	1.461	1.491	1.488	0.873	0.812	1.341	1.416	1.120	0.845	1.376	1.248	0.922	0.716
Ta	1.422	1.460	0.512	0.490	0.487	1.068	1.093	0.642	0.571	0.872	1.138	0.610	0.740	1.049	1.295
Sn	0.004	0.002	0.002	0.003	0.004	0.017	0.029	0.003	0.003	0.003	0.004	0.002	0.002	0.003	0.006
W	0.002	0.003	0.011	0.010	0.009	0.009	0.024	0.007	0.006	0.005	0.007	0.008	0.006	0.013	0.004
Pb	0.001	0.001	0.004	0.005	0.004	0.003	0.002	0.004	0.004	0.002	0.002	0.004	0.003	0.002	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.010	0.005	0.008	0.000	0.000	0.012	0.007	0.001	0.003	0.002	0.000	0.003	0.000	0.002	0.000
Ca	0.000	0.005	0.001	0.000	0.000	0.172	0.000	0.000	0.001	0.002	0.003	0.002	0.002	0.001	0.003
Total	2.995	2.991	2.999	2.994	2.996	3.014	2.994	2.991	2.987	2.991	2.992	2.990	2.995	2.990	2.968
Mn/(Mn+Fe)	0.570	0.574	0.582	0.564	0.571	0.373	0.343	0.370	0.360	0.378	0.376	0.365	0.384	0.378	0.446
Ta/(Ta+Nb)	0.713	0.731	0.260	0.247	0.246	0.550	0.574	0.324	0.287	0.438	0.574	0.307	0.372	0.532	0.644
Comments:	AD - AF	unzoned				DE & DF same grain DH - DL spectacular cluster of 3 zoned grains									
	same grain					patchy zoned		primary		primary					
	core	mid	rim			primary									

Columbite-Tantalite Group

Big Whopper pegmatite										
97-186C										
	CA	CB	CC	CD	CE	CF	CG	CH	CN	CP
FeO	9.53	8.44	10.26	9.51	9.82	10.23	10.14	6.67	10.09	8.95
MnO	8.36	7.92	8.56	8.38	8.41	8.68	8.52	10.92	8.44	7.60
TiO ₂	0.50	0.18	0.51	0.24	0.60	0.58	0.51	0.34	0.56	0.28
Nb ₂ O ₅	52.71	34.21	61.46	51.86	55.36	60.47	57.52	48.79	62.34	38.11
Ta ₂ O ₅	27.14	48.22	17.26	28.71	24.69	19.31	21.71	31.40	17.42	43.80
SnO ₂	0.16	0.02	0.10	0.07	0.18	0.14	0.10	0.10	0.14	0.11
WO ₃	0.64	0.46	0.30	0.53	0.35	0.43	0.31	0.72	0.51	0.37
PbO	0.25	0.20	0.28	0.29	0.23	0.30	0.23	0.23	0.32	0.17
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc ₂ O ₃	0.00	0.04	0.00	0.05	0.06	0.09	0.07	0.04	0.07	0.00
CaO	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Total	99.30	99.70	98.72	99.64	99.68	100.22	99.12	99.22	99.90	99.40

Structural formulae based on 6 oxygens

Fe	0.506	0.492	0.524	0.507	0.512	0.519	0.526	0.361	0.509	0.512
Mn	0.449	0.468	0.443	0.452	0.445	0.446	0.448	0.599	0.431	0.441
Ti	0.024	0.009	0.023	0.012	0.028	0.027	0.024	0.017	0.026	0.015
Nb	1.512	1.079	1.698	1.494	1.562	1.659	1.613	1.429	1.701	1.180
Ta	0.468	0.915	0.287	0.497	0.419	0.319	0.366	0.553	0.286	0.816
Sn	0.004	0.001	0.003	0.002	0.005	0.003	0.002	0.003	0.003	0.003
W	0.011	0.008	0.005	0.009	0.006	0.007	0.005	0.012	0.008	0.007
Pb	0.004	0.004	0.005	0.005	0.004	0.005	0.004	0.004	0.005	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.002	0.000	0.003	0.003	0.005	0.004	0.002	0.004	0.000
Ca	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	2.980	2.980	2.988	2.981	2.983	2.988	2.992	2.981	2.973	2.976
Mn/(Mn+Fe)	0.470	0.487	0.458	0.471	0.465	0.462	0.460	0.624	0.459	0.463
Ta/(Ta+Nb)	0.236	0.459	0.145	0.250	0.212	0.161	0.185	0.279	0.144	0.409

Comments:	CA - CD	CE - CG
	same grain	same grain
	patchy zoned	patchy zoned

Columbite-Tantalite Group

	Big Whopper pegmatite 97-186X						Big Whopper peg. 97-186Z		
	GL	GQ	GR1	GR2	GR3	GR4	CI	CJ	CK
FeO	5.99	6.16	5.99	4.70	5.05	5.65	6.18	6.29	5.97
MnO	11.12	10.77	11.05	12.21	11.88	11.50	11.52	10.11	9.51
TiO ₂	0.28	0.35	0.24	0.32	0.39	0.37	0.98	0.04	0.11
Nb ₂ O ₅	44.66	46.02	46.23	44.87	45.47	45.42	48.82	31.56	21.37
Ta ₂ O ₅	36.31	35.10	35.25	36.13	35.49	35.12	25.85	51.26	62.04
SnO ₂	0.10	0.04	0.09	0.08	0.12	0.09	0.32	0.05	0.19
WO ₃	0.72	0.60	0.51	0.92	0.97	0.88	0.85	0.19	0.20
PbO	0.17	0.22	0.22	0.17	0.19	0.25	0.37	0.14	0.05
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc ₂ O ₃	0.00	0.14	0.07	0.00	0.00	0.12	0.00	0.00	0.00
CaO	0.01	0.02	0.03	0.00	0.02	0.02	0.19	0.00	0.00
Total	99.34	99.40	99.67	99.41	99.57	99.43	95.25	99.64	99.43

Structural formulae based on 6 oxygens

Fe	0.331	0.338	0.328	0.260	0.277	0.311	0.343	0.373	0.375
Mn	0.623	0.599	0.613	0.683	0.661	0.641	0.647	0.607	0.605
Ti	0.014	0.017	0.012	0.016	0.019	0.018	0.049	0.002	0.006
Nb	1.336	1.365	1.369	1.339	1.351	1.350	1.464	1.012	0.726
Ta	0.653	0.627	0.628	0.649	0.634	0.628	0.466	0.988	1.268
Sn	0.003	0.001	0.002	0.002	0.003	0.002	0.008	0.001	0.006
W	0.012	0.010	0.009	0.016	0.016	0.015	0.015	0.004	0.004
Pb	0.003	0.004	0.004	0.003	0.003	0.004	0.007	0.003	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.008	0.004	0.000	0.000	0.007	0.000	0.000	0.000
Ca	0.001	0.002	0.002	0.000	0.001	0.001	0.014	0.000	0.000
Total	2.976	2.970	2.971	2.968	2.967	2.978	3.015	2.990	2.990
Mn/(Mn+Fe)	0.653	0.639	0.652	0.725	0.705	0.673	0.654	0.619	0.617
Ta/(Ta+Nb)	0.328	0.315	0.314	0.326	0.320	0.317	0.242	0.494	0.636

Comments: GR traverse 4 points CJ & CK
minimal zoning apart from patchy rim same grain
cassiterite-rich sample

Columbite-Tantalite Group

	Big Whopper pegmatite 97-198									School of Fish pegmatite 97-264			
	GA	GB	GD	GE	GH	GI	GJ	GK	GL	HK	HL	HM	HP
FeO	1.30	1.50	1.66	1.53	1.59	1.75	1.33	1.38	1.68	9.96	10.09	9.75	10.80
MnO	14.73	14.85	16.25	13.91	16.33	16.19	14.07	14.22	16.33	4.98	5.16	5.36	4.17
TiO2	0.17	0.05	0.12	0.00	0.29	0.25	0.09	0.10	0.20	0.00	0.04	0.05	0.77
Nb2O5	29.56	33.18	49.84	22.41	47.44	48.80	20.42	24.02	48.51	17.36	19.88	17.30	19.33
Ta2O5	52.50	49.75	31.89	61.05	31.52	31.66	61.56	57.67	32.00	66.69	63.60	66.50	63.07
SnO2	0.31	0.13	0.04	0.08	0.08	0.02	0.41	0.39	0.07	0.08	0.03	0.17	0.45
WO3	0.29	0.16	0.25	0.20	1.00	0.70	0.49	0.58	0.61	0.14	0.20	0.29	0.52
PbO	0.12	0.16	0.24	0.11	0.20	0.28	0.20	0.13	0.22	0.12	0.07	0.07	0.06
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.00	0.00	0.00	0.02	0.04	0.05	0.00	0.01	0.00	0.00	0.00	0.09	0.04
CaO	0.02	0.01	0.03	0.02	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.01	0.03
Total	99.00	99.78	100.34	99.33	98.49	99.72	98.58	98.52	99.63	99.34	99.09	99.59	99.23
Structural formulae based on 6 oxygens													
Fe	0.078	0.088	0.089	0.096	0.087	0.095	0.085	0.086	0.091	0.643	0.642	0.627	0.683
Mn	0.897	0.883	0.882	0.881	0.906	0.885	0.907	0.897	0.895	0.325	0.333	0.349	0.267
Ti	0.009	0.003	0.006	0.000	0.014	0.012	0.005	0.006	0.010	0.000	0.002	0.003	0.044
Nb	0.961	1.052	1.443	0.758	1.405	1.424	0.702	0.809	1.419	0.606	0.684	0.601	0.661
Ta	1.027	0.949	0.556	1.242	0.562	0.556	1.274	1.169	0.563	1.400	1.317	1.390	1.298
Sn	0.009	0.003	0.001	0.002	0.002	0.000	0.013	0.011	0.002	0.002	0.001	0.005	0.014
W	0.005	0.003	0.004	0.004	0.017	0.012	0.010	0.011	0.010	0.003	0.004	0.006	0.010
Pb	0.002	0.003	0.004	0.002	0.004	0.005	0.004	0.003	0.004	0.002	0.001	0.002	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.001	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.006	0.003
Ca	0.002	0.001	0.002	0.002	0.000	0.000	0.000	0.001	0.000	0.002	0.002	0.001	0.002
Total	2.990	2.985	2.987	2.989	2.999	2.992	2.999	2.994	2.995	2.983	2.987	2.990	2.983
Mn/(Mn+Fe)	0.920	0.909	0.908	0.902	0.912	0.903	0.914	0.912	0.908	0.336	0.341	0.358	0.281
Ta/(Ta+Nb)	0.517	0.474	0.278	0.621	0.286	0.281	0.645	0.591	0.284	0.698	0.658	0.698	0.663
Comments:	GA & GB same grain	GD & GE same grain	GH & GI same grain	GJ - GL same grain	altered rim	HK - HM same grain	earlier than cassiterite						

Columbite-Tantalite Group

	Bob's pegmatite 97-BP1				Bob's 97-BP2	Bob's 97-BP3		Big Whopper pegmatite 97-BW1				
	BK	BL	BM	BN	AC	RB	QL	KA	KB	KC	KD	KE
FeO	7.38	7.13	7.76	6.01	4.35	5.13	4.73	2.03	1.74	1.59	1.50	1.75
MnO	11.00	10.93	10.96	8.87	12.79	11.69	13.34	14.61	14.55	13.77	13.89	14.96
TiO2	0.43	0.45	0.47	0.48	0.48	0.21	0.40	0.31	0.09	0.18	0.14	0.12
Nb2O5	48.40	45.80	50.96	12.97	40.34	33.69	50.06	33.49	30.91	22.12	22.27	33.89
Ta2O5	31.01	34.38	28.60	69.35	40.50	47.85	29.24	48.33	51.17	61.19	60.15	47.44
SnO2	0.13	0.19	0.12	0.26	0.15	0.13	0.16	0.09	0.04	0.21	1.00	0.04
WO3	0.40	0.46	0.39	0.33	0.57	0.49	0.34	0.56	0.29	0.36	0.35	0.38
PbO	0.22	0.27	0.25	0.00	0.32	0.19	0.20	0.16	0.16	0.09	0.14	0.14
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01
Bi2O3	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.03	0.18	0.00	0.03	0.06	0.03	0.01	0.00	0.00	0.04	0.00
CaO	0.00	0.00	0.00	0.00	0.16	0.01	0.00	0.00	0.01	0.01	0.02	0.01
Total	98.98	99.65	99.72	98.28	99.68	99.44	98.49	99.61	98.96	99.51	99.49	98.74

Structural formulae based on 6 oxygens

Fe	0.401	0.390	0.413	0.399	0.245	0.300	0.256	0.119	0.104	0.100	0.093	0.103
Mn	0.605	0.606	0.591	0.597	0.729	0.693	0.731	0.865	0.881	0.871	0.877	0.891
Ti	0.021	0.022	0.022	0.029	0.024	0.011	0.019	0.016	0.005	0.010	0.008	0.006
Nb	1.421	1.355	1.467	0.466	1.227	1.066	1.463	1.058	0.999	0.747	0.751	1.078
Ta	0.548	0.612	0.495	1.498	0.741	0.911	0.514	0.919	0.995	1.243	1.220	0.908
Sn	0.003	0.005	0.003	0.008	0.004	0.004	0.004	0.003	0.001	0.006	0.030	0.001
W	0.007	0.008	0.006	0.007	0.010	0.009	0.006	0.010	0.005	0.007	0.007	0.007
Pb	0.004	0.005	0.004	0.000	0.006	0.004	0.003	0.003	0.003	0.002	0.003	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.002	0.010	0.000	0.002	0.004	0.002	0.001	0.000	0.000	0.002	0.000
Ca	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.001	0.001	0.002	0.001
Total	3.009	3.005	3.013	3.004	2.999	3.001	2.998	2.995	2.993	2.986	2.992	2.999
Mn/(Mn+Fe)	0.602	0.608	0.589	0.599	0.749	0.698	0.741	0.879	0.894	0.897	0.904	0.896
Ta/(Ta+Nb)	0.278	0.311	0.252	0.763	0.377	0.461	0.260	0.465	0.499	0.625	0.619	0.457

Comments:

BK - BM
same grain

KC & KD
same grain

Columbite-Tantalite Group

	Big Whopper pegmatite 97-BW2					Big Whopper pegmatite 97-BW3				Big Whopper pegmatite 97-BW4					
	RA	RB	RC	RD	RE	BG	BH	BI	BJ	AC	AD	AG	AH	AJ	
FeO	6.89	4.82	3.87	4.79	2.72	0.16	0.28	0.20	0.24	7.72	6.38	7.76	7.43	7.83	
MnO	12.24	14.32	14.00	13.96	12.65	15.86	14.69	15.11	15.78	11.77	9.41	10.47	10.57	11.22	
TiO2	0.22	0.25	0.16	0.28	0.21	0.31	0.09	0.05	0.03	0.43	0.42	0.90	0.26	0.29	
Nb2O5	57.81	59.75	48.97	57.55	20.83	30.19	19.34	20.40	28.81	64.84	26.88	50.24	45.77	59.58	
Ta2O5	20.69	18.72	30.47	21.26	61.33	52.11	62.37	62.46	53.72	14.01	57.24	28.90	34.94	20.17	
SnO2	0.11	0.05	0.06	0.09	0.04	0.32	0.91	0.23	0.02	0.11	0.95	0.32	0.03	0.02	
WO3	0.57	0.36	0.38	0.46	0.41	0.79	0.44	0.31	0.21	0.24	0.17	0.51	0.34	0.33	
PbO	0.26	0.32	0.21	0.26	0.06	0.15	0.13	0.07	0.04	0.34	0.18	0.30	0.17	0.29	
ThO2	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	
UO2	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	
Sb2O3	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	
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05	
CaO	0.00	0.00	0.01	0.02	0.03	0.02	0.05	0.03	0.04	0.01	0.02	0.01	0.01	0.01	
Total	98.84	98.58	98.13	98.67	98.29	99.91	98.34	98.85	98.88	99.46	101.67	99.40	99.51	99.79	
Structural formulae based on 6 oxygens															
Fe	0.358	0.249	0.211	0.250	0.173	0.009	0.018	0.013	0.015	0.386	0.380	0.415	0.408	0.401	
Mn	0.644	0.749	0.775	0.737	0.814	0.954	0.954	0.972	0.967	0.596	0.568	0.567	0.588	0.582	
Ti	0.010	0.011	0.008	0.013	0.012	0.017	0.005	0.003	0.002	0.019	0.022	0.043	0.013	0.013	
Nb	1.625	1.667	1.447	1.622	0.716	0.969	0.671	0.700	0.942	1.754	0.866	1.451	1.359	1.650	
Ta	0.350	0.314	0.542	0.360	1.268	1.006	1.300	1.290	1.057	0.228	1.109	0.502	0.624	0.336	
Sn	0.003	0.001	0.002	0.002	0.001	0.009	0.028	0.007	0.000	0.003	0.027	0.008	0.001	0.001	
W	0.009	0.006	0.006	0.007	0.008	0.015	0.009	0.006	0.004	0.004	0.003	0.008	0.006	0.005	
Pb	0.004	0.005	0.004	0.004	0.001	0.003	0.003	0.001	0.001	0.005	0.004	0.005	0.003	0.005	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.003	
Ca	0.000	0.000	0.001	0.001	0.002	0.001	0.004	0.002	0.003	0.001	0.001	0.001	0.000	0.001	
Total	3.006	3.003	2.995	2.997	2.995	2.983	2.993	2.993	2.991	2.997	2.981	3.001	3.001	2.996	
Mn/(Mn+Fe)	0.643	0.751	0.786	0.747	0.825	0.990	0.981	0.987	0.985	0.607	0.599	0.577	0.591	0.592	
Ta/(Ta+Nb)	0.177	0.159	0.272	0.182	0.639	0.509	0.660	0.648	0.529	0.115	0.562	0.257	0.315	0.169	
Comments:	incl. in quartz					BG - BI same grain patchy zoned				AC & AD same grain		AG, AH & AJ same grain core inter rim			

Columbite-Tantalite Group

Big Whopper pegmatite															
97-BW4															
	LE	RB	RC	RD	RE	RF	RJ1	RJ2	RJ3	RJ4	RJ5	RJ6	RJ7	RK	RL
FeO	8.18	8.26	8.30	8.04	7.54	7.04	7.25	6.32	2.99	4.88	6.31	6.77	7.55	6.25	6.61
MnO	11.14	11.05	10.71	10.60	10.15	8.93	10.78	9.69	14.02	12.12	9.58	10.12	11.07	9.15	9.76
TiO2	1.35	1.29	1.71	1.00	1.44	2.49	0.20	0.00	0.45	0.46	0.02	0.04	0.18	0.08	0.03
Nb2O5	60.33	61.02	58.54	55.30	45.00	28.79	47.60	26.08	38.15	38.82	25.62	35.94	55.07	19.31	29.97
Ta2O5	15.67	16.05	17.58	22.52	32.98	48.85	32.41	56.77	42.07	41.62	57.37	46.14	24.22	64.65	52.43
SnO2	0.41	0.38	0.49	0.31	0.41	0.89	0.03	0.06	0.26	0.33	0.05	0.00	0.00	0.07	0.12
WO3	0.61	0.64	0.60	0.54	0.88	1.76	0.38	0.12	1.01	0.34	0.15	0.17	0.37	0.20	0.20
PbO	0.39	0.36	0.34	0.29	0.25	0.12	0.26	0.13	0.18	0.33	0.11	0.15	0.33	0.11	0.14
ThO2	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
UO2	0.00	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Sc2O3	0.12	0.00	0.06	0.00	0.14	0.01	0.14	0.11	0.11	0.02	0.01	0.05	0.00	0.05	0.04
CaO	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.02	0.06	0.02	0.04	0.02	0.04	0.00	0.00
Total	98.19	99.05	98.35	98.61	98.78	98.94	99.06	99.31	99.30	99.04	99.28	99.40	98.83	99.88	99.31
Structural formulae based on 6 oxygens															
Fe	0.418	0.418	0.426	0.421	0.413	0.415	0.396	0.387	0.170	0.279	0.388	0.393	0.398	0.396	0.396
Mn	0.577	0.567	0.557	0.563	0.563	0.533	0.596	0.601	0.810	0.701	0.596	0.594	0.591	0.588	0.592
Ti	0.062	0.059	0.079	0.047	0.071	0.132	0.010	0.000	0.023	0.024	0.001	0.002	0.009	0.004	0.002
Nb	1.666	1.672	1.625	1.566	1.332	0.918	1.405	0.864	1.176	1.198	0.851	1.126	1.571	0.661	0.971
Ta	0.260	0.265	0.293	0.384	0.588	0.937	0.575	1.131	0.780	0.772	1.147	0.870	0.416	1.332	1.022
Sn	0.010	0.009	0.012	0.008	0.011	0.025	0.001	0.002	0.007	0.009	0.001	0.000	0.000	0.002	0.004
W	0.010	0.010	0.010	0.009	0.015	0.032	0.006	0.002	0.018	0.006	0.003	0.003	0.006	0.004	0.004
Pb	0.006	0.006	0.006	0.005	0.004	0.002	0.005	0.003	0.003	0.006	0.002	0.003	0.006	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.007	0.000	0.003	0.000	0.008	0.001	0.008	0.007	0.006	0.001	0.000	0.003	0.000	0.003	0.003
Ca	0.000	0.001	0.000	0.000	0.000	0.002	0.001	0.001	0.004	0.002	0.003	0.001	0.003	0.000	0.000
Total	3.015	3.007	3.011	3.002	3.005	2.997	3.002	2.998	2.998	2.998	2.994	2.996	2.999	2.994	2.996
Mn/(Mn+Fe)	0.580	0.575	0.567	0.572	0.577	0.562	0.601	0.608	0.826	0.715	0.606	0.602	0.597	0.597	0.599
Ta/(Ta+Nb)	0.135	0.137	0.153	0.197	0.306	0.505	0.291	0.567	0.399	0.392	0.574	0.436	0.209	0.668	0.513
Comments:	RB - RF same grain		RJ traverse along patchy zoned grain						RK & RL same grain as RJ						
	RG - RI high Ti, Sn & W rim - see ixiolite														

Columbite-Tantalite Group

	Big Whopper pegmatite 97-BW5				Big Whopper pegmatite 97-BW7A						Big Whopper peg. 97-BW7B		
	HH	HT	HY	HZ	GC	GH	GI	GK	GL	GP	JL	JM	JN
FeO	16.04	16.67	14.12	14.36	10.46	8.56	9.05	7.88	8.34	8.16	12.30	12.38	12.05
MnO	2.50	2.24	2.00	2.10	4.94	6.54	6.39	7.05	7.07	7.36	3.91	3.63	3.88
TiO2	0.76	0.53	0.51	0.57	0.10	0.28	0.29	0.06	0.04	0.29	0.67	0.68	0.57
Nb2O5	50.96	60.03	31.02	31.50	20.30	12.90	16.76	13.39	17.48	20.86	25.73	25.74	26.45
Ta2O5	28.88	17.17	51.11	50.84	62.87	70.72	66.46	71.47	67.31	62.26	56.84	54.89	54.53
SnO2	0.13	0.08	0.50	0.28	0.40	0.18	0.14	0.06	0.04	0.13	0.32	1.86	1.52
WO3	0.71	0.77	0.45	0.68	0.21	0.26	0.30	0.23	0.24	0.28	0.14	0.17	0.12
PbO	0.20	0.27	0.09	0.16	0.06	0.01	0.11	0.09	0.09	0.02	0.08	0.07	0.11
ThO2	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
UO2	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.08	0.01	0.00	0.04	0.00	0.00	0.00	0.00
Sc2O3	0.04	0.00	0.00	0.06	0.03	0.04	0.07	0.00	0.06	0.01	0.15	0.00	0.02
CaO	0.01	0.03	0.00	0.01	0.03	0.01	0.03	0.02	0.00	0.00	0.00	0.01	0.04
Total	100.25	97.79	99.80	100.55	99.38	99.58	99.60	100.26	100.72	99.36	100.13	99.43	99.28
Structural formulae based on 6 oxygens													
Fe	0.850	0.863	0.835	0.841	0.662	0.564	0.582	0.516	0.530	0.514	0.744	0.753	0.732
Mn	0.134	0.118	0.120	0.124	0.316	0.436	0.416	0.468	0.455	0.469	0.240	0.224	0.239
Ti	0.036	0.025	0.027	0.030	0.006	0.016	0.017	0.003	0.002	0.016	0.036	0.037	0.031
Nb	1.460	1.680	0.992	0.997	0.694	0.459	0.583	0.474	0.601	0.710	0.842	0.846	0.869
Ta	0.498	0.289	0.983	0.968	1.293	1.514	1.390	1.521	1.392	1.274	1.119	1.085	1.077
Sn	0.003	0.002	0.014	0.008	0.012	0.006	0.004	0.002	0.001	0.004	0.009	0.054	0.044
W	0.012	0.012	0.008	0.012	0.004	0.005	0.006	0.005	0.005	0.005	0.003	0.003	0.002
Pb	0.003	0.004	0.002	0.003	0.001	0.000	0.002	0.002	0.002	0.000	0.002	0.001	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Sc	0.002	0.000	0.000	0.004	0.002	0.003	0.005	0.000	0.004	0.000	0.009	0.000	0.001
Ca	0.000	0.002	0.000	0.001	0.002	0.001	0.002	0.001	0.000	0.000	0.000	0.001	0.003
Total	2.999	2.995	2.980	2.988	2.992	3.005	3.006	2.992	2.994	2.993	3.004	3.005	3.000
Mn/(Mn+Fe)	0.136	0.120	0.125	0.129	0.323	0.436	0.417	0.476	0.462	0.477	0.243	0.229	0.246
Ta/(Ta+Nb)	0.254	0.147	0.498	0.493	0.651	0.767	0.705	0.762	0.698	0.642	0.571	0.562	0.554
Comments:	HT & HY same grain incl. in cass.				GH & GI same grain petalite part		GK & GL same grain petalite part					JM & JN incl. same grain in cass. incl. in cass.	

Columbite-Tantalite Group

Big Whopper pegmatite															
97-BW7B															
	JO1	JO2	JO3	JO4	JO5	JO6	JO7	JO8	JO9	JO10	JP	JQ	JR	JS	JT
FeO	10.78	10.60	10.87	11.01	10.90	10.51	10.53	10.62	11.02	10.63	10.69	9.94	10.68	10.22	10.83
MnO	7.58	7.41	7.49	7.60	7.50	7.41	7.44	7.40	7.56	7.61	7.75	7.82	7.75	6.66	7.36
TiO2	0.50	0.32	0.44	0.55	0.54	0.28	0.25	0.37	0.43	0.40	0.31	0.30	0.53	0.77	0.60
Nb2O5	50.55	46.95	51.04	51.91	51.13	45.94	46.98	47.77	52.55	50.22	50.63	49.47	53.00	39.34	51.51
Ta2O5	29.74	33.90	29.38	28.01	28.77	34.65	34.01	31.45	27.60	29.58	29.58	31.00	25.70	40.47	27.96
SnO2	0.11	0.11	0.12	0.10	0.13	0.03	0.11	0.11	0.11	0.10	0.07	0.06	0.11	0.25	0.18
WO3	0.52	0.40	0.48	0.52	0.57	0.52	0.51	0.53	0.51	0.53	0.63	0.46	1.24	0.56	0.54
PbO	0.24	0.20	0.19	0.26	0.22	0.26	0.23	0.22	0.21	0.28	0.21	0.24	0.30	0.23	0.29
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.00	0.01	0.00	0.02	0.00	0.00	0.02	0.00	0.13	0.06	0.04	0.35	0.03	0.06	0.03
CaO	0.01	0.00	0.02	0.00	0.00	0.02	0.01	0.04	0.00	0.00	0.01	0.11	0.01	0.00	0.01
Total	100.03	99.91	100.02	99.97	99.77	99.62	100.09	98.52	100.12	99.42	99.91	99.83	99.34	98.55	99.30
Structural formulae based on 6 oxygens															
Fe	0.575	0.577	0.579	0.583	0.580	0.577	0.573	0.581	0.581	0.571	0.571	0.534	0.565	0.582	0.577
Mn	0.409	0.409	0.404	0.407	0.405	0.412	0.409	0.410	0.404	0.414	0.419	0.425	0.415	0.384	0.398
Ti	0.024	0.016	0.021	0.026	0.026	0.014	0.012	0.018	0.021	0.019	0.015	0.014	0.025	0.039	0.029
Nb	1.457	1.381	1.468	1.486	1.472	1.362	1.381	1.413	1.498	1.458	1.462	1.436	1.516	1.211	1.485
Ta	0.516	0.600	0.508	0.482	0.498	0.618	0.601	0.560	0.473	0.517	0.514	0.541	0.442	0.750	0.485
Sn	0.003	0.003	0.003	0.003	0.003	0.001	0.003	0.003	0.003	0.003	0.002	0.002	0.003	0.007	0.005
W	0.009	0.007	0.008	0.009	0.009	0.009	0.009	0.009	0.008	0.009	0.010	0.008	0.020	0.010	0.009
Pb	0.004	0.004	0.003	0.004	0.004	0.005	0.004	0.004	0.004	0.005	0.004	0.004	0.005	0.004	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.007	0.003	0.002	0.020	0.002	0.004	0.002
Ca	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.001	0.007	0.000	0.000	0.000
Total	2.997	2.996	2.995	3.001	2.997	2.998	2.994	3.001	2.999	2.998	2.999	2.992	2.993	2.991	2.994
Mn/(Mn+Fe)	0.416	0.415	0.411	0.411	0.411	0.417	0.417	0.414	0.410	0.420	0.423	0.443	0.424	0.397	0.408
Ta/(Ta+Nb)	0.261	0.303	0.257	0.245	0.253	0.312	0.303	0.284	0.240	0.262	0.260	0.274	0.226	0.382	0.246
Comments:	JO - traverse across 200 µm grain					JP & JQ					JS & JT				
	patchy zonation					same grain					same grain				
											rim core				

Columbite-Tantalite Group

	Big Whopper pegmatite 97-BW8									Great White North pegmatite 97-GWN1						
	FC	FD	FE	FF	FG	FK	FL	FM	FN	BA	BB	BC	BD	BE	BF	
FeO	6.43	7.30	7.13	7.03	6.31	6.84	6.01	7.12	6.17	14.82	14.26	14.59	14.44	14.69	12.57	
MnO	8.32	10.31	9.52	9.10	9.20	9.30	7.88	11.46	12.17	5.31	5.08	5.63	5.24	5.23	4.45	
TiO2	0.00	0.35	0.06	0.00	0.03	0.00	0.00	0.38	0.30	0.34	0.31	0.38	0.27	0.37	0.22	
Nb2O5	11.52	50.06	34.74	24.91	20.43	25.48	9.35	50.42	49.03	65.75	56.70	65.44	60.49	64.37	33.40	
Ta2O5	72.36	27.76	52.10	58.44	63.58	58.84	72.16	29.78	31.01	12.33	22.74	13.10	17.15	14.34	47.83	
SnO2	0.60	0.05	0.09	0.24	0.12	0.11	0.63	0.13	0.08	0.08	0.04	0.06	0.08	0.09	0.10	
WO3	0.18	0.58	0.17	0.18	0.28	0.18	0.21	0.58	0.85	0.35	0.54	0.37	0.31	0.44	0.53	
PbO	0.07	0.20	0.15	0.16	0.08	0.10	0.04	0.28	0.17	0.33	0.26	0.29	0.29	0.33	0.09	
ThO2	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	
UO2	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	
Sb2O3	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Bi2O3	0.02	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	
Sc2O3	0.02	0.10	0.02	0.00	0.09	0.00	0.00	0.08	0.00	0.11	0.00	0.03	0.00	0.00	0.00	
CaO	0.03	0.00	0.02	0.02	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.01	0.02	
Total	99.55	96.69	104.00	100.08	100.13	100.86	96.28	100.26	99.78	99.42	99.94	99.90	98.26	99.87	99.20	
Structural formulae based on 6 oxygens																
Fe	0.428	0.400	0.402	0.431	0.396	0.415	0.419	0.379	0.332	0.739	0.739	0.726	0.745	0.735	0.739	
Mn	0.561	0.573	0.543	0.565	0.585	0.572	0.556	0.618	0.663	0.268	0.267	0.284	0.273	0.265	0.265	
Ti	0.000	0.017	0.003	0.000	0.002	0.000	0.000	0.018	0.014	0.015	0.015	0.017	0.012	0.017	0.011	
Nb	0.415	1.485	1.058	0.825	0.694	0.836	0.352	1.452	1.427	1.772	1.589	1.760	1.686	1.741	1.061	
Ta	1.567	0.495	0.954	1.165	1.298	1.161	1.635	0.516	0.543	0.200	0.383	0.212	0.287	0.233	0.914	
Sn	0.019	0.001	0.002	0.007	0.004	0.003	0.021	0.003	0.002	0.002	0.001	0.001	0.002	0.002	0.003	
W	0.004	0.010	0.003	0.003	0.005	0.003	0.004	0.010	0.014	0.005	0.009	0.006	0.005	0.007	0.010	
Pb	0.002	0.004	0.003	0.003	0.002	0.002	0.001	0.005	0.003	0.005	0.004	0.005	0.005	0.005	0.002	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.001	0.005	0.001	0.000	0.006	0.000	0.000	0.004	0.000	0.006	0.000	0.001	0.000	0.000	0.000	
Ca	0.003	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.001	
Total	3.000	2.990	2.970	3.001	2.992	2.994	2.989	3.006	3.000	3.012	3.008	3.012	3.016	3.006	3.005	
Mn/(Mn+Fe)	0.567	0.589	0.575	0.567	0.596	0.579	0.571	0.620	0.666	0.266	0.265	0.281	0.269	0.265	0.264	
Ta/(Ta+Nb)	0.791	0.250	0.474	0.585	0.652	0.581	0.823	0.262	0.276	0.101	0.194	0.107	0.146	0.118	0.463	
Comments:	FC & FD	FE - FG								BA - BC	BD - BF					
	same grain	same grain	core								same grain	same grain	core			
	FD FM & FN are all near a veinlet - may explain different Ta content (but so is FC ?)									patchy zonation			patchy zonation			

Columbite-Tantalite Group

	Great White North peg. 97-GWN1					Great White North pegmatite 97-GWN2				Great White North pegmatite 97-GWN3					
	BG	BH	TB	TC	TD	HL	HN	HO	HP	FB	FC	FD	FE	FF	
FeO	14.70	14.23	14.27	13.58	13.61	5.45	6.32	6.15	6.42	13.10	13.00	12.80	13.31	12.92	
MnO	5.24	5.22	4.84	5.00	5.29	9.43	9.49	10.53	9.30	6.29	6.47	6.20	6.41	6.00	
TiO2	0.29	0.24	0.40	0.29	0.26	0.31	0.14	0.47	0.46	0.72	0.86	0.49	0.82	0.80	
Nb2O5	62.72	56.91	66.63	53.79	55.59	17.18	25.20	38.56	22.79	65.28	63.97	56.28	64.67	58.36	
Ta2O5	15.67	21.62	12.86	25.65	24.57	65.59	58.03	44.60	58.84	12.05	14.57	23.38	13.77	20.12	
SnO2	0.08	0.06	0.09	0.11	0.08	0.16	0.05	0.20	0.17	0.16	0.18	0.13	0.10	0.18	
WO3	0.42	0.43	0.37	0.41	0.37	0.28	0.24	0.63	0.46	0.54	0.65	0.51	0.61	0.74	
PbO	0.32	0.35	0.31	0.25	0.30	0.11	0.10	0.21	0.11	0.29	0.32	0.29	0.31	0.28	
ThO2	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	
UO2	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	
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.00	0.00	0.00	0.06	0.00	0.00	0.05	0.04	0.07	0.17	0.07	0.00	0.09	0.03	
CaO	0.01	0.00	0.03	0.01	0.01	0.00	0.03	0.09	0.00	0.01	0.00	0.01	0.00	0.02	
Total	99.46	99.06	99.79	99.14	100.09	98.54	99.64	101.48	98.61	98.60	100.07	100.10	100.08	99.44	
Structural formulae based on 6 oxygens															
Fe	0.743	0.743	0.708	0.719	0.710	0.353	0.387	0.345	0.401	0.656	0.648	0.663	0.661	0.664	
Mn	0.269	0.276	0.243	0.268	0.280	0.619	0.590	0.598	0.589	0.319	0.327	0.326	0.323	0.312	
Ti	0.013	0.011	0.018	0.014	0.012	0.018	0.008	0.023	0.026	0.032	0.038	0.023	0.037	0.037	
Nb	1.715	1.605	1.787	1.539	1.567	0.602	0.835	1.168	0.770	1.767	1.724	1.577	1.737	1.623	
Ta	0.258	0.367	0.207	0.441	0.417	1.383	1.157	0.813	1.195	0.196	0.236	0.394	0.222	0.336	
Sn	0.002	0.001	0.002	0.003	0.002	0.005	0.001	0.005	0.005	0.004	0.004	0.003	0.002	0.005	
W	0.007	0.007	0.006	0.007	0.006	0.006	0.005	0.011	0.009	0.008	0.010	0.008	0.009	0.012	
Pb	0.005	0.006	0.005	0.004	0.005	0.002	0.002	0.004	0.002	0.005	0.005	0.005	0.005	0.005	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.002	0.004	0.009	0.003	0.000	0.004	0.001	
Ca	0.001	0.000	0.002	0.000	0.001	0.000	0.002	0.006	0.000	0.001	0.000	0.000	0.000	0.001	
Total	3.013	3.016	2.978	2.998	2.999	2.989	2.991	2.976	3.001	2.997	2.996	3.000	3.001	2.996	
Mn/(Mn+Fe)	0.265	0.271	0.256	0.271	0.283	0.637	0.604	0.634	0.595	0.327	0.335	0.329	0.328	0.320	
Ta/(Ta+Nb)	0.131	0.186	0.104	0.223	0.210	0.697	0.581	0.410	0.608	0.100	0.120	0.200	0.114	0.172	
Comments:										FB & FC same grain		FD - FF same grain			
core															

Columbite-Tantalite Group

	Great White North pegmatite 97-GWN4											Great White North peg. 97-GWN5			
	RE	RH	RI	EB	EC	ED	EE	EF	EG	EH	EI	KA	KB	KD	KE
FeO	5.79	5.37	5.14	5.61	5.83	5.95	5.62	5.83	5.82	5.87	6.13	6.44	6.17	5.79	6.74
MnO	12.77	10.76	10.63	12.57	12.51	12.97	12.70	12.00	12.00	12.11	12.27	9.10	9.62	10.33	9.99
TiO2	0.20	0.21	0.28	0.33	0.19	0.27	0.36	0.19	0.21	0.27	0.26	0.61	0.54	0.40	0.19
Nb2O5	55.16	28.08	23.53	50.00	52.84	57.59	51.70	46.64	46.92	47.62	52.78	22.31	23.37	25.12	31.57
Ta2O5	25.14	52.30	58.96	29.40	27.37	22.51	27.85	34.35	33.21	33.10	27.01	58.47	57.74	56.10	50.57
SnO2	0.02	1.09	0.55	0.09	0.07	0.05	0.16	0.02	0.02	0.08	0.08	0.39	0.43	0.24	0.05
WO3	0.19	0.61	0.52	0.70	0.44	0.29	0.99	0.41	0.38	0.51	0.32	0.45	0.72	0.64	0.58
PbO	0.26	0.19	0.05	0.23	0.24	0.23	0.27	0.21	0.22	0.24	0.23	0.26	0.10	0.12	0.12
ThO2	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
UO2	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00
Sb2O3	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.02	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
Sc2O3	0.03	0.04	0.00	0.02	0.00	0.00	0.04	0.00	0.00	0.06	0.09	0.00	0.00	0.00	0.00
CaO	0.03	0.01	0.00	0.04	0.03	0.03	0.02	0.03	0.03	0.02	0.04	0.06	0.01	0.00	0.00
Total	99.64	98.70	99.64	98.97	99.52	99.89	99.70	99.67	98.81	99.87	99.21	98.39	98.68	98.75	99.82
Structural formulae based on 6 oxygens															
Fe	0.304	0.326	0.317	0.303	0.309	0.307	0.299	0.318	0.319	0.318	0.326	0.404	0.383	0.357	0.398
Mn	0.678	0.661	0.665	0.686	0.672	0.679	0.683	0.664	0.668	0.665	0.660	0.579	0.606	0.645	0.598
Ti	0.010	0.012	0.015	0.016	0.009	0.013	0.017	0.009	0.010	0.013	0.013	0.034	0.030	0.022	0.010
Nb	1.563	0.921	0.786	1.457	1.515	1.608	1.485	1.378	1.393	1.396	1.516	0.757	0.785	0.837	1.008
Ta	0.429	1.032	1.184	0.515	0.472	0.378	0.481	0.611	0.593	0.584	0.467	1.194	1.167	1.124	0.971
Sn	0.001	0.032	0.016	0.002	0.002	0.001	0.004	0.000	0.001	0.002	0.002	0.012	0.013	0.007	0.001
W	0.003	0.011	0.010	0.012	0.007	0.005	0.016	0.007	0.007	0.009	0.005	0.009	0.014	0.012	0.011
Pb	0.004	0.004	0.001	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.005	0.002	0.002	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000
Sb	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.001	0.002	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.003	0.005	0.000	0.000	0.000	0.000
Ca	0.002	0.000	0.000	0.003	0.002	0.002	0.002	0.002	0.002	0.001	0.003	0.005	0.000	0.000	0.000
Total	2.995	3.002	2.994	2.999	2.993	2.997	2.995	2.994	2.997	2.996	2.999	3.004	3.001	3.006	2.999
Mn/(Mn+Fe)	0.691	0.670	0.677	0.694	0.685	0.688	0.696	0.676	0.676	0.676	0.670	0.589	0.612	0.644	0.600
Ta/(Ta+Nb)	0.215	0.528	0.601	0.261	0.238	0.190	0.245	0.307	0.299	0.295	0.235	0.612	0.598	0.573	0.491
Comments:	RH & RI same grain			ED & EE same grain patchy zoned				EF - EH same grain patchy zoned				KA - KE same grain			

Columbite-Tantalite Group

	Great White North peg. 97-GWNS				Great White North peg. 97-GWN6			Pegmatite 7 97-P7-1			Pegmatite 10 97-P10			
	KF	KG	KI	KJ	MC	MI	MJ	SM	SO	SP	RC	RD	JA	JM
FeO	7.78	7.61	3.53	3.35	11.37	10.85	8.86	10.17	10.50	10.11	14.20	15.10	13.60	14.71
MnO	9.98	9.90	12.88	12.91	6.63	4.51	3.80	5.03	4.72	4.94	3.81	3.75	3.66	3.29
TiO2	0.49	0.61	0.32	0.35	0.27	0.79	0.70	3.88	4.12	3.21	1.12	1.23	1.20	2.60
Nb2O5	43.78	41.75	25.88	26.02	48.32	20.84	28.23	25.73	23.72	24.26	37.46	50.94	39.22	49.34
Ta2O5	36.52	37.81	55.90	55.48	31.25	60.30	52.14	48.30	48.35	47.18	41.90	28.09	40.29	25.60
SnO2	0.24	0.34	0.16	0.16	0.02	0.44	0.71	4.69	5.72	4.81	0.55	0.36	0.47	0.87
WO3	0.63	0.54	0.54	0.65	0.41	0.33	0.43	1.73	2.25	3.51	0.81	0.55	0.84	1.36
PbO	0.20	0.27	0.09	0.10	0.23	0.16	0.16	0.07	0.12	0.14	0.19	0.22	0.41	0.53
ThO2	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	0.00
UO2	0.03	0.12	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.21	0.02	0.11	0.11
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.06	0.06
Bi2O3	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00				
Sc2O3	0.00	0.08	0.00	0.00	0.00	0.00	0.09	0.29	0.23	0.32	0.05	0.23	0.03	0.68
CaO	0.00	0.00	0.00	0.00	0.02	0.02	3.60	0.03	0.04	0.03	0.03	0.03	0.12	0.12
Total	99.65	99.02	99.30	99.04	98.53	98.32	98.71	99.91	99.75	98.50	100.39	100.58	100.01	99.27
Structural formulae based on 6 oxygens														
Fe	0.430	0.427	0.215	0.205	0.622	0.686	0.529	0.593	0.617	0.604	0.801	0.794	0.763	0.776
Mn	0.559	0.562	0.797	0.799	0.367	0.289	0.230	0.297	0.281	0.299	0.218	0.200	0.208	0.176
Ti	0.024	0.031	0.018	0.019	0.013	0.045	0.038	0.204	0.218	0.172	0.057	0.058	0.061	0.123
Nb	1.309	1.266	0.854	0.860	1.428	0.713	0.912	0.811	0.754	0.783	1.142	1.447	1.190	1.406
Ta	0.657	0.690	1.110	1.103	0.555	1.240	1.014	0.916	0.925	0.916	0.769	0.480	0.735	0.439
Sn	0.006	0.009	0.005	0.005	0.001	0.013	0.020	0.130	0.160	0.137	0.015	0.009	0.013	0.022
W	0.011	0.009	0.010	0.012	0.007	0.006	0.008	0.031	0.041	0.065	0.014	0.009	0.015	0.022
Pb	0.004	0.005	0.002	0.002	0.004	0.003	0.003	0.001	0.002	0.003	0.003	0.004	0.007	0.009
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.003	0.000	0.002	0.002
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.002
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000							
Sc	0.000	0.005	0.000	0.000	0.000	0.000	0.006	0.018	0.014	0.020	0.003	0.013	0.002	0.037
Ca	0.000	0.000	0.000	0.000	0.001	0.002	0.275	0.002	0.003	0.002	0.002	0.002	0.009	0.008
Total	3.000	3.004	3.011	3.006	2.998	2.999	3.035	3.004	3.015	3.001	3.028	3.017	3.006	3.021
Mn/(Mn+Fe)	0.565	0.569	0.787	0.796	0.371	0.296	0.303	0.334	0.313	0.331	0.214	0.201	0.214	0.185
Ta/(Ta+Nb)	0.334	0.353	0.565	0.562	0.280	0.635	0.526	0.530	0.551	0.539	0.402	0.249	0.382	0.238
Comments:	KF & KG		incl.		MI & MJ			SM - SP same grain						
	same grain		in garnet		same grain			replaces wodginitite						
	close to micaceous selvage													

Columbite-Tantalite Group

Pegmatite 10																
97-P10-1																
	VR	VX	VY	VZ	WC	WE	WF	WG	WI	WJ	WK	WP	WR	WS	JJ	JK
FeO	13.75	14.46	14.30	13.02	14.18	14.59	14.18	14.75	14.98	14.94	14.04	13.19	13.44	13.68	13.29	13.33
MnO	2.43	2.82	2.76	3.14	2.36	2.02	2.43	2.64	2.94	2.98	3.00	3.12	3.04	3.05	2.82	3.01
TiO2	2.42	0.77	0.78	1.31	1.78	2.07	2.13	0.78	0.83	0.85	1.08	1.13	0.80	1.15	1.06	0.66
Nb2O5	27.92	37.41	34.34	34.70	31.26	31.59	31.31	39.43	45.33	45.46	35.51	28.02	28.98	31.29	26.58	26.72
Ta2O5	50.63	42.50	45.84	44.31	47.94	47.51	46.66	41.04	33.25	33.20	44.26	51.56	52.72	49.30	54.23	54.66
SnO2	0.75	0.21	0.10	0.41	0.78	0.73	0.75	0.16	0.12	0.15	0.27	0.39	0.22	0.30	0.23	0.16
WO3	1.40	1.22	1.25	1.44	0.98	1.10	1.17	1.28	1.41	1.29	1.44	1.06	0.51	0.82	0.95	0.80
PbO	0.18	0.14	0.09	0.16	0.20	0.13	0.14	0.15	0.22	0.20	0.20	0.19	0.06	0.19	0.10	0.12
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.17	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	0.02	0.01	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	0.00
Sc2O3	0.12	0.15	0.06	0.32	0.02	0.01	0.12	0.11	0.00	0.00	0.12	0.00	0.00	0.05	0.11	0.00
CaO	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.11	0.00	0.00	0.00	0.00
Total	99.62	99.67	99.51	99.38	99.48	99.75	98.90	100.33	99.12	99.08	99.92	98.94	99.78	99.83	99.36	99.47
Structural formulae based on 6 oxygens																
Fe	0.811	0.823	0.829	0.747	0.828	0.846	0.828	0.827	0.822	0.820	0.804	0.793	0.801	0.801	0.802	0.807
Mn	0.145	0.163	0.162	0.183	0.140	0.119	0.144	0.150	0.163	0.166	0.174	0.190	0.183	0.181	0.172	0.185
Ti	0.128	0.039	0.040	0.067	0.093	0.108	0.112	0.039	0.041	0.042	0.056	0.061	0.043	0.061	0.057	0.036
Nb	0.890	1.151	1.076	1.077	0.987	0.990	0.988	1.195	1.346	1.349	1.099	0.911	0.933	0.991	0.868	0.875
Ta	0.971	0.787	0.864	0.827	0.910	0.896	0.886	0.748	0.594	0.592	0.824	1.008	1.022	0.939	1.065	1.077
Sn	0.021	0.006	0.003	0.011	0.022	0.020	0.021	0.004	0.003	0.004	0.007	0.011	0.006	0.008	0.007	0.005
W	0.026	0.022	0.022	0.026	0.018	0.020	0.021	0.022	0.024	0.022	0.025	0.020	0.009	0.015	0.018	0.015
Pb	0.003	0.002	0.002	0.003	0.004	0.002	0.003	0.003	0.004	0.004	0.004	0.004	0.001	0.004	0.002	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.007	0.009	0.004	0.019	0.001	0.000	0.007	0.006	0.000	0.000	0.007	0.000	0.000	0.003	0.007	0.000
Ca	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.008	0.000	0.000	0.000	0.000
Total	3.004	3.001	3.001	3.004	3.003	3.002	3.010	2.994	2.999	2.999	2.999	3.008	2.999	3.004	2.998	3.002
Mn/(Mn+Fe)	0.152	0.165	0.164	0.196	0.144	0.123	0.148	0.153	0.166	0.168	0.178	0.193	0.186	0.184	0.177	0.186
Ta/(Ta+Nb)	0.522	0.406	0.445	0.434	0.480	0.475	0.473	0.385	0.306	0.305	0.429	0.525	0.523	0.487	0.551	0.552
Comments:	columbite core with irregular wodginite rim					WC - WG same grain			WI & WJ same grain			WP & WQ same grain		WR & WS same grain		JJ & JK same grain
	wodginite & microlite incls. in this grain										patchy zonation					

Columbite-Tantalite Group

	Pegmatite 10 97-P10-2											Pegmatite 10 97-P10-3				
	LA	LB	LH	LL	LM	LN	LT	LU	LV	LX	LY	LZ	ND	NN	NQ	NS
FeO	13.32	13.66	14.81	14.05	14.57	15.85	12.98	12.31	15.61	14.86	13.40	14.48	13.52	14.90	14.96	16.24
MnO	3.18	2.73	2.46	2.33	2.36	2.49	3.09	4.06	2.81	2.73	2.60	2.69	1.69	1.86	2.33	2.61
TiO2	0.33	0.33	1.04	0.43	0.81	0.86	0.39	0.61	0.76	0.74	0.74	0.75	0.71	1.52	1.12	0.71
Nb2O5	28.46	28.02	37.84	28.58	34.53	50.24	24.44	28.44	49.67	41.40	23.57	36.16	23.19	36.25	36.77	51.79
Ta2O5	52.49	53.30	40.90	52.55	45.19	28.41	57.31	52.31	28.76	38.06	57.94	43.63	56.90	43.16	42.25	27.39
SnO2	0.14	0.16	0.22	0.11	0.22	0.19	0.17	0.25	0.11	0.14	0.17	0.22	1.03	0.22	0.25	0.13
WO3	0.69	0.71	1.46	0.72	1.29	1.50	0.78	0.91	1.34	1.14	0.69	0.92	0.75	1.09	1.53	1.39
PbO	0.19	0.10	0.14	0.08	0.14	0.26	0.17	0.21	0.24	0.18	0.08	0.13	0.12	0.16	0.17	0.23
ThO2	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
UO2	0.00	0.00	0.00	0.04	0.06	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.14	0.00
Sb2O3	0.00	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
Bi2O3	0.00	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
Sc2O3	0.03	0.00	0.00	0.00	0.00	0.05	0.02	0.02	0.00	0.07	0.00	0.02	0.07	0.00	0.00	0.01
CaO	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.01	0.00	0.01	0.02	0.00	0.01
Total	98.82	99.06	98.87	98.89	99.16	99.87	99.33	99.12	99.32	99.32	99.20	99.00	98.00	99.19	99.52	100.52
Structural formulae based on 6 oxygens																
Fe	0.806	0.827	0.845	0.849	0.846	0.844	0.800	0.741	0.838	0.832	0.827	0.835	0.845	0.852	0.853	0.855
Mn	0.195	0.167	0.142	0.142	0.139	0.135	0.193	0.248	0.153	0.155	0.163	0.157	0.107	0.108	0.134	0.139
Ti	0.018	0.018	0.053	0.023	0.042	0.041	0.021	0.033	0.037	0.037	0.041	0.039	0.040	0.078	0.057	0.034
Nb	0.931	0.917	1.167	0.933	1.084	1.446	0.814	0.925	1.441	1.253	0.787	1.128	0.784	1.121	1.134	1.474
Ta	1.033	1.049	0.759	1.032	0.854	0.492	1.148	1.024	0.502	0.693	1.164	0.818	1.157	0.803	0.784	0.469
Sn	0.004	0.005	0.006	0.003	0.006	0.005	0.005	0.007	0.003	0.004	0.005	0.006	0.031	0.006	0.007	0.003
W	0.013	0.013	0.026	0.013	0.023	0.025	0.015	0.017	0.022	0.020	0.013	0.016	0.015	0.019	0.027	0.023
Pb	0.004	0.002	0.003	0.002	0.003	0.005	0.003	0.004	0.004	0.003	0.002	0.002	0.002	0.003	0.003	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.002	0.000	0.000	0.000	0.000	0.003	0.001	0.001	0.000	0.004	0.000	0.001	0.005	0.000	0.000	0.000
Ca	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.001
Total	3.006	3.000	3.000	2.998	2.998	2.996	3.000	3.001	3.001	2.999	3.002	3.003	2.987	2.991	3.002	3.002
Mn/(Mn+Fe)	0.195	0.168	0.144	0.144	0.141	0.137	0.194	0.251	0.154	0.157	0.164	0.158	0.112	0.112	0.136	0.140
Ta/(Ta+Nb)	0.526	0.534	0.394	0.525	0.441	0.254	0.585	0.525	0.258	0.356	0.597	0.421	0.596	0.417	0.409	0.241
Comments:	LA & LB same grain		LL - LN same grain core mid rim				LT - LV same grain no zoning			LX - LZ same grain patchy zoned			ND inclusion in cassiterite		NQ & NS inclusions in garnet	

Columbite-Tantalite Group

	Pegmatite 10 97-P10-4									Pegmatite 10 97-P10-5					
	MA	MB	ME	MF	MM	MN	MS	MT	MU	WF	WG	WH	WI	WK	WL
FeO	14.56	14.32	14.35	14.18	14.03	14.10	14.40	14.00	15.53	14.88	14.95	14.82	14.82	15.11	15.50
MnO	2.98	3.01	2.93	3.10	3.25	3.10	2.36	2.50	2.57	2.48	2.80	2.52	2.51	2.69	2.84
TiO2	2.73	1.39	0.85	0.80	0.71	0.85	0.76	0.58	0.67	2.76	1.60	2.32	2.80	1.78	1.23
Nb2O5	41.22	37.09	35.19	36.06	38.06	38.57	31.53	28.82	46.14	36.95	39.85	38.46	38.80	42.27	47.16
Ta2O5	34.02	41.23	43.98	43.92	41.08	40.46	47.93	51.51	33.31	39.26	37.68	39.23	37.85	34.34	30.27
SnO2	0.68	0.31	0.18	0.17	0.18	0.18	0.26	0.25	0.11	1.07	0.33	0.81	0.87	0.64	0.49
WO3	2.17	1.60	1.61	1.62	1.40	1.39	1.30	1.19	1.10	1.61	2.39	1.25	1.81	1.63	1.89
PbO	0.21	0.16	0.19	0.13	0.15	0.14	0.25	0.14	0.15	0.18	0.11	0.20	0.21	0.34	0.21
ThO2	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
UO2	0.00	0.00	0.00	0.01	0.00	0.03	0.06	0.14	0.00	0.00	0.00	0.00	0.00	0.25	0.00
Sb2O3	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
Bi2O3	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
Sc2O3	0.44	0.07	0.01	0.00	0.09	0.05	0.07	0.00	0.01	0.09	0.18	0.24	0.27	0.01	0.05
CaO	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.01
Total	99.03	99.18	99.29	99.99	98.95	98.87	98.91	99.12	99.60	99.27	99.89	99.84	99.93	99.08	99.66
Structural formulae based on 6 oxygens															
Fe	0.799	0.815	0.829	0.811	0.801	0.803	0.852	0.841	0.847	0.835	0.831	0.825	0.819	0.836	0.835
Mn	0.166	0.173	0.171	0.180	0.188	0.179	0.141	0.152	0.142	0.141	0.158	0.142	0.141	0.151	0.155
Ti	0.135	0.071	0.044	0.041	0.036	0.043	0.040	0.032	0.033	0.139	0.080	0.116	0.139	0.089	0.060
Nb	1.223	1.141	1.099	1.115	1.175	1.187	1.008	0.936	1.361	1.121	1.197	1.157	1.159	1.264	1.374
Ta	0.607	0.763	0.826	0.817	0.763	0.749	0.922	1.006	0.591	0.716	0.681	0.710	0.680	0.618	0.531
Sn	0.018	0.008	0.005	0.005	0.005	0.005	0.007	0.007	0.003	0.029	0.009	0.022	0.023	0.017	0.013
W	0.037	0.028	0.029	0.029	0.025	0.025	0.024	0.022	0.019	0.028	0.041	0.022	0.031	0.028	0.032
Pb	0.004	0.003	0.003	0.002	0.003	0.003	0.005	0.003	0.003	0.003	0.002	0.004	0.004	0.006	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.004	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.025	0.004	0.000	0.000	0.005	0.003	0.004	0.000	0.000	0.005	0.010	0.014	0.015	0.000	0.003
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001
Total	3.014	3.007	3.006	2.999	3.001	2.997	3.006	3.001	2.999	3.017	3.008	3.011	3.010	3.012	3.006
Mn/(Mn+Fe)	0.172	0.175	0.171	0.181	0.190	0.182	0.142	0.153	0.144	0.144	0.160	0.147	0.147	0.153	0.157
Ta/(Ta+Nb)	0.332	0.401	0.429	0.423	0.394	0.387	0.478	0.518	0.303	0.390	0.363	0.380	0.370	0.328	0.279
Comments:	MA & MB same grain		ME & MF same grain		MM & MN same grain		MS - MU same grain			WF - WI same grain			WK & WL same grain		
										columbite associated with more abundant cassiterite					

Columbite-Tantalite Group

Swamp pegmatite 97-SP1																	
	NA	NB	NC	JA	JB	JC	JD	JM	JN	JQ	JR	AH	AI	AR	AU	AX	AY
FeO	0.87	0.91	0.87	0.82	0.81	0.81	0.80	0.47	0.69	0.93	0.91	0.69	0.73	0.80	0.77	0.72	0.78
MnO	13.57	14.67	14.62	14.34	14.53	14.62	14.73	15.04	15.99	15.91	14.60	14.44	13.93	14.30	14.11	14.82	14.85
TiO2	0.00	0.05	0.01	0.00	0.00	0.02	0.00	0.01	0.60	0.26	0.00	0.25	0.03	0.02	0.01	0.02	0.06
Nb2O5	13.33	26.58	23.49	18.90	20.33	23.03	23.65	25.00	37.81	37.87	23.06	20.76	14.05	19.63	16.99	23.41	25.96
Ta2O5	71.32	56.74	59.50	65.00	63.20	60.20	59.42	58.59	42.97	43.98	60.73	62.47	71.16	63.79	67.20	60.14	56.86
SnO2	0.36	0.21	0.04	0.05	0.16	0.00	0.14	0.11	0.59	0.16	0.07	0.27	0.07	0.02	0.06	0.08	0.09
WO3	0.19	0.28	0.27	0.25	0.30	0.17	0.23	0.21	0.67	0.64	0.23	0.30	0.32	0.22	0.20	0.27	0.28
PbO	0.08	0.13	0.05	0.01	0.11	0.09	0.03	0.14	0.29	0.20	0.07	0.27	0.15	0.21	0.26	0.29	0.28
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.04	0.00	0.00	0.01
Bi2O3	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	0.06	0.00	0.00
Sc2O3	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.02	0.02	0.30	0.09
CaO	0.00	0.00	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.00	0.02	0.02	0.02	0.02	0.01	0.02	0.01
Total	99.72	99.57	98.87	99.53	99.45	98.96	99.01	99.59	99.67	99.94	99.70	99.59	100.44	99.05	99.68	100.06	99.26
Structural formulae based on 6 oxygens																	
Fe	0.057	0.055	0.054	0.052	0.051	0.051	0.050	0.029	0.039	0.053	0.056	0.043	0.047	0.051	0.050	0.045	0.048
Mn	0.904	0.906	0.924	0.925	0.931	0.926	0.929	0.937	0.923	0.919	0.919	0.920	0.918	0.924	0.921	0.927	0.923
Ti	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.030	0.013	0.000	0.014	0.002	0.001	0.001	0.001	0.004
Nb	0.474	0.876	0.793	0.651	0.695	0.779	0.796	0.832	1.165	1.167	0.775	0.706	0.495	0.677	0.592	0.781	0.861
Ta	1.527	1.125	1.208	1.346	1.300	1.225	1.203	1.172	0.796	0.815	1.227	1.277	1.507	1.323	1.409	1.207	1.134
Sn	0.011	0.006	0.001	0.002	0.005	0.000	0.004	0.003	0.016	0.004	0.002	0.008	0.002	0.001	0.002	0.002	0.003
W	0.004	0.005	0.005	0.005	0.006	0.003	0.004	0.004	0.012	0.011	0.004	0.006	0.006	0.004	0.004	0.005	0.005
Pb	0.002	0.003	0.001	0.000	0.002	0.002	0.001	0.003	0.005	0.004	0.001	0.006	0.003	0.004	0.005	0.006	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Sc	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.001	0.001	0.019	0.006
Ca	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.002	0.001	0.002	0.002	0.001	0.001	0.000
Total	2.980	2.979	2.988	2.990	2.991	2.988	2.988	2.982	2.988	2.987	2.986	2.988	2.981	2.989	2.987	2.994	2.988
Mn/(Mn+Fe)	0.941	0.942	0.944	0.946	0.948	0.948	0.949	0.970	0.959	0.945	0.942	0.955	0.951	0.948	0.949	0.954	0.951
Ta/(Ta+Nb)	0.763	0.562	0.604	0.674	0.652	0.611	0.602	0.585	0.406	0.411	0.613	0.644	0.753	0.662	0.704	0.607	0.569
Comments:	NA & NB same grain				JB - JD same grain some zoning			JM & JN same grain oscillatory zoned			AH - AY from large block sent in 1999						

Columbite-Tantalite Group

	West pegmatite 97-WP1				West pegmatite 97-WP2					
	QG	QM	QN	QR	CC	CD	CE	CF	SE	SF
FeO	14.78	13.99	13.90	13.81	12.77	12.98	12.52	12.00	12.04	12.71
MnO	3.85	3.45	3.58	3.56	3.75	3.84	4.11	4.75	3.75	3.77
TiO ₂	0.79	0.64	0.34	0.22	0.66	0.75	0.54	0.56	0.65	0.55
Nb ₂ O ₅	50.40	34.78	36.46	35.77	29.50	32.17	30.06	30.36	28.47	30.95
Ta ₂ O ₅	28.13	45.92	45.21	46.11	51.83	50.26	50.98	51.08	52.21	51.26
SnO ₂	0.24	0.26	0.17	0.08	0.94	0.25	0.87	0.94	0.28	0.14
WO ₃	0.50	0.44	0.31	0.22	0.37	0.42	0.47	0.54	0.59	0.55
PbO	0.26	0.11	0.17	0.16	0.14	0.17	0.13	0.14	0.29	0.13
ThO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sc ₂ O ₃	0.00	0.00	0.14	0.11	0.05	0.00	0.04	0.00	0.19	0.00
CaO	0.02	0.01	0.00	0.01	0.00	0.02	0.01	0.00	0.08	0.00
Total	98.96	99.59	100.27	100.04	100.01	100.87	99.73	100.37	98.69	100.05

Structural formulae based on 6 oxygens

Fe	0.793	0.810	0.795	0.796	0.758	0.754	0.743	0.707	0.728	0.750
Mn	0.209	0.202	0.207	0.208	0.225	0.226	0.247	0.284	0.229	0.225
Ti	0.038	0.033	0.017	0.011	0.035	0.039	0.029	0.030	0.035	0.029
Nb	1.461	1.088	1.128	1.114	0.946	1.010	0.964	0.967	0.930	0.987
Ta	0.491	0.864	0.841	0.864	1.000	0.950	0.984	0.979	1.026	0.983
Sn	0.006	0.007	0.005	0.002	0.027	0.007	0.024	0.026	0.008	0.004
W	0.008	0.008	0.005	0.004	0.007	0.008	0.009	0.010	0.011	0.010
Pb	0.004	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.006	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.008	0.006	0.003	0.000	0.002	0.000	0.012	0.000
Ca	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.007	0.000
Total	3.012	3.015	3.010	3.009	3.004	2.999	3.006	3.005	2.993	2.991
Mn/(Mn+Fe)	0.209	0.200	0.207	0.207	0.229	0.230	0.249	0.286	0.240	0.231
Ta/(Ta+Nb)	0.251	0.443	0.427	0.437	0.514	0.485	0.505	0.503	0.525	0.499

Comments: tiny grains CC & CD CE & CF
 same grain same grain

Columbite-Tantalite Group

West pegmatite 97-WP3													
	DF	DG	DH	DI	DM	DN	DQ	DT	DU	DV	NJ	NP	NQ
FeO	9.47	2.81	9.28	8.76	7.88	8.08	8.03	6.45	9.38	8.96	8.62	8.35	7.93
MnO	9.48	16.46	9.61	10.57	9.09	9.31	9.34	12.15	9.54	9.43	9.46	10.55	9.26
TiO2	0.29	0.80	0.25	0.36	0.37	0.50	0.30	0.22	0.20	0.29	0.25	0.45	0.23
Nb2O5	53.75	61.50	53.30	61.04	35.74	39.90	39.63	51.59	54.25	49.75	49.31	57.00	45.74
Ta2O5	26.23	16.87	25.78	18.42	45.28	40.88	41.81	28.90	26.07	30.78	30.45	22.68	35.79
SnO2	0.04	0.07	0.05	0.13	0.41	0.33	0.32	0.04	0.07	0.07	0.06	0.17	0.10
WO3	0.37	0.49	0.34	0.37	0.52	0.29	0.37	0.41	0.41	0.41	0.28	0.31	0.17
PbO	0.24	0.30	0.26	0.28	0.25	0.24	0.24	0.27	0.33	0.25	0.29	0.27	0.15
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Sb2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sc2O3	0.07	0.04	0.06	0.00	0.00	0.01	0.00	0.00	0.04	0.07	0.00	0.08	0.00
CaO	0.01	0.03	0.01	0.02	0.08	0.02	0.03	0.03	0.02	0.00	0.00	0.01	0.02
Total	99.95	99.38	98.95	99.94	99.60	99.61	100.07	100.06	100.29	100.02	98.71	99.88	99.41

Structural formulae based on 6 oxygens

Fe	0.498	0.143	0.493	0.445	0.455	0.456	0.453	0.343	0.491	0.480	0.468	0.432	0.437
Mn	0.505	0.844	0.517	0.543	0.532	0.532	0.534	0.654	0.506	0.512	0.520	0.552	0.516
Ti	0.014	0.036	0.012	0.016	0.019	0.025	0.015	0.011	0.009	0.014	0.012	0.021	0.012
Nb	1.527	1.684	1.530	1.676	1.116	1.218	1.209	1.482	1.536	1.442	1.448	1.594	1.361
Ta	0.448	0.278	0.445	0.304	0.850	0.750	0.767	0.499	0.444	0.536	0.538	0.382	0.641
Sn	0.001	0.002	0.001	0.003	0.011	0.009	0.009	0.001	0.002	0.002	0.001	0.004	0.002
W	0.006	0.008	0.006	0.006	0.009	0.005	0.007	0.007	0.007	0.007	0.005	0.005	0.003
Pb	0.004	0.005	0.004	0.005	0.005	0.004	0.004	0.005	0.005	0.004	0.005	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.002	0.004	0.000	0.004	0.000
Ca	0.000	0.002	0.001	0.001	0.006	0.001	0.002	0.002	0.001	0.000	0.000	0.001	0.002
Total	3.007	3.003	3.011	2.999	3.003	3.003	2.999	3.003	3.004	3.001	2.998	3.000	2.977
Mn/(Mn+Fe)	0.503	0.856	0.512	0.550	0.539	0.538	0.541	0.656	0.508	0.516	0.526	0.561	0.542
Ta/(Ta+Nb)	0.227	0.142	0.225	0.154	0.432	0.381	0.388	0.252	0.224	0.271	0.271	0.193	0.320

Comments:	DF - DH rim same grain oscillatory zoned	DT - DV same grain little zoning	inclusions in cassiterite
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Columbite-Tantalite Group

	Big Mack pegmatite 98-83Ci						Big Mack peg. 98-83Ciii		Big Mack pegmatite 98-83D			
	DA	DB	NK	NL	HD	HJ	HL	BC	BD	CF	CG	CH
FeO	11.75	11.29	11.90	12.17	12.31	12.20	12.74	14.12	13.34	11.45	11.51	11.14
MnO	3.04	3.19	3.11	3.52	3.65	3.62	3.34	2.59	2.47	4.53	4.71	4.61
TiO2	0.46	0.20	0.71	0.39	0.46	0.19	0.64	3.58	3.84	0.26	0.28	0.24
Nb2O5	20.84	18.94	27.27	32.31	25.56	25.93	28.30	46.92	38.13	23.06	25.27	21.60
Ta2O5	60.89	63.52	53.89	49.49	55.98	57.21	54.79	28.28	36.00	60.38	58.41	61.72
SnO2	0.87	0.86	0.68	0.37	0.21	0.08	0.09	0.95	1.07	0.13	0.09	0.33
WO3	0.59	0.31	0.55	0.34	0.68	0.37	0.50	0.82	1.50	0.23	0.22	0.20
PbO	0.19	0.19	0.28	0.28	0.26	0.26	0.20	0.39	0.31	0.15	0.15	0.23
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
UO2	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.08	0.04	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.08	0.00	0.00	0.06	0.00	0.02	0.00	0.57	0.65	0.19	0.00	0.05
CaO	0.04	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.22	0.02	0.01	0.00
Total	98.74	98.53	98.40	98.96	99.12	99.87	100.60	98.31	97.56	100.40	100.65	100.11
Structural formulae based on 6 oxygens												
Fe	0.742	0.726	0.727	0.722	0.755	0.745	0.759	0.754	0.745	0.705	0.699	0.694
Mn	0.195	0.207	0.192	0.211	0.227	0.224	0.201	0.140	0.140	0.282	0.290	0.291
Ti	0.026	0.012	0.039	0.021	0.026	0.010	0.034	0.172	0.193	0.014	0.015	0.014
Nb	0.712	0.658	0.900	1.036	0.848	0.856	0.912	1.355	1.152	0.767	0.830	0.728
Ta	1.251	1.328	1.070	0.954	1.117	1.136	1.062	0.491	0.654	1.209	1.154	1.251
Sn	0.026	0.026	0.020	0.010	0.006	0.002	0.003	0.024	0.028	0.004	0.002	0.010
W	0.012	0.006	0.010	0.006	0.013	0.007	0.009	0.014	0.026	0.004	0.004	0.004
Pb	0.004	0.004	0.006	0.005	0.005	0.005	0.004	0.007	0.006	0.003	0.003	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.005	0.000	0.000	0.004	0.000	0.001	0.000	0.032	0.038	0.012	0.000	0.004
Ca	0.003	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.016	0.002	0.001	0.000
Total	2.976	2.969	2.965	2.970	2.996	2.986	2.985	2.990	2.998	3.003	2.998	2.999
Mn/(Mn+Fe)	0.208	0.222	0.209	0.227	0.231	0.231	0.210	0.157	0.158	0.286	0.293	0.295
Ta/(Ta+Nb)	0.637	0.669	0.543	0.480	0.568	0.570	0.538	0.266	0.362	0.612	0.582	0.632
Comments:	patchy zonation					HJ & HL same grain core rim		BC & BD same grain oscillatory zoning early late		CF - CH same grain patchy zonation		

Columbite-Tantalite Group

	Big Mack pegmatite 98-83E									Big Mack 98-83G	Sep. Rapids pluton 98-248		
	CC	CE	CF	CG	CH	CI	CJ	CK	CL	GD	CA	CB	CC
FeO	12.27	12.89	13.13	11.00	13.09	11.94	11.47	10.87	13.10	12.10	15.32	15.17	12.90
MnO	4.95	5.30	5.51	5.28	5.53	5.06	4.91	4.95	6.14	3.76	4.04	4.21	3.48
TiO2	0.37	0.34	0.43	0.51	0.40	0.41	0.34	0.33	0.55	0.65	0.47	0.43	0.68
Nb2O5	39.26	48.96	54.18	28.76	52.64	35.87	29.01	29.18	58.30	29.66	60.40	61.05	28.34
Ta2O5	41.14	31.35	25.52	52.81	26.67	44.94	52.35	54.24	20.19	50.70	18.51	18.22	52.58
SnO2	0.10	0.11	0.08	0.12	0.06	0.12	0.10	0.16	0.05	1.72	0.08	0.00	0.40
WO3	0.46	0.47	0.51	0.30	0.41	0.42	0.35	0.22	0.42	0.22	0.76	0.45	1.00
PbO	0.32	0.40	0.46	0.29	0.54	0.36	0.36	0.25	0.38	0.08	0.24	0.23	0.10
ThO2	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
UO2	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.06	0.02	0.22	0.12	0.07	0.08	0.13	0.18	0.07	0.09	0.00	0.01	0.00
CaO	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.30	0.00	0.02	0.01	0.00	0.03
Total	98.93	99.82	100.03	99.21	99.41	99.20	99.03	100.68	99.20	98.97	99.81	99.77	99.50

Structural formulae based on 6 oxygens

Fe	0.700	0.695	0.688	0.662	0.695	0.692	0.691	0.645	0.677	0.723	0.780	0.771	0.773
Mn	0.286	0.289	0.292	0.321	0.298	0.297	0.300	0.298	0.321	0.228	0.208	0.217	0.211
Ti	0.019	0.016	0.020	0.027	0.019	0.021	0.018	0.017	0.026	0.035	0.022	0.020	0.037
Nb	1.211	1.428	1.535	0.935	1.512	1.123	0.945	0.936	1.628	0.958	1.663	1.678	0.919
Ta	0.763	0.550	0.435	1.033	0.461	0.847	1.026	1.047	0.339	0.985	0.307	0.301	1.025
Sn	0.003	0.003	0.002	0.004	0.002	0.003	0.003	0.005	0.001	0.049	0.002	0.000	0.012
W	0.008	0.008	0.008	0.006	0.007	0.008	0.007	0.004	0.007	0.004	0.012	0.007	0.019
Pb	0.006	0.007	0.008	0.006	0.009	0.007	0.007	0.005	0.006	0.001	0.004	0.004	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.003	0.001	0.012	0.007	0.004	0.005	0.008	0.011	0.003	0.005	0.000	0.000	0.000
Ca	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.023	0.000	0.001	0.000	0.000	0.002
Total	2.999	2.998	3.000	3.002	3.006	3.003	3.005	2.990	3.008	2.990	2.998	2.998	2.999
Mn/(Mn+Fe)	0.290	0.294	0.298	0.327	0.300	0.300	0.302	0.316	0.322	0.239	0.211	0.219	0.215
Ta/(Ta+Nb)	0.387	0.278	0.221	0.525	0.234	0.430	0.521	0.528	0.172	0.507	0.156	0.152	0.527

Comments:

CC - CH
same grain
patchy zonation

CI - CL
same grain

Columbite-Tantalite Group

	Sep. Rapids pluton				Big Whopper pegmatite								
	98-248				98-ATBWI								
	CD	CE	CF	CG	BK	BL	BM	BN	BO	BP	BQ	BR	BS
FeO	16.07	17.26	13.50	15.31	4.47	4.65	4.63	4.31	4.26	4.58	4.74	4.49	4.52
MnO	3.48	2.36	3.70	3.56	13.36	13.45	13.79	14.01	13.20	13.58	13.96	13.53	13.94
TiO ₂	0.83	0.60	0.97	0.89	0.14	0.34	0.24	0.21	0.19	0.23	0.33	0.54	0.21
Nb ₂ O ₅	61.34	61.89	40.19	56.84	47.40	50.72	53.92	53.23	45.17	51.88	58.45	50.93	54.01
Ta ₂ O ₅	17.71	16.39	38.30	21.74	33.95	29.15	25.52	27.13	35.89	28.47	20.68	28.51	25.09
SnO ₂	0.06	0.04	0.11	0.05	0.03	0.10	0.08	0.04	0.06	0.07	0.08	0.17	0.04
WO ₃	0.74	0.62	1.14	1.01	0.26	0.68	0.58	0.47	0.10	0.40	0.37	0.87	0.49
PbO	0.36	0.31	0.29	0.33	0.22	0.27	0.22	0.24	0.23	0.31	0.30	0.24	0.24
ThO ₂	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
UO ₂	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
Sb ₂ O ₃	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.01	0.00
Bi ₂ O ₃	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Sc ₂ O ₃	0.02	0.15	0.06	0.17	0.01	0.00	0.01	0.00	0.10	0.03	0.02	0.04	0.08
CaO	0.00	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.02
Total	100.61	99.62	98.40	99.93	99.84	99.36	99.02	99.67	99.20	99.55	98.94	99.32	98.66

Structural formulae based on 6 oxygens

Fe	0.808	0.873	0.765	0.789	0.243	0.249	0.245	0.228	0.235	0.244	0.245	0.240	0.240
Mn	0.177	0.121	0.212	0.186	0.736	0.730	0.739	0.751	0.739	0.733	0.732	0.732	0.749
Ti	0.037	0.027	0.049	0.041	0.007	0.016	0.012	0.010	0.009	0.011	0.016	0.026	0.010
Nb	1.668	1.692	1.231	1.584	1.394	1.470	1.542	1.522	1.349	1.494	1.637	1.471	1.548
Ta	0.290	0.269	0.706	0.364	0.601	0.508	0.439	0.467	0.645	0.493	0.348	0.495	0.433
Sn	0.002	0.001	0.003	0.001	0.001	0.002	0.002	0.001	0.002	0.002	0.002	0.004	0.001
W	0.011	0.010	0.020	0.016	0.004	0.011	0.010	0.008	0.002	0.007	0.006	0.014	0.008
Pb	0.006	0.005	0.005	0.005	0.004	0.005	0.004	0.004	0.004	0.005	0.005	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.001	0.008	0.003	0.009	0.001	0.000	0.001	0.000	0.006	0.001	0.001	0.002	0.005
Ca	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001
Total	3.001	3.006	3.000	2.998	2.991	2.992	2.994	2.990	2.991	2.992	2.993	2.990	2.999
Mn/(Mn+Fe)	0.180	0.122	0.217	0.191	0.752	0.746	0.751	0.767	0.758	0.750	0.749	0.753	0.757
Ta/(Ta+Nb)	0.148	0.137	0.364	0.187	0.301	0.257	0.222	0.235	0.323	0.248	0.175	0.252	0.218

Comments:	CD - CF same grain				BK - BN same grain				BO - BQ		incl. in	incl. in	
	core		rim		core		rim		core	same	rim	petalite	petalite
	oscillatory zonation				from Avalon Resources trench				grain				

Columbite-Tantalite Group

	Big Whopper pegmatite 98-SS27				Big Whopper pegmatite 98-SS29										
	HB	HC	HD	HN	DA1	DA2	DA3	DB1	DB2	DB3	DB4	PC	PD	PE	
FeO	0.25	0.26	0.26	0.29	10.26	6.11	10.45	9.87	0.74	2.89	11.65	10.96	5.39	7.01	
MnO	15.09	15.22	15.61	15.10	6.28	10.60	6.13	6.44	14.87	13.10	4.58	5.44	10.27	8.82	
TiO2	0.15	0.17	0.20	0.01	0.01	0.02	0.00	0.00	0.02	0.04	0.04	0.09	0.25	0.21	
Nb2O5	21.67	22.29	26.70	20.36	34.56	35.43	35.14	29.03	26.82	27.66	29.58	28.69	23.03	24.33	
Ta2O5	60.75	59.41	54.56	63.09	48.07	47.05	47.06	53.60	56.42	55.65	53.16	54.25	60.00	58.73	
SnO2	0.76	0.75	1.14	0.11	0.03	0.04	0.03	0.02	0.09	0.12	0.02	0.13	0.19	0.17	
WO3	0.23	0.33	0.57	0.21	0.10	0.16	0.15	0.20	0.24	0.26	0.17	0.15	0.32	0.32	
PbO	0.26	0.41	0.27	0.29	0.16	0.17	0.15	0.17	0.12	0.12	0.09	0.25	0.23	0.19	
ThO2	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	
UO2	0.14	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sb2O3	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.01	
Bi2O3	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.06	0.00	
Sc2O3					0.00	0.11	0.09	0.00	0.00	0.00	0.00	0.05	0.08	0.00	
CaO	0.02	0.03	0.00	0.01	0.03	0.05	0.01	0.02	0.05	0.05	0.02	0.01	0.02	0.01	
Total	99.32	98.98	99.31	99.45	99.52	99.74	99.21	99.36	99.43	99.91	99.31	100.02	99.84	99.80	

Structural formulae based on 6 oxygens

Fe	0.016	0.016	0.016	0.018	0.600	0.354	0.610	0.595	0.045	0.174	0.700	0.658	0.334	0.431
Mn	0.959	0.967	0.963	0.968	0.372	0.622	0.362	0.393	0.918	0.801	0.279	0.331	0.644	0.550
Ti	0.008	0.010	0.011	0.001	0.000	0.001	0.000	0.000	0.001	0.002	0.002	0.005	0.014	0.012
Nb	0.735	0.756	0.879	0.697	1.092	1.110	1.109	0.946	0.884	0.903	0.962	0.931	0.771	0.809
Ta	1.240	1.212	1.080	1.298	0.914	0.887	0.893	1.051	1.119	1.093	1.039	1.059	1.209	1.175
Sn	0.023	0.022	0.033	0.003	0.001	0.001	0.001	0.001	0.003	0.003	0.001	0.004	0.006	0.005
W	0.004	0.006	0.011	0.004	0.002	0.003	0.003	0.004	0.004	0.005	0.003	0.003	0.006	0.006
Pb	0.005	0.008	0.005	0.006	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.005	0.005	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Sc	0.000	0.000	0.000	0.000	0.000	0.007	0.006	0.000	0.000	0.000	0.000	0.003	0.005	0.000
Ca	0.001	0.003	0.000	0.001	0.003	0.004	0.001	0.002	0.004	0.004	0.002	0.001	0.002	0.001
Total	2.995	3.002	2.997	2.996	2.986	2.993	2.988	2.995	2.983	2.990	2.990	2.999	2.996	2.994
Mn/(Mn+Fe)	0.984	0.983	0.984	0.981	0.383	0.637	0.373	0.398	0.953	0.821	0.285	0.334	0.658	0.560
Ta/(Ta+Nb)	0.628	0.616	0.551	0.651	0.456	0.444	0.446	0.526	0.559	0.548	0.519	0.532	0.611	0.592

Comments: HB - HD same grain traverse 225 µm grain traverse across 200 µm grain PC - PE same grain
 lepidolite mass - borehole 98-38 rim rim rim rim PC patchy alteration
 aplite assoc. with greenstone DB traverse - strong oscillatory zonation

Columbite-Tantalite Group

SW Beryl pegmatite 99-AT6081													
	NA	XA	XB	XC	XD1	XD2	XD3	XD4	XD5	XD6	XD7	XE	XF
FeO	15.14	16.04	16.33	16.54	15.50	15.53	15.12	16.09	15.93	15.81	16.16	14.66	16.09
MnO	2.48	2.75	2.83	2.87	2.56	2.82	2.70	2.88	2.78	2.79	2.90	2.52	2.42
TiO2	0.80	0.54	0.64	0.51	1.64	0.53	0.60	0.70	0.68	0.64	0.68	0.91	0.96
Nb2O5	42.24	56.55	56.25	58.56	49.52	52.20	46.47	57.53	56.40	56.58	58.87	38.58	52.20
Ta2O5	37.79	22.81	21.55	19.07	27.72	26.56	32.94	20.71	22.13	21.99	18.96	41.65	26.35
SnO2	0.40	0.16	0.16	0.17	0.39	0.21	0.20	0.12	0.15	0.21	0.20	0.19	0.28
WO3	0.26	0.52	0.46	0.63	0.54	0.50	0.53	0.46	0.47	0.48	0.64	0.34	0.47
PbO	0.18	0.23	0.21	0.23	0.23	0.22	0.18	0.24	0.24	0.21	0.22	0.13	0.22
ThO2	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
UO2	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	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
Sc2O3	0.03	0.07	0.09	0.09	0.26	0.05	0.05	0.12	0.12	0.00	0.04	0.10	0.06
CaO	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.32	99.68	98.53	98.67	98.37	98.63	98.79	98.85	98.90	98.71	98.66	99.06	99.04

Structural formulae based on 6 oxygens

Fe	0.844	0.833	0.854	0.856	0.831	0.830	0.829	0.835	0.831	0.826	0.835	0.833	0.854
Mn	0.140	0.145	0.150	0.150	0.139	0.153	0.150	0.151	0.147	0.148	0.151	0.145	0.130
Ti	0.040	0.025	0.030	0.024	0.079	0.026	0.030	0.032	0.032	0.030	0.031	0.047	0.046
Nb	1.273	1.587	1.591	1.638	1.436	1.508	1.379	1.613	1.590	1.598	1.643	1.186	1.497
Ta	0.685	0.385	0.367	0.321	0.483	0.461	0.588	0.349	0.375	0.374	0.318	0.770	0.455
Sn	0.011	0.004	0.004	0.004	0.010	0.005	0.005	0.003	0.004	0.005	0.005	0.005	0.007
W	0.004	0.008	0.007	0.010	0.009	0.008	0.009	0.007	0.008	0.008	0.010	0.006	0.008
Pb	0.003	0.004	0.004	0.004	0.004	0.004	0.003	0.004	0.004	0.004	0.004	0.002	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.002	0.004	0.005	0.005	0.014	0.003	0.003	0.007	0.006	0.000	0.002	0.006	0.003
Ca	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.003	2.994	3.012	3.012	3.007	2.997	2.996	3.002	2.997	2.992	3.000	3.000	3.003
Mn/(Mn+Fe)	0.142	0.148	0.149	0.149	0.143	0.156	0.153	0.154	0.150	0.152	0.154	0.148	0.132
Ta/(Ta+Nb)	0.350	0.195	0.187	0.164	0.252	0.234	0.299	0.178	0.191	0.189	0.162	0.394	0.233

Comments:

XA - XC
same grain

XD1 - XE same grain with distinct oscillatory zonation
rim
core
all data from inclusions in cassiterite

Columbite-Tantalite Group

Big Mack pegmatite														
99-FWB74														
	LA	LB	LC	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO
FeO	12.89	12.78	12.76	12.25	12.27	12.50	12.72	13.11	13.88	13.87	12.99	12.33	12.02	12.35
MnO	3.42	3.52	3.58	3.90	3.86	3.59	3.56	3.50	3.68	3.78	3.35	3.81	3.86	3.79
TiO2	0.38	0.49	0.43	0.55	0.59	0.57	0.43	0.42	0.27	0.30	0.65	0.66	0.58	0.63
Nb2O5	25.78	26.18	26.07	24.19	24.11	23.84	25.60	29.32	39.21	37.72	24.86	24.74	24.08	24.76
Ta2O5	56.93	56.14	56.91	58.09	57.78	58.16	56.67	53.58	41.29	42.91	57.51	57.81	58.49	57.59
SnO2	0.14	0.17	0.08	0.46	0.70	0.64	0.07	0.14	0.11	0.03	0.18	0.16	0.18	0.26
WO3	0.39	0.49	0.44	0.71	0.69	0.75	0.42	0.45	0.36	0.37	0.71	0.79	0.70	0.76
PbO	0.15	0.15	0.16	0.11	0.06	0.06	0.17	0.10	0.11	0.15	0.13	0.13	0.08	0.09
ThO2	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
UO2	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00
Bi2O3	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
Sc2O3	0.09	0.03	0.00	0.07	0.04	0.00	0.10	0.10	0.10	0.00	0.10	0.04	0.03	0.00
CaO	0.00	0.01	0.00	0.04	0.03	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.02	0.01
Total	100.20	99.97	100.42	100.38	100.11	100.12	99.74	100.76	99.05	99.14	100.48	100.46	100.05	100.29
Structural formulae based on 6 oxygens														
Fe	0.782	0.775	0.772	0.747	0.750	0.765	0.775	0.776	0.791	0.796	0.788	0.749	0.736	0.751
Mn	0.210	0.216	0.219	0.241	0.239	0.223	0.220	0.210	0.212	0.220	0.206	0.234	0.239	0.233
Ti	0.021	0.027	0.024	0.030	0.032	0.031	0.024	0.022	0.014	0.016	0.035	0.036	0.032	0.035
Nb	0.846	0.858	0.853	0.797	0.796	0.789	0.844	0.938	1.208	1.170	0.815	0.812	0.797	0.814
Ta	1.124	1.107	1.119	1.152	1.148	1.158	1.123	1.031	0.765	0.801	1.134	1.142	1.164	1.139
Sn	0.004	0.005	0.002	0.013	0.020	0.019	0.002	0.004	0.003	0.001	0.005	0.005	0.005	0.007
W	0.007	0.009	0.008	0.013	0.013	0.014	0.008	0.008	0.006	0.007	0.013	0.015	0.013	0.014
Pb	0.003	0.003	0.003	0.002	0.001	0.001	0.003	0.002	0.002	0.003	0.003	0.003	0.001	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Sc	0.006	0.002	0.000	0.005	0.002	0.000	0.006	0.006	0.006	0.000	0.006	0.002	0.002	0.000
Ca	0.000	0.001	0.000	0.003	0.002	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.002	0.001
Total	3.003	3.002	3.000	3.003	3.004	3.001	3.005	3.000	3.008	3.013	3.006	2.998	2.993	2.998
Mn/(Mn+Fe)	0.212	0.218	0.221	0.244	0.242	0.225	0.221	0.213	0.212	0.216	0.207	0.238	0.245	0.237
Ta/(Ta+Nb)	0.571	0.563	0.568	0.591	0.590	0.595	0.571	0.524	0.388	0.406	0.582	0.584	0.594	0.583
Comments:	LA - LE			LF - LK			LJ & LK			LL - LO same grain				
	traverse along grain			same grain			darker mottled patch			at edge of grain				

Columbite-Tantalite Group

	Glitter pegmatite 99-GZ1				Glitter pegmatite 99-GZ2				Glitter pegmatite 99-GZ3			
	BA	BB	BC	BD	FA	FB	BA	BB	BC	BD	GF	GG
FeO	16.20	16.90	15.53	14.80	16.68	16.42	16.01	14.86	15.27	15.49	16.53	16.46
MnO	2.43	2.29	2.03	2.20	2.48	2.67	2.48	2.78	2.41	2.37	1.93	2.06
TiO2	1.82	2.22	3.11	3.06	2.89	2.92	2.48	1.69	1.81	1.73	3.05	2.33
Nb2O5	55.66	57.91	44.63	42.46	58.27	58.89	52.89	44.60	43.76	44.59	49.07	49.44
Ta2O5	21.43	18.42	31.20	33.09	16.55	16.38	22.59	33.48	33.88	32.99	26.39	27.46
SnO2	0.33	0.44	0.62	0.90	0.69	0.62	0.53	0.28	0.35	0.26	0.48	0.24
WO3	1.17	1.41	1.23	1.04	0.74	0.79	0.75	0.92	1.04	1.05	1.91	2.10
PbO	0.35	0.25	0.15	0.22	0.27	0.21	0.24	0.18	0.23	0.17	0.24	0.26
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.03	0.01	0.01	0.03	0.00	0.00	0.03	0.00	0.06	0.02
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Sc2O3	0.20	0.15	0.44	0.43	0.45	0.42	0.41	0.23	0.24	0.34	0.54	0.48
CaO	0.12	0.03	0.05	0.17	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01
Total	99.70	100.02	99.03	98.40	99.03	99.32	98.38	99.01	99.02	98.99	100.19	100.85
Structural formulae based on 6 oxygens												
Fe	0.834	0.856	0.836	0.810	0.843	0.826	0.837	0.813	0.837	0.846	0.863	0.859
Mn	0.127	0.117	0.111	0.122	0.127	0.136	0.131	0.154	0.134	0.131	0.102	0.109
Ti	0.084	0.101	0.151	0.151	0.131	0.132	0.116	0.083	0.089	0.085	0.143	0.110
Nb	1.549	1.585	1.299	1.256	1.592	1.601	1.495	1.318	1.297	1.316	1.385	1.396
Ta	0.359	0.303	0.546	0.589	0.272	0.268	0.384	0.595	0.604	0.586	0.448	0.466
Sn	0.008	0.011	0.016	0.023	0.017	0.015	0.013	0.007	0.009	0.007	0.012	0.006
W	0.019	0.022	0.021	0.018	0.012	0.012	0.012	0.016	0.018	0.018	0.031	0.034
Pb	0.006	0.004	0.003	0.004	0.004	0.003	0.004	0.003	0.004	0.003	0.004	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.011	0.008	0.025	0.025	0.024	0.022	0.022	0.013	0.014	0.020	0.029	0.026
Ca	0.008	0.002	0.004	0.012	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000
Total	3.004	3.008	3.011	3.010	3.022	3.015	3.016	3.002	3.007	3.010	3.018	3.011
Mn/(Mn+Fe)	0.132	0.121	0.117	0.131	0.131	0.141	0.135	0.159	0.138	0.134	0.106	0.112
Ta/(Ta+Nb)	0.188	0.161	0.296	0.319	0.146	0.143	0.204	0.311	0.318	0.308	0.244	0.250
Comments:	BA & BB same grain rim	BC & BD same grain	FA & FB same grain	BA - BD same grain BA darker core	GF & GG same grain inclusion in mica							

Columbite-Tantalite Group

Glitter pegmatite 99-GZ4														
	DC	DD	DE	DF	DI	DJ	DK	DL	DM	DN	DP	DR	DS	DT
FeO	13.97	12.85	15.16	12.87	14.89	15.43	13.54	15.24	13.58	13.66	13.94	13.67	13.86	14.64
MnO	3.17	2.95	3.67	3.44	3.57	3.48	3.20	3.52	3.33	3.41	3.27	3.28	3.34	3.63
TiO2	0.69	0.61	0.75	0.54	0.51	1.22	0.43	0.78	0.62	0.90	1.15	0.54	0.73	0.61
Nb2O5	37.55	25.83	52.98	29.89	51.01	52.42	31.55	54.98	34.26	38.02	38.81	34.77	38.93	47.31
Ta2O5	43.26	55.21	25.82	51.86	28.17	26.20	49.75	23.43	46.36	41.78	40.80	45.91	41.70	33.39
SnO2	0.22	1.22	0.22	0.46	0.14	0.23	0.24	0.25	0.26	0.56	0.53	0.25	0.17	0.18
WO3	0.63	0.54	0.85	0.60	0.62	1.00	0.69	0.14	0.68	0.62	0.43	0.65	0.49	0.35
PbO	0.15	0.10	0.18	0.17	0.25	0.19	0.13	0.26	0.12	0.18	0.22	0.14	0.14	0.20
ThO2	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
UO2	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Sb2O3	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
Bi2O3	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
Sc2O3	0.00	0.00	0.00	0.00	0.06	0.08	0.08	0.05	0.06	0.05	0.00	0.17	0.03	0.01
CaO	0.00	0.01	0.00	0.16	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.01	0.02	0.00
Total	99.64	99.32	99.64	99.99	99.21	100.26	99.61	98.65	99.29	99.21	99.19	99.39	99.42	100.33

Structural formulae based on 6 oxygens

Fe	0.797	0.783	0.799	0.763	0.797	0.808	0.799	0.802	0.790	0.778	0.790	0.793	0.786	0.791
Mn	0.183	0.182	0.196	0.206	0.193	0.184	0.192	0.187	0.196	0.197	0.188	0.192	0.192	0.198
Ti	0.035	0.034	0.035	0.029	0.024	0.057	0.023	0.037	0.032	0.046	0.059	0.028	0.037	0.029
Nb	1.158	0.851	1.509	0.959	1.475	1.483	1.006	1.563	1.078	1.170	1.188	1.090	1.193	1.381
Ta	0.802	1.094	0.442	1.001	0.490	0.446	0.955	0.401	0.878	0.774	0.751	0.866	0.769	0.587
Sn	0.006	0.035	0.006	0.013	0.004	0.006	0.007	0.006	0.007	0.015	0.014	0.007	0.005	0.005
W	0.011	0.010	0.014	0.011	0.010	0.016	0.013	0.002	0.012	0.011	0.007	0.012	0.009	0.006
Pb	0.003	0.002	0.003	0.003	0.004	0.003	0.002	0.004	0.002	0.003	0.004	0.003	0.003	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.000	0.004	0.004	0.005	0.003	0.003	0.003	0.000	0.010	0.002	0.001
Ca	0.000	0.001	0.000	0.012	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000
Total	2.996	2.993	3.004	2.997	3.002	3.009	3.001	3.005	3.001	2.999	3.002	3.002	2.996	3.002
Mn/(Mn+Fe)	0.187	0.188	0.197	0.213	0.195	0.186	0.193	0.189	0.199	0.202	0.192	0.195	0.196	0.201
Ta/(Ta+Nb)	0.409	0.563	0.227	0.511	0.249	0.231	0.487	0.204	0.449	0.398	0.387	0.443	0.392	0.298

Comments:	DA - DB2 all inclusions in or attached to a single large grain of cassiterite	DI - DM same grain DI & DL early	patchy zoned attached to cassiterite	DS & DT same grain core rim
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Columbite-Tantalite Group

Glitter pegmatite 99-GZ4												
	DU	DV	DW	DX	DY	DA2	DB2	EE	EN	ER	ES	EZ
FeO	13.50	13.76	14.69	14.03	13.58	13.47	14.16	14.66	14.02	12.19	13.67	16.41
MnO	3.42	3.21	3.48	3.23	3.20	3.24	3.35	3.64	3.55	3.50	3.07	3.91
TiO2	0.69	0.56	1.01	0.82	0.53	1.04	1.64	0.42	0.58	0.62	1.35	1.35
Nb2O5	33.11	34.38	44.35	37.00	32.97	31.23	40.92	39.11	37.99	26.49	32.95	58.91
Ta2O5	48.41	47.28	34.93	42.54	48.31	50.71	37.82	40.49	43.39	55.99	47.56	17.28
SnO2	0.41	0.49	0.32	0.21	0.24	0.34	0.66	0.15	0.20	0.60	0.63	0.24
WO3	0.72	0.70	1.05	1.30	0.56	0.55	0.94	0.60	0.46	0.23	0.23	0.76
PbO	0.17	0.12	0.23	0.15	0.16	0.11	0.15	0.18	0.20	0.12	0.13	0.24
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.06	0.04	0.06	0.08	0.00	0.06	0.01	0.00	0.00	0.32	0.17	0.00
CaO	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.16	0.00	0.01
Total	100.50	100.57	100.12	99.37	99.58	100.75	99.64	99.25	100.39	100.25	99.75	99.11
Structural formulae based on 6 oxygens												
Fe	0.783	0.793	0.803	0.802	0.796	0.785	0.786	0.833	0.794	0.734	0.793	0.838
Mn	0.201	0.187	0.193	0.187	0.190	0.191	0.188	0.209	0.203	0.213	0.180	0.202
Ti	0.036	0.029	0.049	0.042	0.028	0.055	0.082	0.022	0.029	0.033	0.070	0.062
Nb	1.037	1.071	1.310	1.143	1.044	0.983	1.228	1.201	1.163	0.862	1.032	1.626
Ta	0.912	0.886	0.621	0.791	0.920	0.960	0.683	0.748	0.799	1.096	0.896	0.287
Sn	0.011	0.014	0.008	0.006	0.007	0.009	0.017	0.004	0.005	0.017	0.017	0.006
W	0.013	0.013	0.018	0.023	0.010	0.010	0.016	0.011	0.008	0.004	0.004	0.012
Pb	0.003	0.002	0.004	0.003	0.003	0.002	0.003	0.003	0.004	0.002	0.002	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.003	0.003	0.005	0.000	0.003	0.001	0.000	0.000	0.020	0.010	0.000
Ca	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.012	0.000	0.000
Total	3.000	2.996	3.009	3.002	2.998	2.999	3.003	3.031	3.006	2.995	3.006	3.038
Mn/(Mn+Fe)	0.204	0.191	0.194	0.189	0.193	0.196	0.193	0.201	0.204	0.225	0.185	0.194
Ta/(Ta+Nb)	0.468	0.453	0.321	0.409	0.468	0.494	0.357	0.384	0.407	0.560	0.465	0.150
Comments:				DX & DY same grain core		A2 & B2 same grain rim core		inclusion in garnet rim			inclusion in garnet	

Columbite-Tantalite Group

	Glitter pegmatite 99-GZ5					Glitter pegmatite 99-GZ6						Glitter peg. 99-GZ7	
	BJ	BK	BL	BR	BT	CA	CH	CI	CJ	CK	CL	CM	MU
FeO	13.89	14.10	13.61	14.44	13.77	14.13	12.98	13.26	12.49	12.57	12.20	13.66	13.84
MnO	3.25	3.31	3.44	3.74	3.28	3.59	4.13	3.99	3.76	3.86	3.57	4.14	5.54
TiO2	0.55	0.78	0.40	1.36	0.83	2.61	0.43	0.67	0.83	0.58	0.89	0.66	1.51
Nb2O5	33.12	38.11	38.24	48.18	36.03	43.21	35.27	35.90	27.07	29.42	21.66	42.28	65.85
Ta2O5	48.24	42.51	43.42	30.51	44.43	33.97	45.92	46.13	55.43	52.69	60.49	37.74	10.37
SnO2	0.65	0.19	0.41	0.46	0.54	0.77	0.07	0.13	0.31	0.19	0.72	0.18	0.15
WO3	0.89	1.31	0.53	0.48	0.47	0.52	0.47	0.37	0.34	0.41	0.41	0.55	0.66
PbO	0.17	0.17	0.14	0.21	0.14	0.18	0.09	0.17	0.09	0.05	0.10	0.20	0.29
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.30
Sb2O3	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
Bi2O3	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
Sc2O3	0.10	0.00	0.00	0.12	0.04	0.00	0.13	0.00	0.06	0.00	0.00	0.02	0.48
CaO	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.09
Total	100.86	100.56	100.19	99.49	99.55	98.97	99.49	100.68	100.38	99.75	100.04	99.43	99.07
Structural formulae based on 6 oxygens													
Fe	0.803	0.795	0.772	0.775	0.791	0.772	0.751	0.757	0.748	0.749	0.755	0.762	0.683
Mn	0.190	0.189	0.198	0.203	0.191	0.199	0.242	0.230	0.228	0.233	0.224	0.234	0.277
Ti	0.028	0.039	0.021	0.066	0.043	0.128	0.023	0.034	0.044	0.031	0.049	0.033	0.067
Nb	1.035	1.161	1.173	1.399	1.119	1.277	1.104	1.108	0.877	0.948	0.724	1.274	1.758
Ta	0.907	0.779	0.801	0.533	0.830	0.604	0.864	0.856	1.080	1.021	1.217	0.684	0.167
Sn	0.018	0.005	0.011	0.012	0.015	0.020	0.002	0.004	0.009	0.005	0.021	0.005	0.004
W	0.016	0.023	0.009	0.008	0.008	0.009	0.008	0.007	0.006	0.007	0.008	0.009	0.010
Pb	0.003	0.003	0.002	0.004	0.003	0.003	0.002	0.003	0.002	0.001	0.002	0.004	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.004
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.006	0.000	0.000	0.007	0.003	0.000	0.008	0.000	0.004	0.000	0.000	0.001	0.025
Ca	0.000	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.006
Total	3.006	3.000	2.988	3.006	3.002	3.013	3.003	3.001	2.998	2.995	3.001	3.006	3.005
Mn/(Mn+Fe)	0.192	0.192	0.204	0.208	0.195	0.205	0.244	0.233	0.234	0.237	0.229	0.235	0.289
Ta/(Ta+Nb)	0.467	0.402	0.406	0.276	0.426	0.321	0.439	0.436	0.552	0.519	0.627	0.349	0.087
Comments:	BJ & BK same grain		inclusion in cassiterite		inclusion in cassiterite		CH - CJ same grain			CL & CM same grain		associated with	
	accompanied by ferrowodginite inclusions				oscillatory zoned			core		rim		microlite	

Columbite-Tantalite Group

	Wolf pegmatite 99-WZ1					Wolf pegmatite 99-WZ2					
	GC	GD	GE	GG	GP	JA	JB	JC	JD	JE	JF
FeO	5.00	5.88	5.75	4.51	5.11	4.16	4.23	3.71	4.20	4.99	4.71
MnO	13.49	12.75	13.02	12.07	13.59	12.63	12.80	13.55	13.69	13.40	13.53
TiO2	0.32	0.34	0.38	0.45	0.38	0.28	0.23	0.27	0.33	0.34	0.27
Nb2O5	47.14	47.77	47.18	39.60	48.02	35.27	35.28	43.62	45.17	49.78	47.45
Ta2O5	29.83	29.85	27.94	38.42	28.11	45.51	44.97	36.51	33.61	29.02	31.01
SnO2	0.13	0.10	0.15	0.18	0.08	0.08	0.08	0.12	0.07	0.04	0.02
WO3	2.45	1.96	4.01	1.66	2.82	1.11	1.44	1.37	1.90	1.65	1.92
PbO	0.22	0.23	0.20	1.51	0.21	0.13	0.19	0.21	0.19	0.25	0.19
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Sb2O3	0.00	0.02	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Sc2O3	0.08	0.13	0.05	0.07	0.14	0.11	0.10	0.04	0.00	0.00	0.00
CaO	0.04	0.02	0.03	0.21	0.03	0.03	0.02	0.06	0.11	0.00	0.01
Total	98.69	99.01	98.70	98.72	98.49	99.31	99.33	99.51	99.15	99.48	99.12
Structural formulae based on 6 oxygens											
Fe	0.273	0.319	0.313	0.258	0.278	0.241	0.245	0.206	0.231	0.268	0.257
Mn	0.746	0.701	0.719	0.699	0.749	0.742	0.751	0.761	0.763	0.729	0.746
Ti	0.016	0.017	0.019	0.023	0.018	0.014	0.012	0.014	0.016	0.016	0.013
Nb	1.392	1.403	1.389	1.224	1.412	1.105	1.106	1.308	1.343	1.446	1.398
Ta	0.530	0.527	0.495	0.715	0.497	0.858	0.848	0.659	0.601	0.507	0.549
Sn	0.003	0.003	0.004	0.005	0.002	0.002	0.002	0.003	0.002	0.001	0.000
W	0.042	0.033	0.068	0.029	0.048	0.020	0.026	0.023	0.032	0.027	0.032
Pb	0.004	0.004	0.003	0.028	0.004	0.002	0.004	0.004	0.003	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.004	0.007	0.003	0.004	0.008	0.007	0.006	0.002	0.000	0.000	0.000
Ca	0.003	0.001	0.002	0.015	0.002	0.002	0.002	0.004	0.008	0.000	0.001
Total	3.013	3.016	3.014	3.002	3.017	2.995	3.001	2.985	3.000	2.999	3.001
Mn/(Mn+Fe)	0.732	0.687	0.696	0.731	0.729	0.755	0.754	0.787	0.767	0.731	0.744
Ta/(Ta+Nb)	0.276	0.273	0.263	0.369	0.260	0.437	0.434	0.335	0.309	0.260	0.282
Comments:	GD & GE					JA & JB		JC & JD		JE & JF	
	same grain					same grain		same grain		same grain	
	unzoned					oscill. zoned		weak oscillatory zonation			

Columbite-Tantalite Group

	Wolf pegmatite 99-WZ3				Wolf pegmatite 99-WZ4							
	FI	FJ	FK	FL	DA	DD	DE	DF	DI	DJ	DK	DL
FeO	5.27	5.13	5.17	4.88	5.95	4.46	5.23	4.71	4.02	6.55	3.84	5.29
MnO	13.09	12.77	13.02	13.47	12.47	13.95	13.03	13.62	14.42	12.17	14.81	13.10
TiO2	0.41	0.45	0.28	0.24	0.34	0.25	0.30	0.27	0.30	0.31	0.34	0.37
Nb2O5	47.35	43.20	46.56	46.61	47.89	46.56	47.10	48.89	50.65	47.73	50.95	48.71
Ta2O5	31.13	35.19	31.39	31.49	29.45	30.25	31.27	29.49	28.26	29.52	26.97	28.95
SnO2	0.10	0.18	0.02	0.07	0.05	0.08	0.02	0.02	0.06	0.01	0.04	0.09
WO3	1.82	1.69	1.79	1.85	2.47	2.73	1.77	1.29	1.12	2.60	1.63	2.08
PbO	0.23	0.15	0.14	0.17	0.22	0.18	0.10	0.16	0.21	0.22	0.23	0.17
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.06	0.00	0.00	0.08	0.01	0.08	0.00	0.00	0.00	0.00
CaO	0.00	0.00	0.03	0.01	0.01	0.01	0.00	0.00	0.03	0.02	0.04	0.01
Total	99.39	98.75	98.48	98.79	98.86	98.54	98.86	98.53	99.08	99.10	98.85	98.77
Structural formulae based on 6 oxygens												
Fe	0.286	0.286	0.284	0.268	0.323	0.245	0.286	0.256	0.216	0.356	0.206	0.287
Mn	0.721	0.721	0.725	0.748	0.687	0.775	0.721	0.749	0.784	0.669	0.804	0.719
Ti	0.020	0.022	0.014	0.012	0.016	0.012	0.015	0.013	0.014	0.015	0.016	0.018
Nb	1.391	1.302	1.383	1.382	1.409	1.381	1.392	1.436	1.469	1.402	1.477	1.428
Ta	0.550	0.638	0.561	0.562	0.521	0.540	0.556	0.521	0.493	0.521	0.470	0.510
Sn	0.002	0.005	0.001	0.002	0.001	0.002	0.001	0.000	0.002	0.000	0.001	0.002
W	0.031	0.029	0.030	0.031	0.042	0.046	0.030	0.022	0.019	0.044	0.027	0.035
Pb	0.004	0.003	0.003	0.003	0.004	0.003	0.002	0.003	0.004	0.004	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.003	0.000	0.000	0.005	0.001	0.005	0.000	0.000	0.000	0.000
Ca	0.000	0.000	0.002	0.001	0.000	0.001	0.000	0.000	0.002	0.001	0.003	0.001
Total	3.005	3.005	3.006	3.008	3.004	3.010	3.003	3.005	3.003	3.012	3.008	3.003
Mn/(Mn+Fe)	0.716	0.716	0.718	0.737	0.680	0.760	0.716	0.745	0.784	0.653	0.796	0.715
Ta/(Ta+Nb)	0.283	0.329	0.289	0.289	0.270	0.281	0.285	0.266	0.251	0.271	0.242	0.263
Comments:	FI & FJ same grain		FK & FL same grain		DD & DE same grain unzoned							

Columbite-Tantalite Group

Big Whopper pegmatite										
DC97-6-26										
	DA1	DA2	DA3	DA4	DA5	DB	DC	DD	DE	DF
FeO	0.14	0.12	0.12	0.11	0.12	0.10	0.10	0.12	0.11	0.13
MnO	15.94	15.53	15.59	15.88	15.98	14.47	15.78	16.32	16.17	16.17
TiO2	0.08	0.13	0.12	0.11	0.10	0.43	0.19	0.16	0.15	0.20
Nb2O5	32.40	29.85	30.08	32.99	36.57	22.67	34.58	40.25	41.35	39.13
Ta2O5	49.65	52.83	52.39	48.85	45.29	58.86	47.37	40.78	40.00	42.26
SnO2	0.10	0.11	0.10	0.05	0.07	0.58	0.01	0.07	0.11	0.11
WO3	0.42	0.48	0.52	0.36	0.29	0.78	0.59	0.54	0.43	0.53
PbO	0.14	0.13	0.15	0.18	0.18	0.13	0.19	0.19	0.22	0.18
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.03	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.06	0.06	0.00	0.00	0.10	0.00	0.04	0.00
CaO	0.02	0.06	0.00	0.05	0.02	0.02	0.03	0.02	0.03	0.01
Total	98.92	99.23	99.12	98.62	98.62	98.03	98.93	98.43	98.60	98.72

Structural formulae based on 6 oxygens

Fe	0.008	0.007	0.007	0.006	0.007	0.006	0.006	0.007	0.006	0.008
Mn	0.958	0.943	0.947	0.953	0.942	0.922	0.936	0.944	0.928	0.938
Ti	0.004	0.007	0.006	0.006	0.005	0.024	0.010	0.008	0.008	0.010
Nb	1.039	0.968	0.975	1.057	1.150	0.771	1.095	1.242	1.267	1.211
Ta	0.958	1.030	1.021	0.941	0.857	1.204	0.902	0.757	0.737	0.787
Sn	0.003	0.003	0.003	0.001	0.002	0.017	0.000	0.002	0.003	0.003
W	0.008	0.009	0.010	0.007	0.005	0.015	0.011	0.009	0.008	0.009
Pb	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.004	0.003	0.000	0.000	0.006	0.000	0.002	0.000
Ca	0.001	0.004	0.000	0.003	0.002	0.002	0.002	0.001	0.002	0.001
Total	2.982	2.975	2.976	2.981	2.973	2.965	2.971	2.973	2.966	2.971
Mn/(Mn+Fe)	0.991	0.992	0.993	0.993	0.993	0.993	0.994	0.993	0.993	0.992
Ta/(Ta+Nb)	0.480	0.516	0.512	0.471	0.427	0.610	0.452	0.379	0.368	0.394

Comments:

unzoned
Avalon Resources borehole

DB - DF same grain
patchy zoned area
rest of grain - unzoned

Columbite-Tantalite Group

	Big Whopper peg. DC97-8-57			Big Whopper pegmatite DC97-8-91						Big Whopper pegmatite DC97-8-124					
	CA	CB	CC	BB	BC	BD	BF	BG	BI	BL	BM	BN	BO	BP	BQ
	FeO	12.43	13.03	13.86	3.81	4.22	3.95	4.03	4.16	3.49	6.42	6.61	7.77	5.75	5.34
MnO	7.16	6.90	6.21	14.44	14.02	14.18	14.96	13.73	13.61	10.77	9.35	9.42	10.35	11.66	11.81
TiO ₂	0.69	0.92	0.54	0.21	0.41	0.20	0.27	0.22	0.22	0.33	0.37	0.41	0.37	0.44	0.35
Nb ₂ O ₅	68.37	69.38	67.81	52.63	51.71	50.67	60.24	46.51	39.55	43.43	31.70	44.09	32.12	42.84	44.75
Ta ₂ O ₅	9.40	8.44	10.80	28.00	28.50	30.37	20.04	33.65	43.69	37.99	50.81	37.34	49.72	38.57	36.34
SnO ₂	0.06	0.03	0.02	0.04	0.14	0.03	0.11	0.05	0.25	0.06	0.16	0.12	0.14	0.09	0.14
WO ₃	0.69	1.30	0.65	0.44	0.74	0.58	0.40	0.64	0.40	0.42	0.46	0.65	0.57	0.51	0.52
PbO	0.33	0.36	0.35	0.23	0.26	0.30	0.32	0.23	0.16	0.20	0.15	0.18	0.10	0.12	0.17
ThO ₂	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
UO ₂	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
Sb ₂ O ₃	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00
Sc ₂ O ₃	0.10	0.26	0.12	0.00	0.06	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.04	0.00	0.00
CaO	0.03	0.00	0.02	0.02	0.01	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00
Total	99.24	100.62	100.36	99.83	100.06	100.30	100.38	99.24	101.40	99.64	99.66	99.99	99.16	99.57	99.41

Structural formulae based on 6 oxygens

Fe	0.612	0.630	0.679	0.202	0.224	0.211	0.205	0.228	0.195	0.357	0.391	0.429	0.340	0.297	0.295
Mn	0.357	0.338	0.308	0.775	0.752	0.766	0.771	0.762	0.771	0.606	0.560	0.526	0.620	0.658	0.661
Ti	0.030	0.040	0.024	0.010	0.020	0.010	0.012	0.011	0.011	0.016	0.020	0.020	0.020	0.022	0.017
Nb	1.818	1.814	1.796	1.507	1.481	1.461	1.656	1.378	1.195	1.304	1.012	1.314	1.027	1.289	1.336
Ta	0.150	0.133	0.172	0.482	0.491	0.527	0.332	0.600	0.794	0.686	0.976	0.670	0.956	0.698	0.653
Sn	0.001	0.001	0.000	0.001	0.004	0.001	0.003	0.001	0.007	0.001	0.004	0.003	0.004	0.002	0.004
W	0.011	0.020	0.010	0.007	0.012	0.010	0.006	0.011	0.007	0.007	0.008	0.011	0.010	0.009	0.009
Pb	0.005	0.006	0.005	0.004	0.004	0.005	0.005	0.004	0.003	0.004	0.003	0.003	0.002	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Sc	0.005	0.013	0.006	0.000	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.002	0.000	0.000
Ca	0.002	0.000	0.001	0.002	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000
Total	2.992	2.994	3.001	2.990	2.992	2.990	2.990	2.998	2.984	2.982	2.975	2.978	2.980	2.978	2.978
Mn/(Mn+Fe)	0.368	0.349	0.312	0.793	0.771	0.784	0.790	0.770	0.798	0.630	0.589	0.551	0.646	0.689	0.691
Ta/(Ta+Nb)	0.076	0.068	0.087	0.242	0.249	0.265	0.167	0.303	0.399	0.345	0.491	0.338	0.482	0.351	0.328

Comments: 3 small grains
Avalon Resources borehole

BC - BG from cluster of grains
Avalon Resources borehole

BM - BO same grain
mainly unzoned rim
Avalon Resources borehole

Columbite-Tantalite Group

	SW Beryl pegmatite EFR-6056A				SW Beryl pegmatite EFR-6056B										
	EA	EB	EC	ED	KA	KB	KC1	KC2	KC3	KC4	KC5	KC6	KC7	KC8	KC9
FeO	10.89	11.26	10.85	10.99	10.28	10.51	9.46	8.61	8.63	9.04	8.13	8.21	9.12	8.72	8.44
MnO	6.46	6.92	6.48	6.66	6.56	7.21	6.49	7.29	7.17	6.76	7.42	7.48	6.59	7.19	7.41
TiO2	0.48	0.40	0.51	0.42	0.31	0.33	0.30	0.34	0.38	0.33	0.45	0.40	0.36	0.38	0.40
Nb2O5	36.40	45.68	35.26	39.64	43.89	55.09	32.87	34.75	31.23	29.13	28.61	28.45	28.57	27.77	28.56
Ta2O5	44.40	33.27	45.48	41.31	37.59	25.28	49.37	47.48	50.93	53.21	53.59	53.83	53.93	54.02	52.86
SnO2	0.13	0.13	0.18	0.11	0.08	0.04	0.06	0.07	0.10	0.25	0.16	0.39	0.10	0.60	0.65
WO3	0.69	0.74	0.72	0.67	0.35	0.42	0.44	0.43	0.51	0.60	0.64	0.55	0.61	0.58	0.58
PbO	0.13	0.18	0.11	0.16	0.20	0.28	0.10	0.17	0.24	0.15	0.11	0.11	0.06	0.09	0.13
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Se2O3	0.07	0.07	0.06	0.01	0.03	0.00	0.00	0.05	0.01	0.00	0.00	0.00	0.03	0.00	0.08
CaO	0.00	0.00	0.00	0.01	0.03	0.01	0.00	0.05	0.02	0.01	0.01	0.01	0.02	0.02	0.01
Total	99.66	98.66	99.65	99.97	99.35	99.16	99.08	99.25	99.21	99.48	99.13	99.46	99.38	99.37	99.11

Structural formulae based on 6 oxygens

Fe	0.625	0.621	0.626	0.619	0.572	0.553	0.558	0.503	0.513	0.543	0.490	0.494	0.549	0.527	0.508
Mn	0.376	0.387	0.379	0.380	0.370	0.384	0.388	0.431	0.432	0.411	0.453	0.456	0.402	0.440	0.452
Ti	0.025	0.020	0.027	0.021	0.015	0.016	0.016	0.018	0.020	0.018	0.024	0.022	0.020	0.021	0.022
Nb	1.130	1.362	1.100	1.208	1.319	1.568	1.049	1.096	1.004	0.945	0.933	0.926	0.930	0.907	0.931
Ta	0.829	0.597	0.854	0.757	0.680	0.433	0.948	0.901	0.985	1.039	1.051	1.054	1.056	1.061	1.036
Sn	0.004	0.003	0.005	0.003	0.002	0.001	0.002	0.002	0.003	0.007	0.004	0.011	0.003	0.017	0.019
W	0.012	0.013	0.013	0.012	0.006	0.007	0.008	0.008	0.009	0.011	0.012	0.010	0.011	0.011	0.011
Pb	0.002	0.003	0.002	0.003	0.004	0.005	0.002	0.003	0.005	0.003	0.002	0.002	0.001	0.002	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sc	0.004	0.004	0.004	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.000	0.005
Ca	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.004	0.002	0.001	0.001	0.001	0.001	0.002	0.001
Total	3.007	3.011	3.010	3.004	2.971	2.968	2.971	2.968	2.974	2.977	2.971	2.976	2.975	2.988	2.986
Mn/(Mn+Fe)	0.375	0.384	0.377	0.380	0.393	0.410	0.410	0.462	0.457	0.431	0.480	0.480	0.422	0.455	0.471
Ta/(Ta+Nb)	0.423	0.305	0.437	0.385	0.340	0.216	0.475	0.451	0.495	0.524	0.530	0.532	0.532	0.539	0.527

Comments: EA - ED same grain KA - KC same grain KC traverse from rim to core to rim of strongly oscillatory zoned grain

ED darker core region

Emerald Fields Resource Corporation sample

Columbite-Tantalite Group

SW Beryl pegmatite EFR-6056B														
	KC10	KC11	KC12	KC13	KC14	KD1	KD2	KD4	KD5	KD6	KD7	KD8	KD9	KD10
FeO	8.32	8.32	8.30	8.73	11.18	9.39	8.80	8.67	8.96	8.18	8.21	9.25	8.67	8.34
MnO	7.39	7.50	7.46	8.19	6.88	6.52	7.25	7.15	6.86	7.47	7.55	6.48	7.19	7.43
TiO2	0.45	0.42	0.37	0.29	0.32	0.31	0.31	0.36	0.35	0.45	0.35	0.39	0.37	0.36
Nb2O5	27.43	28.46	29.80	39.30	52.47	32.52	34.73	29.67	28.73	28.49	28.22	28.80	28.00	28.80
Ta2O5	54.14	53.74	52.44	42.41	27.29	49.66	47.31	52.16	53.28	53.59	53.70	53.75	53.78	52.82
SnO2	0.62	0.14	0.27	0.07	0.06	0.05	0.06	0.19	0.29	0.18	0.38	0.10	0.58	0.63
WO3	0.79	0.72	0.43	0.34	0.39	0.36	0.44	0.59	0.56	0.64	0.51	0.60	0.57	0.57
PbO	0.12	0.13	0.13	0.17	0.25	0.15	0.14	0.20	0.11	0.09	0.08	0.07	0.09	0.18
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.07	0.07	0.17	0.01	0.08	0.02	0.01
CaO	0.02	0.00	0.00	0.02	0.01	0.01	0.04	0.00	0.00	0.00	0.01	0.01	0.00	0.02
Total	99.26	99.42	99.23	99.55	98.85	98.97	99.04	99.10	99.21	99.26	99.01	99.51	99.26	99.14

Structural formulae based on 6 oxygens

Fe	0.504	0.501	0.497	0.496	0.597	0.556	0.514	0.520	0.540	0.492	0.497	0.555	0.524	0.502
Mn	0.453	0.457	0.453	0.471	0.372	0.391	0.429	0.435	0.418	0.456	0.463	0.394	0.440	0.453
Ti	0.024	0.023	0.020	0.015	0.016	0.016	0.016	0.019	0.019	0.024	0.019	0.021	0.020	0.019
Nb	0.898	0.926	0.965	1.207	1.515	1.041	1.097	0.962	0.935	0.927	0.923	0.935	0.914	0.938
Ta	1.066	1.052	1.022	0.784	0.474	0.956	0.899	1.018	1.043	1.049	1.057	1.049	1.057	1.035
Sn	0.018	0.004	0.008	0.002	0.002	0.002	0.002	0.005	0.008	0.005	0.011	0.003	0.017	0.018
W	0.015	0.013	0.008	0.006	0.006	0.007	0.008	0.011	0.010	0.012	0.010	0.011	0.011	0.011
Pb	0.002	0.002	0.003	0.003	0.004	0.003	0.003	0.004	0.002	0.002	0.002	0.001	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.004	0.004	0.011	0.000	0.005	0.001	0.000
Ca	0.001	0.000	0.000	0.001	0.001	0.001	0.003	0.000	0.000	0.000	0.001	0.000	0.000	0.002
Total	2.982	2.979	2.976	2.985	2.986	2.973	2.972	2.980	2.981	2.978	2.981	2.975	2.985	2.982
Mn/(Mn+Fe)	0.474	0.477	0.477	0.487	0.384	0.413	0.455	0.455	0.437	0.481	0.482	0.415	0.457	0.474
Ta/(Ta+Nb)	0.543	0.532	0.514	0.394	0.238	0.479	0.450	0.514	0.527	0.531	0.534	0.529	0.536	0.525

Comments:

KD & KE same spot

Emerald Fields Resource Corporation sample

Columbite-Tantalite Group

SW Beryl pegmatite EFR-6056B															
	KD11	KD12	KD13	KD14	KD15	KE1	KE2	KE3	KE4	KE5	KE6	KE7	KE8	KE9	KE10
FeO	8.40	8.37	8.78	8.57	11.47	9.71	8.83	8.75	8.88	8.13	8.18	9.24	8.64	8.35	8.34
MnO	7.58	7.65	8.02	7.91	6.90	6.46	7.09	7.23	6.85	7.56	7.51	6.56	7.22	7.48	7.66
TiO2	0.42	0.38	0.31	0.27	0.37	0.31	0.34	0.36	0.38	0.43	0.39	0.39	0.34	0.44	0.37
Nb2O5	28.73	29.99	39.69	37.31	52.59	32.88	31.21	30.55	28.79	28.78	28.42	28.81	28.00	28.56	29.67
Ta2O5	53.60	52.50	42.28	44.60	27.09	49.80	51.03	51.90	53.29	53.68	53.54	53.39	53.62	53.43	52.22
SnO2	0.15	0.24	0.08	0.02	0.08	0.06	0.07	0.12	0.32	0.14	0.41	0.10	0.52	0.11	0.25
WO3	0.80	0.49	0.41	0.41	0.42	0.34	0.49	0.53	0.56	0.54	0.53	0.52	0.51	0.77	0.48
PbO	0.05	0.12	0.15	0.21	0.27	0.17	0.14	0.12	0.14	0.09	0.13	0.18	0.14	0.15	0.10
ThO2	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
UO2	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
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
Se2O3	0.14	0.01	0.17	0.00	0.00	0.25	0.12	0.00	0.10	0.00	0.00	0.04	0.07	0.05	0.00
CaO	0.00	0.01	0.03	0.16	0.02	0.01	0.03	0.02	0.00	0.03	0.00	0.02	0.01	0.03	0.01
Total	99.86	99.75	99.89	99.29	99.20	99.98	99.33	99.57	99.29	99.39	99.09	99.24	99.06	99.34	99.08

Structural formulae based on 6 oxygens

Fe	0.502	0.498	0.496	0.492	0.610	0.568	0.524	0.520	0.534	0.489	0.494	0.556	0.523	0.503	0.500
Mn	0.459	0.461	0.459	0.461	0.371	0.383	0.426	0.436	0.417	0.461	0.459	0.400	0.443	0.456	0.465
Ti	0.022	0.020	0.016	0.014	0.018	0.017	0.018	0.019	0.020	0.023	0.021	0.021	0.019	0.024	0.020
Nb	0.929	0.965	1.211	1.159	1.512	1.040	1.001	0.982	0.936	0.935	0.928	0.938	0.916	0.929	0.962
Ta	1.042	1.017	0.776	0.833	0.469	0.947	0.985	1.004	1.042	1.049	1.052	1.045	1.055	1.045	1.018
Sn	0.004	0.007	0.002	0.000	0.002	0.002	0.002	0.003	0.009	0.004	0.012	0.003	0.015	0.003	0.007
W	0.015	0.009	0.007	0.007	0.007	0.006	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.014	0.009
Pb	0.001	0.002	0.003	0.004	0.005	0.003	0.003	0.002	0.003	0.002	0.002	0.002	0.004	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Sc	0.009	0.001	0.010	0.000	0.000	0.015	0.008	0.000	0.007	0.000	0.000	0.003	0.004	0.003	0.000
Ca	0.000	0.001	0.002	0.012	0.001	0.001	0.002	0.001	0.000	0.002	0.000	0.001	0.001	0.002	0.000
Total	2.983	2.982	2.982	2.982	2.995	2.981	2.979	2.978	2.979	2.976	2.978	2.981	2.988	2.982	2.984
Mn/(Mn+Fe)	0.478	0.481	0.481	0.483	0.378	0.403	0.448	0.456	0.438	0.485	0.482	0.418	0.458	0.476	0.482
Ta/(Ta+Nb)	0.529	0.513	0.391	0.418	0.237	0.477	0.496	0.505	0.527	0.529	0.531	0.527	0.535	0.529	0.514

Comments:

Emerald Fields Resource Corporation sample

Columbite-Tantalite Group

SW Beryl pegmatite																
EFR-6056B																
	KF1	KF2	KF3	KF4	KG	KH1	KH2	KH4	KH5	KH6	KH7	KH8	KH9	KH10	KH11	KH12
FeO	9.66	8.73	8.38	8.55	7.83	8.39	7.78	7.81	7.96	7.74	7.69	8.14	8.06	8.02	8.86	8.64
MnO	6.42	7.06	7.69	8.00	7.52	7.45	7.52	7.55	7.60	7.66	8.27	7.51	7.38	7.42	7.75	7.77
TiO2	0.33	0.34	0.38	0.29	0.50	0.37	0.42	0.39	0.38	0.43	0.35	0.46	0.32	0.34	0.32	0.40
Nb2O5	32.73	30.90	29.69	38.61	25.22	30.45	23.37	23.35	23.81	23.93	30.29	25.67	24.88	24.61	36.33	33.29
Ta2O5	49.35	51.21	52.00	42.78	57.24	52.90	59.48	60.15	59.41	59.26	52.24	57.07	57.81	58.86	45.24	49.05
SnO2	0.08	0.13	0.20	0.08	0.23	0.11	0.17	0.12	0.10	0.16	0.10	0.28	0.34	0.10	0.03	0.11
WO3	0.37	0.54	0.50	0.45	0.63	0.42	0.57	0.54	0.61	0.55	0.60	0.69	0.68	0.62	0.45	0.50
PbO	0.10	0.12	0.15	0.17	0.07	0.16	0.09	0.05	0.06	0.12	0.13	0.07	0.05	0.12	0.14	0.12
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.02	0.00	0.07	0.05	0.02	0.03	0.03	0.00	0.00	0.00	0.17	0.11	0.05	0.00	0.04
CaO	0.01	0.01	0.03	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.00	0.03	0.04	0.01	0.03
Total	99.04	99.04	98.98	98.99	99.32	100.26	99.45	100.01	99.96	99.86	99.68	100.04	99.66	100.18	99.13	99.95

Structural formulae based on 6 oxygens

Fe	0.571	0.521	0.503	0.489	0.480	0.496	0.482	0.482	0.490	0.476	0.458	0.494	0.494	0.490	0.513	0.504
Mn	0.384	0.426	0.467	0.464	0.467	0.447	0.472	0.471	0.474	0.477	0.498	0.462	0.458	0.459	0.454	0.459
Ti	0.018	0.018	0.020	0.015	0.027	0.019	0.023	0.022	0.021	0.024	0.019	0.025	0.018	0.019	0.017	0.021
Nb	1.045	0.996	0.963	1.195	0.836	0.975	0.783	0.778	0.792	0.796	0.975	0.842	0.824	0.814	1.137	1.050
Ta	0.948	0.993	1.015	0.796	1.141	1.019	1.198	1.206	1.189	1.186	1.011	1.126	1.152	1.171	0.851	0.931
Sn	0.002	0.004	0.006	0.002	0.007	0.003	0.005	0.003	0.003	0.005	0.003	0.008	0.010	0.003	0.001	0.003
W	0.007	0.010	0.009	0.008	0.012	0.008	0.011	0.010	0.012	0.011	0.011	0.013	0.013	0.012	0.008	0.009
Pb	0.002	0.002	0.003	0.003	0.001	0.003	0.002	0.001	0.001	0.002	0.003	0.001	0.001	0.002	0.003	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.001	0.000	0.004	0.003	0.001	0.002	0.002	0.000	0.000	0.000	0.010	0.007	0.003	0.000	0.002
Ca	0.001	0.001	0.002	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.002	0.003	0.001	0.002
Total	2.977	2.973	2.988	2.978	2.976	2.972	2.978	2.977	2.982	2.978	2.978	2.983	2.979	2.977	2.984	2.985
Mn/(Mn+Fe)	0.402	0.450	0.482	0.487	0.493	0.474	0.495	0.495	0.492	0.501	0.521	0.483	0.481	0.484	0.470	0.477
Ta/(Ta+Nb)	0.476	0.499	0.513	0.400	0.577	0.511	0.605	0.608	0.600	0.598	0.509	0.572	0.583	0.590	0.428	0.470

Comments:

KH traverse

Emerald Fields Resource Corporation sample

Columbite-Tantalite Group

SW Beryl pegmatite														
EFR-6056B														
	KH13	KH14	KH15	KH16	KH17	KK1	KK2	KK3	KK4	KK5	KK6	KK7	KK8	KK9
FeO	8.80	8.55	10.17	8.86	8.70	10.47	8.89	10.03	9.54	10.68	9.76	9.96	9.87	9.18
MnO	7.19	7.46	6.97	6.39	8.15	7.13	8.23	6.83	7.53	7.50	6.34	6.46	6.50	7.39
TiO2	0.37	0.36	0.39	0.35	0.27	0.28	0.26	0.30	0.30	0.27	0.38	0.36	0.30	0.29
Nb2O5	30.95	30.86	41.41	31.53	42.34	48.73	42.76	41.68	44.29	54.20	30.21	34.73	35.92	40.13
Ta2O5	51.65	51.87	40.26	50.98	39.55	31.55	38.94	40.10	36.69	26.49	51.79	47.62	45.67	41.63
SnO2	0.14	0.14	0.06	0.16	0.05	0.04	0.05	0.09	0.05	0.04	0.11	0.06	0.08	0.00
WO3	0.46	0.58	0.39	0.51	0.47	0.42	0.36	0.38	0.33	0.23	0.63	0.39	0.46	0.33
PbO	0.09	0.11	0.18	0.05	0.19	0.19	0.20	0.20	0.23	0.31	0.16	0.15	0.19	0.15
ThO2	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
UO2	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
Sb2O3	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.09	0.03	0.00	0.00	0.00	0.13	0.00	0.00	0.13	0.02	0.00	0.00	0.00	0.08
CaO	0.02	0.02	0.03	0.89	0.05	0.01	0.01	0.02	0.06	0.01	0.01	0.02	0.02	0.01
Total	99.74	99.97	99.86	99.76	99.77	98.95	99.69	99.64	99.13	99.75	99.39	99.74	99.00	99.19

Structural formulae based on 6 oxygens

Fe	0.521	0.506	0.570	0.522	0.486	0.569	0.496	0.563	0.529	0.562	0.582	0.579	0.574	0.521
Mn	0.431	0.447	0.395	0.381	0.461	0.392	0.465	0.388	0.423	0.400	0.383	0.380	0.382	0.424
Ti	0.019	0.019	0.019	0.019	0.014	0.014	0.013	0.015	0.015	0.013	0.021	0.019	0.016	0.015
Nb	0.991	0.987	1.254	1.004	1.278	1.432	1.289	1.264	1.329	1.543	0.975	1.091	1.128	1.231
Ta	0.995	0.998	0.733	0.977	0.718	0.558	0.706	0.732	0.662	0.454	1.005	0.900	0.863	0.768
Sn	0.004	0.004	0.001	0.004	0.001	0.001	0.001	0.002	0.001	0.001	0.003	0.002	0.002	0.000
W	0.008	0.011	0.007	0.009	0.008	0.007	0.006	0.007	0.006	0.004	0.012	0.007	0.008	0.006
Pb	0.002	0.002	0.003	0.001	0.003	0.003	0.004	0.004	0.004	0.005	0.003	0.003	0.004	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.006	0.002	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.001	0.000	0.000	0.000	0.005
Ca	0.002	0.002	0.002	0.067	0.004	0.000	0.001	0.001	0.004	0.001	0.001	0.001	0.001	0.001
Total	2.978	2.977	2.985	2.986	2.974	2.984	2.980	2.976	2.982	2.984	2.984	2.980	2.978	2.973
Mn/(Mn+Fe)	0.453	0.469	0.409	0.422	0.487	0.408	0.484	0.408	0.444	0.416	0.397	0.396	0.400	0.449
Ta/(Ta+Nb)	0.501	0.503	0.369	0.493	0.360	0.280	0.354	0.367	0.333	0.227	0.508	0.452	0.433	0.384

Comments:

KK traverse col. contains microlite incls.
slightly radiating crystals
with marginal patchy zonation

Emerald Fields Resource Corporation sample

Columbite-Tantalite Group

	SW Petalite pegmatite EFR-6059											SW Beryl peg. EFR-6067A		
	PJ	PK	RA	RB	RC	RD	RE	RF	PM	RG	RH	FA	FB	
FeO	4.05	4.13	3.82	4.08	4.09	4.04	4.03	4.48	4.55	4.16	4.50	10.65	11.15	
MnO	11.56	11.13	11.26	11.21	11.05	10.72	10.82	12.70	14.10	11.24	12.53	5.87	5.82	
TiO ₂	0.11	0.04	0.22	0.07	0.02	0.09	0.08	0.27	0.37	0.11	0.31	1.27	1.20	
Nb ₂ O ₅	21.94	18.38	19.42	20.13	17.91	15.11	15.71	41.10	55.43	22.15	39.63	38.85	41.29	
Ta ₂ O ₅	60.56	64.30	63.48	63.62	66.15	68.95	68.25	40.01	23.67	61.09	42.17	40.62	39.17	
SnO ₂	0.21	0.20	0.31	0.12	0.15	0.10	0.10	0.06	0.48	0.38	0.09	0.30	0.25	
WO ₃	0.06	0.10	0.34	0.20	0.23	0.15	0.14	0.36	0.24	0.20	0.30	1.08	0.94	
PbO	0.14	0.14	0.18	0.10	0.30	0.08	0.15	0.40	0.07	0.19	0.46	0.19	0.14	
ThO ₂	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	
UO ₂	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	
Sb ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	
Bi ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Se ₂ O ₃	0.03	0.04	0.11	0.06	0.00	0.00	0.16	0.00	0.04	0.04	0.10	0.56	0.18	
CaO	0.01	0.03	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.15	0.00	
Total	98.65	98.50	99.13	99.58	99.91	99.26	99.42	99.42	98.96	99.55	100.11	99.55	100.15	
Structural formulae based on 6 oxygens														
Fe	0.255	0.266	0.243	0.258	0.262	0.264	0.262	0.253	0.239	0.260	0.254	0.598	0.618	
Mn	0.738	0.727	0.726	0.718	0.716	0.710	0.712	0.725	0.749	0.711	0.717	0.334	0.326	
Ti	0.006	0.002	0.013	0.004	0.001	0.005	0.005	0.014	0.018	0.006	0.016	0.064	0.060	
Nb	0.748	0.641	0.668	0.688	0.620	0.534	0.552	1.252	1.571	0.748	1.210	1.180	1.237	
Ta	1.241	1.349	1.313	1.308	1.376	1.465	1.442	0.733	0.404	1.241	0.774	0.742	0.706	
Sn	0.006	0.006	0.009	0.003	0.005	0.003	0.003	0.002	0.012	0.011	0.002	0.008	0.007	
W	0.001	0.002	0.007	0.004	0.005	0.003	0.003	0.006	0.004	0.004	0.005	0.019	0.016	
Pb	0.003	0.003	0.004	0.002	0.006	0.002	0.003	0.007	0.001	0.004	0.008	0.004	0.002	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.002	0.003	0.007	0.004	0.000	0.000	0.010	0.000	0.002	0.003	0.006	0.033	0.010	
Ca	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.011	0.000	
Total	3.001	3.002	2.990	2.989	2.991	2.987	2.991	2.994	3.000	2.989	2.992	2.992	2.982	
Mn/(Mn+Fe)	0.743	0.732	0.749	0.736	0.732	0.729	0.731	0.742	0.758	0.732	0.738	0.358	0.346	
Ta/(Ta+Nb)	0.624	0.678	0.663	0.655	0.690	0.733	0.723	0.369	0.204	0.624	0.390	0.386	0.363	
Comments:	PJ, PK, RA - RF		RA - RE core to rim				PM, RG & RH				FA & FB			
	same grain		strong oscillatory zonation				patchy		same grain		same grain			
	Emerald Fields Resource Corporation sample						alteration		patchy		patchy		mantled by wodge.	

Columbite-Tantalite Group

	Zone 11 pegmatite EFR-6082								SW Beryl pegmatite EFR-6090							
	DA	DB	DC	RP	RQ	RR	RS	TF	SA	SB	SC	SE	SF	SG	SM	GO
FeO	17.63	17.05	17.59	17.55	17.29	17.29	17.68	16.17	16.27	15.23	13.63	13.90	13.46	14.18	13.71	13.26
MnO	2.66	2.50	2.70	2.56	2.63	3.35	2.79	3.02	3.38	3.11	2.96	3.15	2.97	3.02	2.93	2.89
TiO2	1.45	3.05	1.74	1.75	1.99	0.85	1.45	1.12	0.90	0.97	0.99	1.12	0.99	1.18	1.69	0.91
Nb2O5	70.10	69.03	71.45	68.47	67.33	70.04	69.29	60.34	65.27	51.78	33.89	40.37	32.84	43.17	39.31	30.83
Ta2O5	4.80	4.77	4.01	7.16	6.92	6.34	6.23	17.48	10.94	25.33	46.28	38.53	47.68	37.33	38.80	49.66
SnO2	0.17	0.35	0.13	0.10	0.19	0.08	0.10	0.10	0.03	0.04	0.29	0.18	0.30	0.19	0.29	0.29
WO3	0.74	0.57	0.66	0.52	0.73	0.63	0.63	0.60	0.55	0.84	0.58	0.70	0.67	0.58	0.65	0.55
PbO	0.77	0.77	0.73	0.63	0.66	0.83	0.75	0.64	0.67	0.60	0.23	0.35	0.42	0.42	0.53	0.21
ThO2	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
UO2	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	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
Se2O3	0.00	0.00	0.00	0.41	0.49	0.17	0.34	0.29	0.19	0.34	0.35	0.10	0.12	0.30	0.61	0.18
CaO	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02	0.01	0.03	0.00
Total	98.33	98.09	99.04	99.16	98.23	99.61	99.27	99.76	98.21	98.23	99.19	98.45	99.45	100.36	98.56	98.78
Structural formulae based on 6 oxygens																
Fe	0.862	0.829	0.849	0.856	0.850	0.842	0.860	0.820	0.817	0.814	0.792	0.786	0.787	0.778	0.773	0.788
Mn	0.132	0.123	0.132	0.126	0.131	0.165	0.137	0.155	0.172	0.168	0.174	0.180	0.176	0.168	0.167	0.174
Ti	0.064	0.133	0.075	0.077	0.088	0.037	0.064	0.051	0.041	0.047	0.052	0.057	0.052	0.058	0.086	0.049
Nb	1.853	1.815	1.865	1.804	1.790	1.843	1.823	1.654	1.772	1.496	1.065	1.234	1.038	1.280	1.198	0.990
Ta	0.076	0.076	0.063	0.113	0.111	0.100	0.099	0.288	0.179	0.440	0.874	0.708	0.906	0.666	0.711	0.959
Sn	0.004	0.008	0.003	0.002	0.004	0.002	0.002	0.002	0.001	0.001	0.008	0.005	0.008	0.005	0.008	0.008
W	0.011	0.009	0.010	0.008	0.011	0.009	0.010	0.009	0.009	0.014	0.010	0.012	0.012	0.010	0.011	0.010
Pb	0.012	0.012	0.011	0.010	0.010	0.013	0.012	0.010	0.011	0.010	0.004	0.006	0.008	0.007	0.010	0.004
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.021	0.025	0.009	0.017	0.015	0.010	0.019	0.021	0.006	0.007	0.017	0.036	0.011
Ca	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.002	0.000
Total	3.016	3.006	3.009	3.018	3.021	3.022	3.024	3.006	3.010	3.010	3.000	2.998	2.995	2.990	3.002	2.993
Mn/(Mn+Fe)	0.133	0.129	0.135	0.129	0.133	0.164	0.138	0.159	0.174	0.171	0.180	0.187	0.182	0.177	0.178	0.181
Ta/(Ta+Nb)	0.040	0.040	0.033	0.059	0.058	0.052	0.051	0.148	0.092	0.227	0.451	0.365	0.466	0.342	0.373	0.492
Comments:	DA & DB		RP & RQ				oscill.		SA - SC		Emerald Fields Resource Corporation sample					
	same grain		same grain				zoned		same grain							
	unzoned		Emerald Fields R.C. sample				grain		rim		core					

Columbite-Tantalite Group

Big Mack pegmatite					
EFR-6099					
	RA	RB	RG	RH	RI
FeO	16.62	17.03	16.40	16.55	16.78
MnO	3.08	2.37	2.62	2.49	2.70
TiO2	0.98	1.07	0.76	1.99	0.81
Nb2O5	63.74	62.35	54.79	55.71	59.66
Ta2O5	12.77	14.88	23.40	19.64	18.03
SnO2	1.17	1.14	0.82	1.67	0.51
WO3	0.34	0.29	0.30	0.28	0.29
PbO	0.10	0.10	0.10	0.31	0.08
ThO2	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.02	0.00	0.00	0.01
Sb2O3	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.05	0.15	0.17	0.04	0.05
CaO	0.03	0.00	0.01	0.00	0.00
Total	98.87	99.40	99.36	98.68	98.92
Structural formulae					
based on 6 oxygens					
Fe	0.834	0.856	0.857	0.857	0.860
Mn	0.157	0.121	0.139	0.131	0.140
Ti	0.044	0.049	0.036	0.092	0.037
Nb	1.729	1.694	1.547	1.559	1.652
Ta	0.208	0.243	0.397	0.330	0.300
Sn	0.028	0.027	0.020	0.041	0.012
W	0.005	0.004	0.005	0.004	0.005
Pb	0.002	0.002	0.002	0.005	0.001
Th	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000
Sc	0.003	0.008	0.009	0.002	0.003
Ca	0.002	0.000	0.001	0.000	0.000
Total	3.011	3.005	3.013	3.022	3.011
Mn/(Mn+Fe)	0.158	0.124	0.139	0.132	0.140
Ta/(Ta+Nb)	0.108	0.126	0.204	0.175	0.154
Comments:	RG & RH				
	Emerald Fields	same grain			
	sample	associated with nigerite			

Wodginite Group

	S.R. Pluton			East Beryl pegmatite									
	93-260C			93-265A									
Raw data	AO	AY	ZA	ZE1	ZE2	ZI	ZL	ZS	ZY	ZZ	ZO	ZP	ZQ
FeO	5.84	3.55	0.55	0.59	0.67	0.53	0.75	0.58	0.48	0.51	0.59	0.49	0.51
MnO	6.50	8.19	12.19	12.74	12.31	13.47	13.13	13.36	11.95	12.43	12.82	12.89	13.15
TiO2	0.16	0.14	0.10	0.08	0.08	0.11	0.08	0.05	0.13	0.10	0.11	0.11	0.11
Nb2O5	7.48	5.82	7.78	7.17	6.63	9.06	7.28	7.27	3.07	7.66	8.08	8.32	8.53
Ta2O5	61.42	62.74	61.80	60.72	62.80	59.09	57.88	57.51	69.71	61.82	58.42	59.99	58.32
SnO2	15.23	15.10	16.45	15.91	15.35	12.70	13.78	14.49	13.21	15.55	15.13	14.81	14.00
WO3	0.10	0.07	1.22	3.26	2.61	5.07	7.70	7.69	1.65	2.51	5.02	3.58	5.63
PbO	0.01	0.03	0.00	0.05	0.00	0.00	0.23	0.02	0.00	0.00	0.02	0.07	0.02
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Sc2O3	0.21	0.10											
Sb2O3	0.00	0.00											
Bi2O3	0.00	0.00											
Total	96.54	95.37	100.09	100.52	100.45	100.03	100.83	100.97	100.20	100.58	100.21	100.29	100.27
Recalculated	93-260C			93-265A									
oxides	AO	AY	ZA	ZE	ZE	ZI	ZL	ZS	ZY	ZZ	ZO	ZP	ZQ
Li2O	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	4.29	2.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	6.50	8.19	12.19	12.74	12.31	13.47	13.13	13.36	11.95	12.43	12.82	12.89	13.15
Fe2O3	1.69	1.58	0.61	0.66	0.74	0.59	0.83	0.64	0.53	0.57	0.66	0.54	0.57
TiO2	0.16	0.14	0.10	0.08	0.08	0.11	0.08	0.05	0.13	0.10	0.11	0.11	0.11
Nb2O5	7.48	5.82	7.78	7.17	6.63	9.06	7.28	7.27	3.07	7.66	8.08	8.32	8.53
Ta2O5	61.42	62.74	61.80	60.72	62.80	59.09	57.88	57.51	69.71	61.82	58.42	59.99	58.32
SnO2	15.23	15.10	16.45	15.91	15.35	12.70	13.78	14.49	13.21	15.55	15.13	14.81	14.00
WO3	0.10	0.07	1.22	3.26	2.61	5.07	7.70	7.69	1.65	2.51	5.02	3.58	5.63
PbO	0.01	0.03	0.00	0.05	0.00	0.00	0.23	0.02	0.00	0.00	0.02	0.07	0.02
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Sc2O3	0.21	0.10											
Sb2O3	0.00	0.00											
Bi2O3	0.00	0.00											
Total	97.13	95.98	100.15	100.59	100.52	100.09	100.91	101.03	100.25	100.64	100.28	100.34	100.33
Structural formulae based on 32 oxygens													
Li	0.061	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe2+	1.559	0.783	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	2.380	3.069	4.345	4.527	4.399	4.759	4.634	4.704	4.401	4.412	4.536	4.566	4.642
Fe3+	0.552	0.529	0.194	0.207	0.236	0.185	0.261	0.202	0.175	0.179	0.206	0.171	0.178
Ti	0.052	0.048	0.032	0.025	0.025	0.035	0.025	0.016	0.043	0.032	0.035	0.035	0.034
Nb	1.462	1.164	1.480	1.360	1.265	1.708	1.371	1.366	0.603	1.451	1.526	1.573	1.607
Ta	7.220	7.547	7.072	6.928	7.205	6.702	6.559	6.502	8.242	7.045	6.637	6.823	6.610
Sn	2.625	2.664	2.760	2.662	2.582	2.112	2.289	2.402	2.290	2.598	2.520	2.470	2.327
W	0.011	0.008	0.133	0.354	0.285	0.548	0.831	0.829	0.186	0.273	0.544	0.388	0.608
Pb	0.001	0.004	0.000	0.006	0.000	0.000	0.026	0.002	0.000	0.000	0.002	0.008	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Sc	0.078	0.040											
Sb	0.000	0.000											
Bi	0.000	0.000											
Total	16.000	16.000	16.016	16.069	15.998	16.049	15.997	16.022	15.940	15.990	16.008	16.037	16.008
Comments:	core of large inclusion in cassiterite	tungsteniferous wodginite	ZA and ZE from same crystal						ZY and Z adjacent to ZK, L, M and S				
	wodginite								wodginite - some tungsteniferous				
									(Li2O, FeO and Fe2O3 values calculated using the method of Ercit et al. 1992)				

NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).

Wodginite Group

East Beryl pegmatite												
93-265A												
Raw data	SG	SH	SL	AA	AB	AC	AD	AE	AF	AG	AH	AI
FeO	1.95	0.95	2.32	0.50	0.56	0.57	0.49	0.44	0.47	3.93	0.46	0.54
MnO	10.74	12.75	16.54	13.01	12.36	19.66	12.42	12.74	12.09	15.88	11.90	12.96
TiO2	0.08	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Nb2O5	7.13	6.51	4.00	7.75	7.08	2.19	7.83	7.25	7.54	5.51	6.99	6.69
Ta2O5	53.83	55.80	34.67	53.84	54.90	12.66	55.30	54.39	58.66	21.95	58.65	52.32
SnO2	13.75	13.48	8.10	14.06	14.94	3.02	14.60	14.70	15.34	5.00	16.57	14.11
WO3	7.82	10.50	34.63	11.01	9.53	60.80	8.41	9.98	5.59	45.25	5.06	13.39
PbO	0.99	0.13	0.14	0.00	0.00	0.06	0.00	0.01	0.00	0.22	0.04	0.02
ThO2	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.43	0.23	0.00	0.12	0.01	0.18	0.00	0.00	0.13	0.03	0.11	0.11
Sc2O3	0.03	0.02	0.02	0.07	0.00	0.00	0.01	0.02	0.00	0.51	0.00	0.00
Sb2O3	0.08	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	2.35	0.29	0.26	0.00	0.02	0.04	0.02	0.00	0.00	0.34	0.00	0.02
Total	99.19	100.78	100.77	100.36	99.39	99.18	99.09	99.51	99.83	98.63	99.78	100.16
Recalculated	93-265A											
oxides	SG	SH	SL	AA	AB	AC	AD	AE	AF	AG	AH	AI
Li2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	10.74	12.75	16.54	13.01	12.36	19.66	12.42	12.74	12.09	15.88	11.90	12.96
Fe2O3	2.15	1.06	2.58	0.56	0.63	0.63	0.55	0.49	0.52	4.37	0.51	0.60
TiO2	0.08	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Nb2O5	7.13	6.51	4.00	7.75	7.08	2.19	7.83	7.25	7.54	5.51	6.99	6.69
Ta2O5	53.83	55.80	34.67	53.84	54.90	12.66	55.30	54.39	58.66	21.95	58.65	52.32
SnO2	13.75	13.48	8.10	14.06	14.94	3.02	14.60	14.70	15.34	5.00	16.57	14.11
WO3	7.82	10.50	34.63	11.01	9.53	60.80	8.41	9.98	5.59	45.25	5.06	13.39
PbO	0.99	0.13	0.14	0.00	0.00	0.06	0.00	0.01	0.00	0.22	0.04	0.02
ThO2	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.43	0.23	0.00	0.12	0.01	0.18	0.00	0.00	0.13	0.03	0.11	0.11
Sc2O3	0.03	0.02	0.02	0.07	0.00	0.00	0.01	0.02	0.00	0.51	0.00	0.00
Sb2O3	0.08	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	2.35	0.29	0.26	0.00	0.02	0.04	0.02	0.00	0.00	0.34	0.00	0.02
Total	99.39	100.89	101.03	100.41	99.46	99.24	99.15	99.56	99.88	99.06	99.83	100.22
Structural formulae based on 32 oxygens												
Li	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe2+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mn	3.890	4.511	5.699	4.583	4.418	6.811	4.442	4.541	4.317	5.409	4.265	4.591
Fe3+	0.697	0.332	0.789	0.175	0.199	0.195	0.174	0.156	0.166	1.322	0.163	0.189
Ti	0.026	0.019	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Nb	1.379	1.229	0.736	1.458	1.350	0.405	1.495	1.379	1.438	1.001	1.337	1.265
Ta	6.261	6.339	3.835	6.090	6.300	1.408	6.349	6.227	6.728	2.400	6.747	5.950
Sn	2.345	2.245	1.314	2.331	2.514	0.492	2.458	2.467	2.580	0.802	2.795	2.353
W	0.867	1.137	3.651	1.187	1.042	6.445	0.920	1.089	0.611	4.715	0.555	1.451
Pb	0.114	0.015	0.015	0.000	0.000	0.006	0.000	0.001	0.000	0.024	0.005	0.003
Th	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.041	0.021	0.000	0.011	0.001	0.016	0.000	0.000	0.012	0.002	0.010	0.010
Sc	0.011	0.007	0.007	0.024	0.000	0.000	0.005	0.006	0.000	0.178	0.000	0.000
Sb	0.014	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.259	0.031	0.027	0.000	0.002	0.004	0.002	0.000	0.000	0.036	0.000	0.002
Total	15.905	15.898	16.096	15.861	15.826	15.783	15.845	15.865	15.853	15.892	15.877	15.815
Comments:	high Bi	high W				high W				high W		

wodginite - some tungsteniferous

Wodginite Group

Raw data	East Beryl pegmatite 93-265AM							East Beryl pegmatite 93-265AM							
	KB	KJ	KK	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	
FeO	0.47	0.68	0.57	0.44	0.45	0.44	0.51	0.48	0.81	0.40	0.44	0.44	0.49	0.46	
MnO	12.02	11.67	11.56	11.42	12.07	11.95	11.93	11.92	11.19	11.79	11.72	11.70	12.00	11.83	
TiO2	0.02	0.14	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	
Nb2O5	7.20	2.83	6.14	6.02	6.15	5.54	8.28	7.74	7.86	6.72	5.95	6.02	7.33	7.34	
Ta2O5	61.47	67.41	61.29	63.29	62.42	60.55	60.24	61.03	59.98	62.68	64.35	63.29	59.56	61.01	
SnO2	17.56	14.12	17.06	17.49	15.37	16.06	15.61	15.97	16.77	16.73	15.71	15.89	16.18	16.45	
WO3	1.73	2.66	2.79	1.71	4.09	5.30	3.60	3.14	2.45	2.44	1.74	2.80	4.49	2.71	
PbO	0.02	0.10	0.12	0.00	0.00	0.01	0.05	0.00	0.10	0.00	0.00	0.01	0.04	0.00	
ThO2	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
UO2	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.00	0.00	0.00	0.11	0.09	0.02	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.01	
Sb2O3	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Bi2O3	0.03	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.02	0.00	0.01	0.00	0.00	0.00	
Total	100.53	99.86	99.64	100.50	100.64	99.87	100.45	100.29	99.19	100.77	99.93	100.16	100.12	99.81	
Recalculated	93-265AM														
oxides	KB	KJ	KK	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	
Li2O	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	
FeO	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	
MnO	12.02	11.67	11.56	11.42	12.07	11.95	11.93	11.92	11.19	11.79	11.72	11.70	12.00	11.83	
Fe2O3	0.52	0.76	0.63	0.49	0.50	0.49	0.57	0.54	0.91	0.45	0.49	0.49	0.55	0.51	
TiO2	0.02	0.14	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	
Nb2O5	7.20	2.83	6.14	6.02	6.15	5.54	8.28	7.74	7.86	6.72	5.95	6.02	7.33	7.34	
Ta2O5	61.47	67.41	61.29	63.29	62.42	60.55	60.24	61.03	59.98	62.68	64.35	63.29	59.56	61.01	
SnO2	17.56	14.12	17.06	17.49	15.37	16.06	15.61	15.97	16.77	16.73	15.71	15.89	16.18	16.45	
WO3	1.73	2.66	2.79	1.71	4.09	5.30	3.60	3.14	2.45	2.44	1.74	2.80	4.49	2.71	
PbO	0.02	0.10	0.12	0.00	0.00	0.01	0.05	0.00	0.10	0.00	0.00	0.01	0.04	0.00	
ThO2	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
UO2	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.00	0.00	0.00	0.11	0.09	0.02	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.01	
Sb2O3	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Bi2O3	0.03	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.02	0.00	0.01	0.00	0.00	0.00	
Total	100.58	99.94	99.70	100.54	100.69	99.92	100.51	100.34	99.28	100.81	99.98	100.21	100.18	99.86	
Structural formulae based on 32 oxygens															
Li	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Fe2+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Mn	4.281	4.306	4.173	4.101	4.319	4.315	4.222	4.244	4.019	4.208	4.245	4.219	4.280	4.241	
Fe3+	0.165	0.248	0.203	0.157	0.158	0.158	0.180	0.170	0.289	0.142	0.159	0.156	0.173	0.161	
Ti	0.006	0.046	0.032	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.007	0.002	
Nb	1.369	0.557	1.183	1.154	1.174	1.068	1.563	1.471	1.506	1.280	1.149	1.159	1.396	1.405	
Ta	7.029	7.986	7.104	7.296	7.173	7.020	6.845	6.977	6.915	7.182	7.482	7.329	6.820	7.022	
Sn	2.944	2.453	2.899	2.957	2.590	2.730	2.601	2.677	2.834	2.810	2.679	2.699	2.717	2.776	
W	0.189	0.300	0.308	0.188	0.448	0.586	0.390	0.342	0.269	0.267	0.193	0.309	0.490	0.297	
Pb	0.002	0.012	0.014	0.000	0.000	0.001	0.005	0.000	0.011	0.000	0.000	0.001	0.005	0.000	
Th	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.000	0.000	0.000	0.040	0.034	0.006	0.071	0.000	0.004	0.000	0.000	0.000	0.000	0.003	
Sb	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.003	0.000	0.000	0.001	0.000	0.000	0.004	0.000	0.002	0.000	0.001	0.000	0.000	0.000	
Total	15.990	15.939	15.918	15.894	15.897	15.884	15.880	15.882	15.849	15.890	15.908	15.873	15.887	15.906	
Comments:	all are inclusions in large muscovite assoc. Bi alteration							AD - AH same grain near KB				AJ & AK same grain			
wodginite															

Wodginite Group

Raw data	E Beryl	Audreys peg.		Lou's peg.		Lou's pegmatite			Lou's peg.		James'
	93-265P	93-271		93-272B		93-272D			93-272E		93-276B
	WK	YD	YE	RH	RI	PF	PN	PO	WJ	JJ	PA
FeO	4.92	11.49	11.45	10.69	10.15	9.24	9.62	9.43	11.14	12.44	10.10
MnO	9.19	2.24	2.14	3.43	3.34	4.31	4.05	4.15	2.62	2.15	3.82
TiO2	1.56	0.95	0.90	4.14	3.05	1.30	1.39	1.36	4.71	4.17	2.53
Nb2O5	9.03	9.83	10.25	14.75	13.03	10.46	10.29	10.43	14.14	17.77	13.73
Ta2O5	59.04	57.48	56.77	53.94	55.35	59.54	60.34	60.27	54.63	52.42	55.73
SnO2	14.92	11.49	10.94	10.36	10.63	12.80	12.84	12.68	9.86	10.45	11.28
WO3	0.51	3.06	2.94	0.09	0.58	0.37	0.37	0.36	0.02	0.00	1.77
PbO	0.02	0.17	0.22	0.10	0.07	0.12	0.07	0.15	0.51	0.03	0.05
ThO2	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.01	0.00	0.00
UO2	0.02	0.34	0.35	0.14	0.17	0.09	0.05	0.12	0.00	0.00	0.00
Sc2O3	0.02	0.57	0.57	0.44	0.28	0.13	0.13	0.11		0.46	
Sb2O3	0.02	0.00	0.00	0.03	0.11	0.03	0.00	0.05		0.00	
Bi2O3	0.02										
Total	99.27	97.62	96.53	98.15	96.76	98.39	99.15	99.12	97.64	99.89	98.99
Recalculated	93-265P	93-271		93-272B		93-272D			93-272E		93-276B
oxides	WK	YD	YE	RH	RI	PF	PN	PO	WJ	WJ	PA
Li2O	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
FeO	2.81	9.05	8.97	8.99	8.36	7.15	7.52	7.34	9.39	10.64	7.79
MnO	9.19	2.24	2.14	3.43	3.34	4.31	4.05	4.15	2.62	2.15	3.82
Fe2O3	2.33	2.63	2.67	1.83	1.94	2.29	2.30	2.29	1.93	1.94	2.53
TiO2	1.56	0.95	0.90	4.14	3.05	1.30	1.39	1.36	4.71	4.17	2.53
Nb2O5	9.03	9.83	10.25	14.75	13.03	10.46	10.29	10.43	14.14	17.77	13.73
Ta2O5	59.04	57.48	56.77	53.94	55.35	59.54	60.34	60.27	54.63	52.42	55.73
SnO2	14.92	11.49	10.94	10.36	10.63	12.80	12.84	12.68	9.86	10.45	11.28
WO3	0.51	3.06	2.94	0.09	0.58	0.37	0.37	0.36	0.02	0.00	1.77
PbO	0.02	0.17	0.22	0.10	0.07	0.12	0.07	0.15	0.51	0.03	0.05
ThO2	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.01	0.00	0.00
UO2	0.02	0.34	0.35	0.14	0.17	0.09	0.05	0.12	0.00	0.00	0.00
Sc2O3	0.02	0.57	0.57	0.44	0.28	0.13	0.13	0.11		0.46	
Sb2O3	0.02	0.00	0.00	0.03	0.11	0.03	0.00	0.05		0.00	
Bi2O3	0.02										
Total	99.49	97.81	96.74	98.28	96.91	98.59	99.35	99.32	97.82	100.03	99.27
Structural formulae based on 32 oxygens											
Li	0.000	0.005	0.028	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.101
Fe2+	0.970	3.183	3.183	2.979	2.864	2.486	2.593	2.534	3.126	3.408	2.606
Mn	3.201	0.793	0.764	1.146	1.154	1.512	1.410	1.447	0.882	0.695	1.288
Fe3+	0.722	0.831	0.853	0.547	0.598	0.715	0.715	0.712	0.578	0.560	0.760
Ti	0.482	0.298	0.285	1.228	0.936	0.405	0.430	0.421	1.408	1.196	0.757
Nb	1.679	1.856	1.953	2.630	2.403	1.959	1.913	1.941	2.542	3.064	2.472
Ta	6.602	6.530	6.507	5.785	6.140	6.707	6.747	6.747	5.906	5.438	6.037
Sn	2.446	1.914	1.839	1.629	1.729	2.114	2.105	2.081	1.563	1.589	1.791
W	0.054	0.331	0.321	0.009	0.061	0.040	0.039	0.038	0.002	0.000	0.183
Pb	0.002	0.019	0.025	0.011	0.008	0.013	0.008	0.017	0.055	0.003	0.005
Th	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.001	0.001	0.000	0.000
U	0.002	0.032	0.033	0.012	0.015	0.008	0.005	0.011	0.000	0.000	0.000
Sc	0.007	0.207	0.209	0.151	0.100	0.047	0.047	0.039		0.153	0.000
Sb	0.003	0.000	0.000	0.005	0.018	0.005	0.000	0.008		0.000	0.000
Bi	0.002										
Total	16.173	16.000	16.000	16.135	16.026	16.011	16.012	16.000	16.063	16.106	16.000
Comments:		YD & YE same grain		RH & RI same grain inclusion in large euhedral cass.		PF - PO same grain some microlite alteration			inclusion in large euhedral cassiterite		
	wodginite	ferrowodginite		ferrowodginite		ferrowodginite			ferrowodginite		

Wodginite Group

Raw data	James' pegmatite					SW Beryl pegmatite			Marko's pegmatite				
	93-276B					94-15A			94-44A				
	PC	PS	PU	PV	SO	FC	FK	FL	VA	VC	VF	VG	VH
FeO	10.29	10.37	10.39	10.33	9.94	10.33	9.74	10.12	2.11	2.19	2.14	2.19	2.15
MnO	3.54	3.62	3.79	3.79	4.43	4.13	4.14	3.97	10.24	10.38	10.57	10.43	10.35
TiO2	2.85	3.50	2.84	3.08	2.94	2.53	2.81	1.87	1.41	1.53	1.43	1.20	1.44
Nb2O5	12.33	12.60	13.32	12.74	14.28	13.36	12.73	12.29	7.90	8.47	8.09	6.90	8.14
Ta2O5	57.56	57.13	57.30	56.50	54.84	54.32	55.81	55.12	60.57	60.60	59.65	61.43	61.68
SnO2	11.28	10.53	11.13	10.75	10.49	11.74	11.66	12.17	14.97	15.04	15.03	14.99	14.95
WO3	1.65	1.65	1.57	1.72	1.56	2.45	1.72	2.53	0.33	0.14	0.26	0.25	0.17
PbO	0.06	0.00	0.00	0.00	0.03	0.15	0.12	0.18	0.05	0.00	0.02	0.02	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01
UO2	0.00	0.00	0.00	0.00	0.00	0.20	0.11	0.14	0.00	0.00	0.00	0.00	0.00
Sc2O3						0.23	0.19	0.23	0.02	0.02	0.02	0.02	0.02
Sb2O3						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3						0.00	0.00	0.00					
Total	99.55	99.39	100.32	98.89	98.51	99.44	99.03	98.62	97.58	98.37	97.19	97.40	98.89
Recalculated	93-276B					94-15A			94-44A				
oxides	PC	PS	PU	PV	SO	FC	FK	FL	VA	VC	VF	VG	VH
Li2O	0.05	0.03	0.04	0.02	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.04
FeO	8.12	8.23	8.09	8.04	7.50	7.95	7.71	7.75	0.73	0.81	0.64	0.65	0.75
MnO	3.54	3.62	3.79	3.79	4.43	4.13	4.14	3.97	10.24	10.38	10.57	10.43	10.35
Fe2O3	2.38	2.35	2.52	2.50	2.68	2.61	2.22	2.59	1.53	1.53	1.67	1.70	1.55
TiO2	2.85	3.50	2.84	3.08	2.94	2.53	2.81	1.87	1.41	1.53	1.43	1.20	1.44
Nb2O5	12.33	12.60	13.32	12.74	14.28	13.36	12.73	12.29	7.90	8.47	8.09	6.90	8.14
Ta2O5	57.56	57.13	57.30	56.50	54.84	54.32	55.81	55.12	60.57	60.60	59.65	61.43	61.68
SnO2	11.28	10.53	11.13	10.75	10.49	11.74	11.66	12.17	14.97	15.04	15.03	14.99	14.95
WO3	1.65	1.65	1.57	1.72	1.56	2.45	1.72	2.53	0.33	0.14	0.26	0.25	0.17
PbO	0.06	0.00	0.00	0.00	0.03	0.15	0.12	0.18	0.05	0.00	0.02	0.02	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01
UO2	0.00	0.00	0.00	0.00	0.00	0.20	0.11	0.14	0.00	0.00	0.00	0.00	0.00
Sc2O3						0.23	0.19	0.23	0.02	0.02	0.02	0.02	0.02
Sb2O3						0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3						0.00	0.00	0.00					
Total	99.81	99.63	100.58	99.13	98.76	99.66	99.22	98.84	97.79	98.55	97.38	97.59	99.11
Structural formulae based on 32 oxygens													
Li	0.080	0.048	0.067	0.027	0.006	0.000	0.000	0.000	0.060	0.035	0.000	0.000	0.076
Fe2+	2.717	2.736	2.671	2.693	2.499	2.646	2.589	2.633	0.260	0.284	0.226	0.234	0.263
Mn	1.197	1.216	1.262	1.280	1.491	1.388	1.402	1.361	3.674	3.681	3.798	3.777	3.661
Fe3+	0.716	0.703	0.748	0.754	0.805	0.781	0.669	0.792	0.488	0.482	0.533	0.549	0.488
Ti	0.854	1.042	0.839	0.925	0.879	0.755	0.845	0.569	0.449	0.482	0.456	0.386	0.452
Nb	2.223	2.259	2.371	2.299	2.566	2.396	2.302	2.249	1.514	1.602	1.552	1.333	1.538
Ta	6.243	6.162	6.135	6.134	5.927	5.861	6.070	6.067	6.977	6.899	6.881	7.142	7.006
Sn	1.794	1.664	1.746	1.711	1.662	1.857	1.860	1.964	2.529	2.511	2.542	2.555	2.490
W	0.171	0.170	0.160	0.178	0.161	0.252	0.178	0.265	0.036	0.015	0.029	0.028	0.018
Pb	0.006	0.000	0.000	0.000	0.003	0.016	0.013	0.020	0.006	0.000	0.002	0.002	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.001
U	0.000	0.000	0.000	0.000	0.000	0.018	0.010	0.013	0.000	0.000	0.000	0.000	0.000
Sc						0.080	0.066	0.081	0.007	0.007	0.007	0.007	0.007
Sb						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.050	16.004	16.014	16.000	16.000	16.026	16.013	16.000
Comments:	PA - PV same grain BSE image shows very complex zoning of this crystal this was the first grain found in Ontario ferrowodginite					FC - FL same grain grain is part wodginite and part cassiterite ferrowodginite			VA - VN same grain complex crystal - part wodginite/part microlite/part columbite wodginite				

Wodginite Group

Raw data	Marko's pegmatite 94-44A				Marko's 94-44C	Marko's pegmatite 94-44D					Marko's peg. 94-44E	
	VJ	VL	VM	VN	YF	DB	JB	JC	JD	JG	KA	KB
FeO	2.31	2.19	2.36	2.31	2.36	2.38	2.43	2.33	2.30	2.25	2.26	2.25
MnO	10.12	10.12	10.10	10.18	10.01	10.70	9.53	9.95	9.90	9.44	10.04	10.38
TiO2	1.24	1.38	1.02	1.13	0.84	1.14	0.79	1.00	1.09	1.00	1.43	1.28
Nb2O5	6.95	7.31	6.69	6.72	5.72	5.73	6.30	6.26	5.71	5.87	4.69	4.94
Ta2O5	63.06	61.12	61.64	62.07	62.41	63.16	64.34	65.01	65.34	65.40	66.02	65.52
SnO2	15.02	15.20	15.98	15.20	16.37	15.15	14.98	14.04	13.99	14.95	14.41	14.22
WO3	0.22	0.33	0.26	0.22	0.16	0.18	0.18	0.26	0.33	0.28	0.21	0.22
PbO	0.03	0.02	0.02	0.03	0.02	0.02	0.05	0.05	0.05	0.03	0.02	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.02	0.00	0.00
Sc2O3	0.03	0.03	0.05	0.03		0.03	0.00	0.00	0.00	0.00		
Sb2O3	0.00	0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00		
Bi2O3						0.00	0.00	0.03	0.03	0.03		
Total	98.95	97.67	98.07	97.86	97.89	98.46	98.65	98.94	98.76	99.28	99.09	98.81
Recalculated oxides	94-44A				94-44C	94-44D					94-44E	
	VJ	VL	VM	VN	YF	DB	JB	JC	JD	JG	KA	KB
Li2O	0.04	0.03	0.00	0.01	0.00	0.00	0.11	0.10	0.10	0.15	0.05	0.01
FeO	0.88	0.86	1.01	0.85	1.01	0.65	1.01	0.71	0.72	0.98	0.82	0.62
MnO	10.12	10.12	10.10	10.18	10.01	10.70	9.53	9.95	9.90	9.44	10.04	10.38
Fe2O3	1.58	1.47	1.50	1.61	1.49	1.92	1.57	1.79	1.74	1.41	1.59	1.81
TiO2	1.24	1.38	1.02	1.13	0.84	1.14	0.79	1.00	1.09	1.00	1.43	1.28
Nb2O5	6.95	7.31	6.69	6.72	5.72	5.73	6.30	6.26	5.71	5.87	4.69	4.94
Ta2O5	63.06	61.12	61.64	62.07	62.41	63.16	64.34	65.01	65.34	65.40	66.02	65.52
SnO2	15.02	15.20	15.98	15.20	16.37	15.15	14.98	14.04	13.99	14.95	14.41	14.22
WO3	0.22	0.33	0.26	0.22	0.16	0.18	0.18	0.26	0.33	0.28	0.21	0.22
PbO	0.03	0.02	0.02	0.03	0.02	0.02	0.05	0.05	0.05	0.03	0.02	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.02	0.00	0.00
Sc2O3	0.03	0.03	0.05	0.03		0.03	0.00	0.00	0.00	0.00		
Sb2O3	0.00	0.00	0.00	0.00		0.02	0.00	0.00	0.00	0.00		
Bi2O3						0.00	0.00	0.03	0.03	0.03		
Total	99.18	97.87	98.26	98.06	98.04	98.70	98.91	99.21	99.02	99.56	99.29	99.00
Structural formulae based on 32 oxygens												
Li	0.074	0.049	0.000	0.012	0.000	0.000	0.192	0.166	0.164	0.259	0.080	0.024
Fe2+	0.312	0.307	0.360	0.306	0.365	0.230	0.362	0.253	0.258	0.347	0.293	0.222
Mn	3.611	3.642	3.645	3.679	3.649	3.857	3.440	3.575	3.573	3.390	3.624	3.754
Fe3+	0.502	0.471	0.481	0.519	0.484	0.617	0.505	0.573	0.562	0.450	0.513	0.581
Ti	0.393	0.441	0.327	0.363	0.272	0.365	0.253	0.319	0.349	0.319	0.458	0.411
Nb	1.323	1.404	1.288	1.296	1.113	1.103	1.214	1.201	1.100	1.125	0.904	0.954
Ta	7.225	7.061	7.142	7.202	7.304	7.310	7.458	7.500	7.571	7.541	7.652	7.608
Sn	2.523	2.575	2.715	2.586	2.809	2.571	2.546	2.375	2.377	2.528	2.449	2.421
W	0.024	0.036	0.029	0.024	0.018	0.020	0.020	0.029	0.036	0.031	0.023	0.024
Pb	0.003	0.002	0.002	0.003	0.002	0.002	0.006	0.006	0.006	0.003	0.002	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.002	0.002	0.000	0.000
Sc	0.011	0.011	0.019	0.011	0.000	0.011	0.000	0.000	0.000	0.000		
Sb	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000		
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.003		
Total	16.000	16.000	16.007	16.000	16.016	16.090	16.000	16.000	16.000	16.000	16.000	16.000
Comments:					inclusion in cass.	JB & JC rimmed with microlite					KA & KB same grain from aplite	
	wodginite				Fe wodginite	wodginite					wodginite	

Wodginite Group

Raw data	Marko's peg. 94-44E				Marko's pegmatite 94-44I								
	KH	KK	#1	#2	#3	#4	QG	QI	QK	QL	QN	SY	SZ
FeO	2.46	2.37	8.41	7.42	7.16	6.74	5.91	8.49	7.54	9.02	4.92	9.18	8.93
MnO	9.97	10.23	4.44	4.80	5.15	5.38	6.96	4.94	5.09	4.47	7.24	4.03	4.00
TiO2	1.19	1.16	6.85	5.63	7.04	4.31	5.02	7.90	6.33	6.42	1.67	6.74	4.86
Nb2O5	6.08	6.62	12.20	7.95	8.37	6.05	7.54	11.11	9.36	12.10	1.57	9.23	5.15
Ta2O5	64.04	64.10	57.80	61.83	60.95	64.32	62.08	57.82	56.63	57.35	68.06	60.18	64.44
SnO2	14.56	15.00	9.44	10.10	9.06	11.91	11.02	8.47	13.38	9.00	14.48	9.19	11.03
WO3	0.29	0.20	0.72	0.67	0.64	0.44	0.65	0.49	0.55	0.41	0.45	0.31	0.42
PbO	0.02	0.00	0.00	0.00	0.04	0.01	0.03	0.02	0.07	0.05	0.02	0.05	0.05
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.09
Sc2O3			0.36	0.06	0.14	0.17						0.08	0.05
Sb2O3			0.00	0.00	0.00	0.00						0.00	0.00
Bi2O3			0.00	0.03	0.00	0.00						0.02	0.05
Total	98.61	99.68	100.21	98.49	98.56	99.33	99.21	99.24	98.95	98.83	98.41	99.09	98.97
Recalculated	94-44E				94-44i								
oxides	KH	KK	#1	#2	#3	#4	QG	QI	QK	QL	QN	SY	SZ
Li2O	0.05	0.04	0.01	0.07	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.92	0.84	7.81	6.59	6.61	5.93	4.76	7.57	7.16	7.77	3.59	8.19	7.73
MnO	9.97	10.23	4.44	4.80	5.15	5.38	6.96	4.94	5.09	4.47	7.24	4.03	4.00
Fe2O3	1.70	1.69	0.63	0.90	0.60	0.88	1.27	1.018	0.417	1.381	1.47	1.08	1.32
TiO2	1.19	1.16	6.85	5.63	7.04	4.31	5.02	7.90	6.33	6.42	1.67	6.74	4.86
Nb2O5	6.08	6.62	12.20	7.95	8.37	6.05	7.54	11.11	9.36	12.10	1.57	9.23	5.15
Ta2O5	64.04	64.10	57.80	61.83	60.95	64.32	62.08	57.82	56.63	57.35	68.06	60.18	64.44
SnO2	14.56	15.00	9.44	10.10	9.06	11.91	11.02	8.47	13.38	9.00	14.48	9.19	11.03
WO3	0.29	0.20	0.72	0.67	0.64	0.44	0.65	0.49	0.55	0.41	0.45	0.31	0.42
PbO	0.02	0.00	0.00	0.00	0.04	0.01	0.03	0.02	0.07	0.05	0.02	0.05	0.05
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.09
Sc2O3			0.36	0.06	0.14	0.17						0.08	0.05
Sb2O3			0.00	0.00	0.00	0.00						0.00	0.00
Bi2O3			0.00	0.03	0.00	0.00						0.02	0.05
Total	98.82	99.88	100.26	98.62	98.63	99.44	99.34	99.33	98.99	98.96	98.55	99.28	99.19
Structural formulae based on 32 oxygens													
Li	0.080	0.068	0.021	0.107	0.035	0.077	0.000	0.000	0.000	0.000	0.007	0.000	0.000
Fe2+	0.328	0.297	2.528	2.242	2.214	2.047	1.617	2.455	2.382	2.548	1.312	2.718	2.672
Mn	3.590	3.635	1.451	1.651	1.746	1.875	2.391	1.622	1.714	1.483	2.678	1.353	1.398
Fe3+	0.547	0.535	0.182	0.276	0.181	0.275	0.388	0.297	0.125	0.408	0.485	0.324	0.409
Ti	0.380	0.366	1.987	1.716	2.117	1.336	1.531	2.303	1.893	1.891	0.549	2.008	1.508
Nb	1.169	1.256	2.127	1.457	1.513	1.127	1.383	1.947	1.682	2.143	0.310	1.653	0.961
Ta	7.404	7.313	6.060	6.821	6.628	7.201	6.848	6.095	6.123	6.110	8.084	6.485	7.231
Sn	2.468	2.509	1.451	1.634	1.444	1.955	1.782	1.309	2.121	1.406	2.522	1.452	1.815
W	0.032	0.022	0.072	0.071	0.067	0.047	0.068	0.049	0.057	0.042	0.051	0.032	0.045
Pb	0.002	0.000	0.000	0.000	0.005	0.001	0.003	0.002	0.007	0.005	0.002	0.005	0.006
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.008
Sc			0.121	0.022	0.050	0.060						0.028	0.018
Sb			0.000	0.000	0.000	0.000						0.000	0.000
Bi			0.000	0.003	0.000	0.000						0.002	0.005
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.011	16.079	16.103	16.036	16.000	16.076	16.076
Comments:	partially replaced by microlite close to aplite		all data from single grain with patchy zonation FeTi wodginite occurs at margin										
	wodginite		FeTi wodg.	FeTi wodg.	wodg.		Fe wodg.	wodg.		Fe wodg.			
			Fe wodg.	Fe wodg.			FeTi wodg.	FeTi wodg.				FeTi wodg.	

Wodginite Group

Marko's pegmatite														
94-44i														
Raw data	TB	TC	TQZ	TQL	TSF	TQA	TQB	TSG	TQC	TSH	TSJ	TQE	TSK	TSL
FeO	4.66	4.73	9.05	8.44	8.59	8.57	7.46	7.27	6.87	5.11	3.62	1.66	3.98	3.34
MnO	8.14	8.53	4.24	4.74	4.52	4.73	5.56	5.94	6.02	7.30	8.65	10.58	8.23	8.79
TiO2	4.43	4.43	6.11	4.93	5.42	6.43	4.81	5.53	4.51	2.84	2.60	0.53	1.72	2.36
Nb2O5	6.26	7.01	9.77	8.12	9.19	9.98	7.89	9.27	7.23	4.60	4.10	3.32	2.47	2.19
Ta2O5	62.34	63.15	60.74	61.54	61.01	59.44	62.25	60.47	62.60	64.91	65.05	65.95	67.05	67.78
SnO2	11.80	11.23	9.80	11.01	10.43	9.64	11.22	10.30	11.51	13.29	14.17	15.46	14.37	13.83
WO3	0.53	0.59	0.55	0.47	0.51	0.43	0.60	0.55	0.46	0.44	0.57	1.02	0.54	0.69
PbO	0.07	0.02	0.12	0.08	0.08	0.08	0.10	0.07	0.02	0.02	0.02	0.00	0.00	0.00
ThO2	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
UO2	0.09	0.00	0.08	0.12	0.12	0.09	0.08	0.06	0.09	0.06	0.03	0.03	0.02	0.00
Sc2O3	0.05	0.02	0.06	0.03	0.03	0.08	0.03	0.06	0.03	0.05	0.02	0.03	0.03	0.03
Sb2O3	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.01
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.00	0.09	0.02
Total	98.33	99.70	100.46	99.45	99.87	99.39	99.97	99.46	99.31	98.57	98.81	98.55	98.41	98.98

Recalculated														
94-44i														
oxides	TB	TC	TQZ	TQL	TSF	TQA	TQB	TSG	TQC	TSH	TSJ	TQE	TSK	TSL
Li2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.02
FeO	3.48	3.29	7.93	7.17	7.44	7.52	6.26	6.08	5.68	3.89	2.48	0.08	2.66	2.12
MnO	8.14	8.53	4.24	4.74	4.52	4.73	5.56	5.94	6.02	7.30	8.65	10.58	8.23	8.79
Fe2O3	1.30	1.60	1.22	1.39	1.27	1.16	1.33	1.31	1.31	1.34	1.26	1.75	1.46	1.34
TiO2	4.43	4.43	6.11	4.93	5.42	6.43	4.81	5.53	4.51	2.84	2.60	0.53	1.72	2.36
Nb2O5	6.26	7.01	9.77	8.12	9.19	9.98	7.89	9.27	7.23	4.60	4.10	3.32	2.47	2.19
Ta2O5	62.34	63.15	60.74	61.54	61.01	59.44	62.25	60.47	62.60	64.91	65.05	65.95	67.05	67.78
SnO2	11.80	11.23	9.80	11.01	10.43	9.64	11.22	10.30	11.51	13.29	14.17	15.46	14.37	13.83
WO3	0.53	0.59	0.55	0.47	0.51	0.43	0.60	0.55	0.46	0.44	0.57	1.02	0.54	0.69
PbO	0.07	0.02	0.12	0.08	0.08	0.08	0.10	0.07	0.02	0.02	0.02	0.00	0.00	0.00
ThO2	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
UO2	0.09	0.00	0.08	0.12	0.12	0.09	0.08	0.06	0.09	0.06	0.03	0.03	0.02	0.00
Sc2O3	0.05	0.02	0.06	0.03	0.03	0.08	0.03	0.06	0.03	0.05	0.02	0.03	0.03	0.03
Sb2O3	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.01
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.00	0.09	0.02
Total	98.52	99.89	100.65	99.63	100.04	99.61	100.14	99.68	99.46	98.75	98.97	98.79	98.67	99.19

Structural formulae based on 32 oxygens

Li	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.078	0.010	0.038
Fe2+	1.206	1.118	2.608	2.424	2.480	2.482	2.110	2.029	1.940	1.380	0.883	0.029	0.967	0.764
Mn	2.852	2.935	1.409	1.620	1.525	1.579	1.897	2.005	2.079	2.617	3.110	3.894	3.023	3.198
Fe3+	0.406	0.489	0.362	0.424	0.381	0.344	0.402	0.394	0.403	0.429	0.402	0.575	0.477	0.435
Ti	1.378	1.353	1.803	1.496	1.623	1.906	1.457	1.657	1.383	0.904	0.830	0.173	0.561	0.762
Nb	1.171	1.288	1.733	1.481	1.655	1.779	1.437	1.670	1.333	0.880	0.787	0.652	0.484	0.425
Ta	7.012	6.977	6.482	6.753	6.608	6.372	6.818	6.554	6.942	7.472	7.508	7.792	7.907	7.917
Sn	1.946	1.819	1.533	1.772	1.656	1.515	1.802	1.637	1.872	2.243	2.398	2.678	2.485	2.369
W	0.057	0.062	0.056	0.049	0.053	0.044	0.063	0.057	0.049	0.048	0.063	0.115	0.061	0.077
Pb	0.008	0.002	0.013	0.009	0.009	0.008	0.011	0.008	0.002	0.002	0.002	0.000	0.000	0.000
Th	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000
U	0.008	0.000	0.007	0.011	0.011	0.008	0.007	0.005	0.008	0.006	0.003	0.003	0.002	0.000
Sc	0.018	0.007	0.021	0.011	0.010	0.027	0.011	0.021	0.011	0.018	0.007	0.011	0.011	0.011
Sb	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.002
Bi	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.002	0.000	0.010	0.002
Total	16.066	16.056	16.030	16.053	16.014	16.069	16.018	16.042	16.021	16.000	16.000	16.000	16.000	16.000

Comments: all data from single grain with patchy zonation core of crystal
FeTi wodginite occurs at margin

wodg.	Fe wodg.	Fe wodg.	Fe wodg.	wodg.	wodg.	wodg.	wodg.
wodg.	Fe wodg.	FeTi wodg.	Fe wodg.	wodg.	wodg.	wodg.	wodg.

Wodginite Group

Raw data	Marko's pegmatite 94-44I									Marko's pegmatite 94-44J			
	TQF	TSM	TQP	TQS	TQT	TQU	TSU	TSV	TQW	SK	ZI	ZJ	ZK
FeO	3.26	3.50	4.27	7.56	7.01	7.70	6.96	8.58	10.07	7.78	8.40	7.63	8.52
MnO	8.76	8.83	8.18	5.41	5.78	5.50	5.90	4.77	3.90	5.61	5.22	6.69	5.66
TiO2	2.14	2.09	3.37	6.27	6.66	7.73	5.68	7.57	8.14	8.27	8.11	8.21	9.01
Nb2O5	2.01	2.05	3.30	8.55	7.05	9.81	6.52	12.94	15.74	10.30	13.55	13.85	13.75
Ta2O5	67.38	67.72	65.86	60.73	62.18	58.69	62.76	55.99	53.29	59.92	52.46	53.57	55.49
SnO2	13.85	13.39	12.84	9.40	9.12	8.71	10.27	8.65	8.30	8.39	11.13	8.49	8.13
WO3	0.65	0.50	0.57	0.45	0.48	0.37	0.75	0.46	0.34	0.00	0.12	0.04	0.11
PbO	0.00	0.00	0.02	0.03	0.03	0.03	0.00	0.08	0.11	0.03	0.05	0.08	0.05
ThO2	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.02	0.03
UO2	0.05	0.05	0.12	0.05	0.08	0.06	0.06	0.12	0.23	0.00	0.00	0.08	0.00
Sc2O3	0.03	0.03	0.05	0.06	0.06	0.06	0.03	0.06	0.05				
Sb2O3	0.10	0.00	0.39	0.05	0.05	0.02	0.02	0.03	0.05				
Bi2O3	0.02	0.05	0.05	0.03	0.02	0.03	0.00	0.00	0.02				
Total	98.11	98.13	98.53	98.45	98.39	98.64	98.90	99.16	100.12	100.30	99.05	98.66	100.75
Recalculated oxides	94-44i												
	TQF	TSM	TQP	TQS	TQT	TQU	TSU	TSV	TQW	SK	ZI	ZJ	ZK
Li2O	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	2.06	2.08	3.19	6.55	6.12	6.89	5.89	7.70	9.08	7.00	7.82	6.40	7.57
MnO	8.76	8.83	8.18	5.41	5.78	5.50	5.90	4.77	3.90	5.61	5.22	6.69	5.66
Fe2O3	1.33	1.57	1.19	1.11	0.97	0.89	1.18	0.97	1.09	0.86	0.64	1.36	1.05
TiO2	2.14	2.09	3.37	6.27	6.66	7.73	5.68	7.57	8.14	8.27	8.11	8.21	9.01
Nb2O5	2.01	2.05	3.30	8.55	7.05	9.81	6.52	12.94	15.74	10.30	13.55	13.85	13.75
Ta2O5	67.38	67.72	65.86	60.73	62.18	58.69	62.76	55.99	53.29	59.92	52.46	53.57	55.49
SnO2	13.85	13.39	12.84	9.40	9.12	8.71	10.27	8.65	8.30	8.39	11.13	8.49	8.13
WO3	0.65	0.50	0.57	0.45	0.48	0.37	0.75	0.46	0.34	0.00	0.12	0.04	0.11
PbO	0.00	0.00	0.02	0.03	0.03	0.03	0.00	0.08	0.11	0.03	0.05	0.08	0.05
ThO2	0.01	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.02	0.03
UO2	0.05	0.05	0.12	0.05	0.08	0.06	0.06	0.12	0.23	0.00	0.00	0.08	0.00
Sc2O3	0.03	0.03	0.05	0.06	0.06	0.06	0.03	0.06	0.05				
Sb2O3	0.10	0.00	0.39	0.05	0.05	0.02	0.02	0.03	0.05				
Bi2O3	0.02	0.05	0.05	0.03	0.02	0.03	0.00	0.00	0.02				
Total	98.40	98.36	99.13	98.69	98.61	98.83	99.06	99.34	100.34	100.38	99.11	98.79	100.85
Structural formulae based on 32 oxygens													
Li	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe2+	0.749	0.758	1.132	2.203	2.072	2.267	2.007	2.484	2.844	2.257	2.497	2.046	2.365
Mn	3.223	3.250	2.933	1.840	1.978	1.831	2.032	1.556	1.236	1.830	1.687	2.163	1.790
Fe3+	0.436	0.514	0.380	0.335	0.297	0.263	0.360	0.280	0.307	0.248	0.184	0.390	0.294
Ti	0.699	0.683	1.073	1.893	2.024	2.284	1.737	2.193	2.291	2.395	2.327	2.356	2.529
Nb	0.395	0.403	0.632	1.552	1.288	1.743	1.199	2.253	2.663	1.793	2.338	2.390	2.320
Ta	7.961	8.002	7.582	6.631	6.833	6.272	6.940	5.865	5.423	6.275	5.444	5.560	5.633
Sn	2.399	2.320	2.167	1.505	1.469	1.365	1.665	1.328	1.238	1.288	1.694	1.292	1.210
W	0.073	0.056	0.063	0.047	0.050	0.038	0.079	0.046	0.033	0.000	0.012	0.004	0.011
Pb	0.000	0.000	0.002	0.003	0.003	0.003	0.000	0.008	0.011	0.003	0.005	0.008	0.005
Th	0.001	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.001	0.002	0.003
U	0.005	0.005	0.011	0.004	0.007	0.005	0.005	0.010	0.019	0.000	0.000	0.007	0.000
Sc	0.011	0.011	0.018	0.021	0.021	0.021	0.011	0.020	0.016				
Sb	0.018	0.000	0.068	0.008	0.008	0.003	0.003	0.005	0.008				
Bi	0.002	0.006	0.005	0.003	0.002	0.003	0.000	0.000	0.002				
Total	16.000	16.007	16.067	16.046	16.054	16.101	16.039	16.048	16.091	16.090	16.189	16.216	16.160
Comments:	all data from single grain with patchy zonation												
	FeTi wodg. occurs at margin									inclusion 1 - SK, ZI, ZJ, ZK			
	220 µm												
	wodg.	wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.
	wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	FeTi wodg.	Ti wodg.		

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Marko's pegmatite															
94-44J															
Raw data	YH	YI	YJ	YK	YL	YM	ZL	ZP	ZQ	ZS	ZT	YN	YO	YP	
FeO	11.11	11.08	10.27	5.63	5.35	6.13	5.41	7.05	6.96	7.15	6.38	6.68	6.13	6.67	
MnO	2.24	2.06	2.92	7.40	7.63	6.89	7.31	6.51	6.63	6.91	7.23	6.26	6.96	6.30	
TiO2	7.92	7.50	7.54	6.98	7.79	7.11	7.32	8.65	9.17	8.91	9.12	8.65	8.58	8.54	
Nb2O5	13.37	12.47	12.96	12.55	12.62	11.44	12.12	13.18	13.89	13.23	13.45	13.45	12.81	14.01	
Ta2O5	56.35	58.85	58.05	58.47	58.04	59.85	56.97	56.81	55.13	54.71	54.54	57.53	57.52	56.44	
SnO2	8.35	8.36	8.76	9.50	8.98	9.13	10.73	8.10	8.10	7.78	7.97	7.92	8.24	8.11	
WO3	0.05	0.02	0.00	0.00	0.00	0.06	0.00	0.09	0.06	0.06	0.12	0.01	0.04	0.06	
PbO	0.02	0.02	0.03	0.10	0.07	0.05	0.02	0.03	0.07	0.03	0.05	0.07	0.07	0.03	
ThO2	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.01	0.01	0.00	0.00	0.02	0.00	
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00	
Sc2O3															
Sb2O3															
Bi2O3															
Total	99.42	100.36	100.53	100.63	100.48	100.67	99.90	100.49	100.02	98.79	98.88	100.57	100.37	100.16	
Recalculated															
94-44J															
oxides	YH	YI	YJ	YK	YL	YM	ZL	ZP	ZQ	ZS	ZT	YN	YO	YP	
Li2O	0.00	0.02	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02	
FeO	10.31	10.25	9.50	4.84	4.74	5.33	5.02	6.30	6.31	6.13	5.66	6.18	5.59	6.16	
MnO	2.24	2.06	2.92	7.40	7.63	6.89	7.31	6.51	6.63	6.91	7.23	6.26	6.96	6.30	
Fe2O3	0.89	0.90	0.84	0.87	0.67	0.88	0.43	0.83	0.71	1.12	0.80	0.55	0.60	0.56	
TiO2	7.92	7.50	7.54	6.98	7.79	7.11	7.32	8.65	9.17	8.91	9.12	8.65	8.58	8.54	
Nb2O5	13.37	12.47	12.96	12.55	12.62	11.44	12.12	13.18	13.89	13.23	13.45	13.45	12.81	14.01	
Ta2O5	56.35	58.85	58.05	58.47	58.04	59.85	56.97	56.81	55.13	54.71	54.54	57.53	57.52	56.44	
SnO2	8.35	8.36	8.76	9.50	8.98	9.13	10.73	8.10	8.10	7.78	7.97	7.92	8.24	8.11	
WO3	0.05	0.02	0.00	0.00	0.00	0.06	0.00	0.09	0.06	0.06	0.12	0.01	0.04	0.06	
PbO	0.02	0.02	0.03	0.10	0.07	0.05	0.02	0.03	0.07	0.03	0.05	0.07	0.07	0.03	
ThO2	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.01	0.01	0.00	0.00	0.02	0.00	
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00	
Sc2O3															
Sb2O3															
Bi2O3															
Total	99.50	100.46	100.62	100.73	100.55	100.77	99.94	100.57	100.09	98.90	98.96	100.64	100.43	100.23	
Structural formulae based on 32 oxygens															
Li	0.000	0.037	0.017	0.027	0.010	0.023	0.000	0.000	0.000	0.000	0.000	0.040	0.000	0.036	
Fe2+	3.303	3.292	3.036	1.557	1.516	1.721	1.622	1.988	1.984	1.954	1.798	1.952	1.774	1.946	
Mn	0.727	0.669	0.944	2.406	2.467	2.251	2.390	2.080	2.109	2.228	2.327	2.001	2.236	2.015	
Fe3+	0.255	0.260	0.242	0.250	0.192	0.256	0.125	0.236	0.202	0.322	0.229	0.156	0.171	0.160	
Ti	2.281	2.162	2.164	2.015	2.237	2.062	2.125	2.454	2.590	2.551	2.606	2.454	2.447	2.425	
Nb	2.315	2.161	2.236	2.178	2.178	1.994	2.115	2.248	2.358	2.277	2.310	2.294	2.197	2.392	
Ta	5.868	6.136	6.025	6.103	6.026	6.277	5.981	5.828	5.631	5.663	5.635	5.903	5.933	5.796	
Sn	1.275	1.278	1.333	1.454	1.367	1.404	1.652	1.218	1.213	1.181	1.207	1.192	1.246	1.221	
W	0.005	0.002	0.000	0.000	0.000	0.006	0.000	0.009	0.006	0.006	0.012	0.001	0.004	0.006	
Pb	0.002	0.002	0.003	0.010	0.007	0.005	0.002	0.003	0.007	0.003	0.005	0.007	0.007	0.003	
Th	0.001	0.000	0.000	0.000	0.000	0.001	0.002	0.003	0.001	0.001	0.000	0.000	0.002	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.002	0.000	0.000	0.000	
Sc															
Sb															
Bi															
Total	16.031	16.000	16.000	16.000	16.000	16.000	16.014	16.071	16.101	16.185	16.130	16.000	16.017	16.000	
Comments:	all data from zoned inclusions in a cm sized cassiterite associated with antimonian microlite														
	inclusion 2 - YH, YI, YJ				inclusion 3 - YK, YL, YM, ZL				inclusion 4 - ZP, ZQ, ZS, ZT, YN, YO, YP, YW						
	200 µm				80 µm				200 µm						
	FeTi wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		
	FeTi wodg.		FeTi wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		

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Marko's pegmatite															
94-44J															
Raw data	YW	ZA	ZB	ZC	ZD	ZE	ZF	YA	YB	ZY	ZZ	YU	YV	YQ	
FeO	6.83	6.79	5.51	4.57	7.85	7.23	7.22	4.65	5.54	5.11	5.21	6.76	7.66	8.87	
MnO	6.02	6.53	7.79	9.49	6.16	6.61	6.56	8.56	7.84	8.32	8.32	6.39	5.65	4.51	
TiO2	8.06	8.73	9.25	9.84	8.20	9.48	8.19	7.88	7.40	6.90	7.46	7.91	8.25	7.89	
Nb2O5	13.23	14.57	15.20	15.66	14.61	14.76	14.55	12.47	13.54	13.00	12.49	14.28	15.35	13.75	
Ta2O5	58.07	56.15	54.44	53.68	54.98	53.37	54.11	55.76	56.60	55.62	55.39	56.08	55.22	56.75	
SnO2	8.43	7.49	7.56	6.85	8.65	7.41	8.47	10.02	9.22	9.97	10.06	8.45	8.49	8.52	
WO3	0.09	0.01	0.00	0.00	0.13	0.06	0.04	0.13	0.00	0.01	0.07	0.05	0.02	0.05	
PbO	0.02	0.02	0.08	0.03	0.08	0.07	0.05	0.08	0.02	0.07	0.03	0.07	0.07	0.03	
ThO2	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	
UO2	0.00	0.00	0.00	0.02	0.06	0.05	0.02	0.00	0.00	0.05	0.00	0.00	0.00	0.00	
Sc2O3															
Sb2O3															
Bi2O3															
Total	100.75	100.29	99.84	100.16	100.72	99.05	99.21	99.55	100.16	99.06	99.03	100.00	100.71	100.39	
Recalculated	94-44J														
oxides	YW	ZA	ZB	ZC	ZD	ZE	ZF	YA	YB	ZY	ZZ	YU	YV	YQ	
Li2O	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	
FeO	6.26	6.12	4.97	3.74	6.85	6.45	6.28	4.05	4.69	4.16	4.35	6.05	7.01	8.08	
MnO	6.02	6.53	7.79	9.49	6.16	6.61	6.56	8.56	7.84	8.32	8.32	6.39	5.65	4.51	
Fe2O3	0.62	0.74	0.59	0.92	1.10	0.86	1.04	0.67	0.94	1.05	0.95	0.78	0.72	0.87	
TiO2	8.06	8.73	9.25	9.84	8.20	9.48	8.19	7.88	7.40	6.90	7.46	7.91	8.25	7.89	
Nb2O5	13.23	14.57	15.20	15.66	14.61	14.76	14.55	12.47	13.54	13.00	12.49	14.28	15.35	13.75	
Ta2O5	58.07	56.15	54.44	53.68	54.98	53.37	54.11	55.76	56.60	55.62	55.39	56.08	55.22	56.75	
SnO2	8.43	7.49	7.56	6.85	8.65	7.41	8.47	10.02	9.22	9.97	10.06	8.45	8.49	8.52	
WO3	0.09	0.01	0.00	0.00	0.13	0.06	0.04	0.13	0.00	0.01	0.07	0.05	0.02	0.05	
PbO	0.02	0.02	0.08	0.03	0.08	0.07	0.05	0.08	0.02	0.07	0.03	0.07	0.07	0.03	
ThO2	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	
UO2	0.00	0.00	0.00	0.02	0.06	0.05	0.02	0.00	0.00	0.05	0.00	0.00	0.00	0.00	
Sc2O3															
Sb2O3															
Bi2O3															
Total	100.85	100.36	99.90	100.25	100.82	99.13	99.31	99.61	100.25	99.16	99.12	100.08	100.78	100.47	
Structural formulae based on 32 oxygens															
Li	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.010	0.000	
Fe2+	1.986	1.923	1.556	1.156	2.146	2.027	1.993	1.300	1.497	1.348	1.406	1.921	2.193	2.564	
Mn	1.931	2.076	2.467	2.967	1.953	2.103	2.108	2.783	2.533	2.730	2.722	2.053	1.789	1.448	
Fe3+	0.177	0.209	0.167	0.255	0.311	0.244	0.298	0.193	0.270	0.308	0.277	0.224	0.202	0.248	
Ti	2.295	2.464	2.601	2.732	2.309	2.678	2.337	2.275	2.123	2.010	2.167	2.257	2.320	2.250	
Nb	2.265	2.473	2.569	2.613	2.473	2.506	2.496	2.164	2.335	2.277	2.181	2.449	2.595	2.357	
Ta	5.981	5.732	5.535	5.389	5.598	5.451	5.583	5.821	5.871	5.859	5.819	5.786	5.615	5.851	
Sn	1.273	1.121	1.127	1.008	1.291	1.110	1.281	1.534	1.402	1.540	1.550	1.278	1.266	1.288	
W	0.009	0.001	0.000	0.000	0.013	0.006	0.004	0.013	0.000	0.001	0.007	0.005	0.002	0.005	
Pb	0.002	0.002	0.008	0.003	0.008	0.007	0.005	0.008	0.002	0.007	0.003	0.007	0.007	0.003	
Th	0.000	0.000	0.001	0.002	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.002	
U	0.000	0.000	0.000	0.002	0.005	0.004	0.002	0.000	0.000	0.004	0.000	0.000	0.000	0.000	
Sc															
Sb															
Bi															
Total	16.000	16.001	16.031	16.126	16.108	16.137	16.106	16.091	16.032	16.085	16.132	16.000	16.000	16.015	
Comments:	all data from zoned inclusions in a cm sized cassiterite associated with antimonian microlite														
	inclusion 5 - ZA, ZB, ZC, ZD, ZE, ZF					inclusion 6 - YA, ZY, ZZ					inclusion 7 - YU, YV				
	200 µm					100 µm					100 µm				
	Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		Ti wodg.		FeTi wodg.		
	FeTi wodg.		Ti wodg.		FeTi wodg.		Ti wodg.		Ti wodg.		Ti wodg.		FeTi wodg.		

Wodginite Group

Raw data	Marko's pegmatite 94-44J					Marko's pegmatite 94-44K						
	YR	YS	YT	ZW	ZX	CG	CH	CJ	CT	CV	CX	CY
FeO	8.86	7.64	6.41	5.73	5.83	10.67	9.70	10.27	7.33	10.43	5.87	11.04
MnO	4.40	5.73	6.65	7.43	7.69	3.01	3.12	3.30	5.90	2.90	7.60	2.73
TiO2	7.86	7.53	7.93	8.49	7.52	7.10	7.32	7.60	7.42	7.61	8.40	8.20
Nb2O5	13.57	13.14	12.95	12.64	12.92	13.90	12.86	12.59	13.53	13.64	14.70	15.90
Ta2O5	57.17	57.73	57.50	57.27	56.21	55.75	56.72	56.71	56.97	55.58	54.31	53.53
SnO2	8.38	8.81	8.54	8.27	8.85	9.30	8.58	8.47	8.37	8.42	8.12	8.23
WO3	0.08	0.00	0.00	0.00	0.14	0.06	0.05	0.03	0.00	0.00	0.04	0.00
PbO	0.08	0.03	0.07	0.07	0.03	0.03	0.03	0.02	0.02	0.03	0.05	0.08
ThO2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3												
Sb2O3												
Bi2O3												
Total	100.40	100.61	100.05	99.90	99.28	99.82	98.38	98.99	99.54	98.61	99.09	99.71
Recalculated												
oxides												
Li2O	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00
FeO	8.09	6.79	5.75	5.12	4.86	9.62	8.95	9.26	6.44	9.55	5.08	10.12
MnO	4.40	5.73	6.65	7.43	7.69	3.01	3.12	3.30	5.90	2.90	7.60	2.73
Fe2O3	0.85	0.94	0.73	0.67	1.07	1.15	0.81	1.11	0.98	0.97	0.87	1.01
TiO2	7.86	7.53	7.93	8.49	7.52	7.10	7.32	7.60	7.42	7.61	8.40	8.20
Nb2O5	13.57	13.14	12.95	12.64	12.92	13.90	12.86	12.59	13.53	13.64	14.70	15.90
Ta2O5	57.17	57.73	57.50	57.27	56.21	55.75	56.72	56.71	56.97	55.58	54.31	53.53
SnO2	8.38	8.81	8.54	8.27	8.85	9.30	8.58	8.47	8.37	8.42	8.12	8.23
WO3	0.08	0.00	0.00	0.00	0.14	0.06	0.05	0.03	0.00	0.00	0.04	0.00
PbO	0.08	0.03	0.07	0.07	0.03	0.03	0.03	0.02	0.02	0.03	0.05	0.08
ThO2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3												
Sb2O3												
Bi2O3												
Total	100.48	100.70	100.12	99.96	99.38	99.93	98.48	99.09	99.64	98.70	99.17	99.80
Structural formulae based on 32 oxygens												
Li	0.006	0.000	0.002	0.000	0.000	0.000	0.044	0.000	0.009	0.000	0.000	0.000
Fe2+	2.571	2.164	1.839	1.633	1.565	3.081	2.923	2.996	2.070	3.084	1.613	3.183
Mn	1.415	1.848	2.152	2.399	2.507	0.975	1.030	1.080	1.918	0.948	2.442	0.868
Fe3+	0.243	0.268	0.209	0.194	0.311	0.332	0.239	0.323	0.283	0.283	0.249	0.285
Ti	2.245	2.156	2.279	2.434	2.177	2.042	2.145	2.209	2.142	2.209	2.396	2.316
Nb	2.330	2.262	2.237	2.178	2.248	2.403	2.266	2.200	2.348	2.380	2.521	2.700
Ta	5.905	5.977	5.975	5.937	5.884	5.799	6.012	5.960	5.947	5.833	5.602	5.467
Sn	1.269	1.337	1.301	1.257	1.358	1.418	1.333	1.305	1.281	1.296	1.228	1.232
W	0.008	0.000	0.000	0.000	0.014	0.006	0.005	0.003	0.000	0.000	0.004	0.000
Pb	0.008	0.003	0.007	0.007	0.003	0.003	0.003	0.002	0.002	0.003	0.005	0.008
Th	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc												
Sb												
Bi												
Total	16.000	16.015	16.000	16.039	16.076	16.059	16.000	16.079	16.000	16.035	16.059	16.059
Comments:	CG - CY separate inclusions in large zoned cassiterite grain											
	inclusion 8 - YQ, YR											
	FeTi wodg. Ti wodg.											
	FeTi wodg. Ti wodg. Ti wodg. all FeTi wodgite except CX Ti wodg.											

Wodginite Group

Raw data	Marko's pegmatite 94-44K				Marko's pegmatite 94-44M				Marko's pegmatite 94-44P				
	QH	QI	QJ	QM	LA	LD	LE	LJ	LK	CB	CF	CG	CH
FeO	10.54	10.66	9.82	9.50	11.19	12.03	12.07	10.44	12.27	2.46	2.36	2.31	2.57
MnO	2.82	2.80	3.97	4.03	2.34	2.33	2.21	2.88	2.24	10.01	10.15	9.91	10.11
TiO2	8.04	8.13	7.52	8.52	7.82	8.61	8.31	7.92	8.86	1.21	1.28	1.06	1.30
Nb2O5	12.90	12.82	11.91	15.54	10.21	11.12	11.18	9.48	11.73	5.93	5.35	5.67	6.21
Ta2O5	56.54	56.27	56.77	53.20	59.20	57.70	57.06	59.59	56.34	66.00	67.11	65.90	65.28
SnO2	8.13	8.13	8.92	7.96	9.52	8.32	9.03	9.24	8.90	14.20	14.22	14.89	13.56
WO3	0.04	0.05	0.08	0.05	0.02	0.00	0.01	0.02	0.11	0.18	0.21	0.25	0.23
PbO	0.08	0.07	0.05	0.11	0.03	0.08	0.02	0.08	0.06	0.02	0.00	0.02	0.02
ThO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
UO2	0.05	0.12	0.11	0.08	0.09	0.03	0.08	0.09	0.09	0.00	0.00	0.00	0.00
Sc2O3	0.03	0.06	0.06	0.06	0.05	0.03	0.05	0.06	0.06				
Sb2O3	0.50	0.09	0.06	0.06	0.06	0.08	0.05	0.05	0.03				
Bi2O3													
Total	99.14	99.05	99.15	98.99	100.41	100.22	99.97	99.74	100.59	100.01	100.69	100.01	99.28
Recalculated oxides	94-44K				94-44M				94-44P				
	QH	QI	QJ	QM	LA	LD	LE	LJ	LK	CB	CF	CG	CH
Li2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.09	0.06
FeO	9.84	9.86	8.77	8.76	10.43	10.91	11.01	9.74	11.23	0.87	0.78	0.86	0.83
MnO	2.82	2.80	3.97	4.03	2.34	2.33	2.21	2.88	2.24	10.01	10.15	9.91	10.11
Fe2O3	0.75	0.88	1.15	0.81	0.83	1.22	1.16	0.77	1.13	1.76	1.75	1.60	1.93
TiO2	8.04	8.13	7.52	8.52	7.82	8.61	8.31	7.92	8.86	1.21	1.28	1.06	1.30
Nb2O5	12.90	12.82	11.91	15.54	10.21	11.12	11.18	9.48	11.73	5.93	5.35	5.67	6.21
Ta2O5	56.54	56.27	56.77	53.20	59.20	57.70	57.06	59.59	56.34	66.00	67.11	65.90	65.28
SnO2	8.13	8.13	8.92	7.96	9.52	8.32	9.03	9.24	8.90	14.20	14.22	14.89	13.56
WO3	0.04	0.05	0.08	0.05	0.02	0.00	0.01	0.02	0.11	0.18	0.21	0.25	0.23
PbO	0.08	0.07	0.05	0.11	0.03	0.08	0.02	0.08	0.06	0.02	0.00	0.02	0.02
ThO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
UO2	0.05	0.12	0.11	0.08	0.09	0.03	0.08	0.09	0.09	0.00	0.00	0.00	0.00
Sc2O3	0.03	0.06	0.06	0.06	0.05	0.03	0.05	0.06	0.06				
Sb2O3	0.50	0.09	0.06	0.06	0.06	0.08	0.05	0.05	0.03				
Bi2O3													
Total	99.72	99.27	99.37	99.18	100.59	100.43	100.17	99.92	100.78	100.25	100.93	100.25	99.52
Structural formulae based on 32 oxygens													
Li	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.129	0.159	0.095
Fe2+	3.162	3.170	2.842	2.769	3.368	3.480	3.527	3.177	3.550	0.306	0.273	0.304	0.292
Mn	0.915	0.911	1.301	1.288	0.765	0.753	0.715	0.949	0.715	3.560	3.597	3.535	3.611
Fe3+	0.216	0.254	0.335	0.230	0.242	0.352	0.333	0.225	0.321	0.558	0.552	0.509	0.614
Ti	2.317	2.348	2.187	2.418	2.268	2.466	2.390	2.320	2.514	0.382	0.403	0.336	0.412
Nb	2.235	2.226	2.083	2.652	1.780	1.915	1.933	1.670	2.001	1.126	1.012	1.080	1.184
Ta	5.892	5.877	5.972	5.461	6.211	5.978	5.934	6.312	5.782	7.537	7.637	7.548	7.485
Sn	1.242	1.245	1.376	1.198	1.464	1.264	1.377	1.435	1.340	2.378	2.373	2.500	2.280
W	0.004	0.005	0.008	0.005	0.002	0.000	0.001	0.002	0.011	0.020	0.023	0.027	0.025
Pb	0.008	0.007	0.005	0.011	0.003	0.008	0.002	0.008	0.006	0.002	0.000	0.002	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000
U	0.004	0.010	0.009	0.007	0.008	0.003	0.007	0.008	0.008	0.000	0.000	0.000	0.000
Sc	0.010	0.020	0.020	0.020	0.017	0.010	0.017	0.020	0.020				
Sb	0.079	0.014	0.010	0.009	0.010	0.013	0.008	0.008	0.005				
Bi													
Total	16.085	16.088	16.147	16.068	16.137	16.241	16.244	16.134	16.270	16.000	16.000	16.000	16.000
Comments:	QH - QJ same grain inclusion in large zoned cassiterite				separate inclusions in large cassiterite grain				four individual grains		marginally replaced with microlite		
	all ferrotitanowodginite				all ferrotitanowodginite				all wodginite				

Wodginite Group

Raw data	Marko's pegmatite 94-44R							Marko's pegmatite 94-44S					Marko's 94-44T	
	DI	YA	YB	YC	YD	YG	YH	DD	DE	DF	DG	DH	EA	
FeO	2.51	2.50	2.60	2.65	2.67	2.48	2.72	2.37	2.35	2.41	2.38	2.35	2.17	
MnO	10.05	9.91	10.20	10.15	9.86	10.12	9.93	9.98	9.67	9.68	9.99	9.91	10.21	
TiO2	1.23	1.13	1.29	1.11	1.14	1.11	0.95	1.11	1.14	1.29	1.16	1.14	1.20	
Nb2O5	5.92	5.81	6.15	6.46	6.31	6.46	6.76	5.95	5.82	5.90	6.11	5.91	4.90	
Ta2O5	66.14	65.06	65.17	64.53	64.88	64.08	63.21	65.03	65.50	64.92	64.72	64.76	65.95	
SnO2	14.17	15.05	13.81	14.12	14.60	15.18	14.94	14.71	15.03	14.48	14.30	14.80	14.82	
WO3	0.13	0.25	0.13	0.30	0.20	0.26	0.39	0.23	0.22	0.28	0.40	0.37	0.22	
PbO	0.03	0.05	0.02	0.10	0.07	0.08	0.03	0.07	0.05	0.08	0.10	0.00	0.00	
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
UO2	0.00	0.06	0.00	0.09	0.11	0.05	0.12	0.01	0.07	0.02	0.00	0.01	0.00	
Sc2O3		0.02	0.05	0.02	0.03	0.03	0.05							
Sb2O3		0.00	0.01	0.01	0.00	0.00	0.00							
Bi2O3		0.00	0.03	0.00	0.03	0.03	0.00							
Total	100.18	99.82	99.37	99.51	99.84	99.82	99.05	99.47	99.85	99.06	99.16	99.25	99.47	
Recalculated oxides	DI	YA	YB	YC	YD	YG	YH	DD	DE	DF	DG	DH	EA	
Li2O	0.07	0.05	0.02	0.03	0.05	0.03	0.03	0.07	0.11	0.09	0.08	0.08	0.05	
FeO	0.89	1.05	0.91	0.91	1.13	0.98	1.13	0.86	1.02	1.00	0.79	0.89	0.70	
MnO	10.05	9.91	10.20	10.15	9.86	10.12	9.93	9.98	9.67	9.68	9.99	9.91	10.21	
Fe2O3	1.79	1.61	1.88	1.93	1.70	1.66	1.76	1.67	1.47	1.56	1.76	1.62	1.63	
TiO2	1.23	1.13	1.29	1.11	1.14	1.11	0.95	1.11	1.14	1.29	1.16	1.14	1.20	
Nb2O5	5.92	5.81	6.15	6.46	6.31	6.46	6.76	5.95	5.82	5.90	6.11	5.91	4.90	
Ta2O5	66.14	65.06	65.17	64.53	64.88	64.08	63.21	65.03	65.50	64.92	64.72	64.76	65.95	
SnO2	14.17	15.05	13.81	14.12	14.60	15.18	14.94	14.71	15.03	14.48	14.30	14.80	14.82	
WO3	0.13	0.25	0.13	0.30	0.20	0.26	0.39	0.23	0.22	0.28	0.40	0.37	0.22	
PbO	0.03	0.05	0.02	0.10	0.07	0.08	0.03	0.07	0.05	0.08	0.10	0.00	0.00	
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
UO2	0.00	0.06	0.00	0.09	0.11	0.05	0.12	0.01	0.07	0.02	0.00	0.01	0.00	
Sc2O3		0.02	0.05	0.02	0.03	0.03	0.05							
Sb2O3		0.00	0.01	0.01	0.00	0.00	0.00							
Bi2O3		0.00	0.03	0.00	0.03	0.03	0.00							
Total	100.42	100.04	99.66	99.76	100.11	100.07	99.30	99.70	100.09	99.30	99.40	99.48	99.67	
Structural formulae based on 32 oxygens														
Li	0.114	0.088	0.038	0.050	0.087	0.048	0.046	0.115	0.182	0.161	0.128	0.134	0.077	
Fe2+	0.314	0.370	0.320	0.320	0.398	0.346	0.399	0.305	0.361	0.356	0.281	0.315	0.249	
Mn	3.569	3.537	3.640	3.619	3.508	3.597	3.552	3.572	3.452	3.474	3.579	3.552	3.674	
Fe3+	0.566	0.511	0.596	0.613	0.540	0.524	0.561	0.533	0.467	0.498	0.561	0.517	0.522	
Ti	0.388	0.358	0.409	0.351	0.360	0.350	0.302	0.353	0.361	0.411	0.369	0.363	0.383	
Nb	1.122	1.107	1.171	1.229	1.198	1.226	1.290	1.137	1.109	1.130	1.169	1.130	0.941	
Ta	7.541	7.455	7.466	7.386	7.410	7.313	7.259	7.473	7.506	7.481	7.445	7.451	7.619	
Sn	2.369	2.529	2.320	2.370	2.445	2.540	2.516	2.478	2.526	2.447	2.412	2.497	2.510	
W	0.014	0.027	0.014	0.033	0.022	0.028	0.043	0.025	0.024	0.031	0.044	0.041	0.024	
Pb	0.003	0.006	0.002	0.011	0.008	0.009	0.003	0.008	0.006	0.009	0.011	0.000	0.000	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.006	0.000	0.008	0.010	0.005	0.011	0.001	0.007	0.002	0.000	0.001	0.000	
Sc		0.007	0.018	0.007	0.011	0.011	0.018							
Sb		0.000	0.002	0.002	0.000	0.000	0.000							
Bi		0.000	0.003	0.000	0.003	0.003	0.000							
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	
Comments:	many grains are marginally replaced with microlite							DD - DH from same large grain associated with cassiterite						
	YA - YC same grain				YG & YH same grain									
	all wodginite							all wodginite				wodginite		

Wodginite Group

Raw data	Marko's peg. 94-44T		Marko's 94-44U	Marko's peg. 94-44V		Marko's pegmatite 94-44ii				Marko's pegmatite 94-44iii(V1)		
	EB	EE	XG	ED	EE	EA	EB	EC	ED	AA	AB	AC
FeO	2.48	2.10	4.33	2.21	2.78	2.41	2.37	2.39	2.58	2.39	2.65	2.30
MnO	9.94	10.03	7.81	10.46	10.41	9.73	9.59	9.66	9.81	9.67	9.83	9.92
TiO ₂	1.18	1.06	4.56	1.11	1.09	1.03	1.08	1.16	0.82	1.06	1.00	1.04
Nb ₂ O ₅	6.07	5.31	10.52	6.05	6.59	6.09	5.86	6.10	6.44	5.76	6.45	5.94
Ta ₂ O ₅	66.45	66.26	57.49	65.42	65.28	64.90	65.10	65.41	64.34	65.28	64.68	65.70
SnO ₂	14.45	15.12	12.02	14.90	14.63	14.79	14.55	14.11	14.90	14.88	14.08	14.68
WO ₃	0.29	0.26	0.39	0.14	0.12	0.29	0.37	0.36	0.67	0.38	0.41	0.29
PbO	0.00	0.03	0.03	0.02	0.03	0.05	0.07	0.05	0.05	0.12	0.03	0.03
ThO ₂	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.06	0.03	0.01	0.03	0.07
Sc ₂ O ₃			0.37			0.02	0.06	0.02	0.05	0.02	0.05	0.02
Sb ₂ O ₃			0.00									
Bi ₂ O ₃			0.05									
Total	100.86	100.17	97.63	100.32	100.94	99.35	99.02	99.30	99.64	99.55	99.16	99.97
Recalculated	94-44T		94-44U	94-44V		94-44ii				94-44iii(V1)		
oxides	EB	EE	XG	ED	EE	EA	EB	EC	ED	AA	AB	AC
Li ₂ O	0.10	0.10	0.02	0.04	0.00	0.10	0.11	0.13	0.09	0.10	0.08	0.10
FeO	0.93	0.71	3.74	0.63	0.97	0.97	0.99	0.91	0.99	0.98	0.99	0.83
MnO	9.94	10.03	7.81	10.46	10.41	9.73	9.59	9.66	9.81	9.67	9.83	9.92
Fe ₂ O ₃	1.71	1.53	0.63	1.75	2.00	1.58	1.52	1.63	1.75	1.55	1.84	1.63
TiO ₂	1.18	1.06	4.56	1.11	1.09	1.03	1.08	1.16	0.82	1.06	1.00	1.04
Nb ₂ O ₅	6.07	5.31	10.52	6.05	6.59	6.09	5.86	6.10	6.44	5.76	6.45	5.94
Ta ₂ O ₅	66.45	66.26	57.49	65.42	65.28	64.90	65.10	65.41	64.34	65.28	64.68	65.70
SnO ₂	14.45	15.12	12.02	14.90	14.63	14.79	14.55	14.11	14.90	14.88	14.08	14.68
WO ₃	0.29	0.26	0.39	0.14	0.12	0.29	0.37	0.36	0.67	0.38	0.41	0.29
PbO	0.00	0.03	0.03	0.02	0.03	0.05	0.07	0.05	0.05	0.12	0.03	0.03
ThO ₂	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
UO ₂	0.00	0.00	0.00	0.00	0.00	0.06	0.02	0.06	0.03	0.01	0.03	0.07
Sc ₂ O ₃			0.37			0.02	0.06	0.02	0.05	0.02	0.05	0.02
Sb ₂ O ₃			0.00									
Bi ₂ O ₃			0.05									
Total	101.12	100.41	97.62	100.53	101.14	99.61	99.33	99.60	99.94	99.82	99.46	100.24
Structural formulae based on 32 oxygens												
Li	0.172	0.163	0.032	0.065	0.000	0.163	0.192	0.214	0.146	0.173	0.131	0.170
Fe ²⁺	0.324	0.253	1.276	0.223	0.339	0.346	0.352	0.323	0.351	0.349	0.350	0.292
Mn	3.504	3.581	2.688	3.710	3.658	3.485	3.448	3.457	3.497	3.464	3.516	3.535
Fe ³⁺	0.539	0.487	0.194	0.551	0.626	0.506	0.489	0.521	0.557	0.496	0.586	0.517
Ti	0.369	0.336	1.394	0.350	0.340	0.328	0.345	0.369	0.260	0.337	0.318	0.329
Nb	1.142	1.012	1.932	1.145	1.236	1.164	1.124	1.165	1.225	1.101	1.231	1.130
Ta	7.521	7.595	6.355	7.450	7.365	7.463	7.514	7.515	7.364	7.507	7.428	7.516
Sn	2.398	2.541	1.948	2.488	2.420	2.494	2.462	2.377	2.500	2.509	2.371	2.462
W	0.031	0.028	0.041	0.015	0.013	0.032	0.041	0.039	0.073	0.042	0.045	0.032
Pb	0.000	0.003	0.004	0.002	0.003	0.006	0.008	0.006	0.006	0.014	0.003	0.003
Th	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.006	0.003	0.001	0.003	0.007
Sc			0.130			0.007	0.022	0.007	0.018	0.007	0.018	0.007
Sb			0.000									
Bi			0.005									
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	EB is marginally altered to microlite wodginite		inclusion in cassiterite	complex wodginite-microlite grain 50% of each wodginite		EA - EC same grain		ED partially altered to microlite		AA & AB same grain large, unzoned and unaltered all wodginite		

Wodginite Group

Raw data	Marko's peg. 94-44iii(V1)		Marko's pegmatite 94-44iii(V2)						Pegmatite 5 94-80D				
	AD	AE	IA	IC	ID	IE	IF	IG	GC	GD	GE	GF	GH
FeO	2.44	2.40	2.43	2.65	2.66	2.29	2.53	2.26	7.80	7.96	7.88	8.44	8.27
MnO	9.76	9.65	9.66	9.75	9.77	9.65	9.68	9.87	5.37	5.17	5.10	5.46	4.87
TiO2	0.98	1.01	1.03	0.95	1.00	1.04	1.24	0.98	1.00	1.06	1.67	1.22	1.27
Nb2O5	6.28	6.10	6.33	6.63	6.40	5.81	6.14	5.78	7.90	7.05	6.82	6.64	5.83
Ta2O5	64.05	64.61	65.18	64.61	64.60	65.49	65.72	65.31	59.91	63.59	62.97	63.03	63.33
SnO2	15.04	14.74	14.75	14.40	14.47	14.91	13.48	14.74	13.54	11.97	11.90	12.41	11.11
WO3	0.43	0.40	0.34	0.38	0.40	0.25	0.23	0.32	4.65	2.57	2.98	2.00	4.54
PbO	0.03	0.08	0.05	0.10	0.10	0.08	0.03	0.08	0.03	0.00	0.00	0.05	0.00
ThO2	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
UO2	0.06	0.08	0.04	0.06	0.14	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.05	0.02	0.05	0.03	0.02	0.02	0.02	0.03	0.12	0.26	0.00	0.00	0.24
Sb2O3									0.00	0.00	0.00	0.00	0.00
Bi2O3									0.00	0.01	0.00	0.00	0.00
Total	99.07	99.07	99.81	99.53	99.54	99.52	99.13	99.34	100.33	99.63	99.32	99.25	99.46
Recalculated	94-44iii(V1)		94-44iii(V2)						94-80D				
oxides	AD	AE	IA	IC	ID	IE	IF	IG	GC	GD	GE	GF	GH
Li2O	0.08	0.10	0.12	0.09	0.07	0.12	0.11	0.10	0.16	0.11	0.14	0.00	0.16
FeO	1.02	0.97	1.02	1.03	1.06	0.94	0.94	0.80	5.43	5.68	5.60	5.89	5.69
MnO	9.76	9.65	9.66	9.75	9.77	9.65	9.68	9.87	5.37	5.17	5.10	5.46	4.87
Fe2O3	1.57	1.58	1.55	1.78	1.77	1.49	1.76	1.61	2.58	2.47	2.48	2.81	2.78
TiO2	0.98	1.01	1.03	0.95	1.00	1.04	1.24	0.98	1.00	1.06	1.67	1.22	1.27
Nb2O5	6.28	6.10	6.33	6.63	6.40	5.81	6.14	5.78	7.90	7.05	6.82	6.64	5.83
Ta2O5	64.05	64.61	65.18	64.61	64.60	65.49	65.72	65.31	59.91	63.59	62.97	63.03	63.33
SnO2	15.04	14.74	14.75	14.40	14.47	14.91	13.48	14.74	13.54	11.97	11.90	12.41	11.11
WO3	0.43	0.40	0.34	0.38	0.40	0.25	0.23	0.32	4.65	2.57	2.98	2.00	4.54
PbO	0.03	0.08	0.05	0.10	0.10	0.08	0.03	0.08	0.03	0.00	0.00	0.05	0.00
ThO2	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
UO2	0.06	0.08	0.04	0.06	0.14	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.05	0.02	0.05	0.03	0.02	0.02	0.02	0.03	0.12	0.26	0.00	0.00	0.24
Sb2O3									0.00	0.00	0.00	0.00	0.00
Bi2O3									0.00	0.01	0.00	0.00	0.00
Total	99.35	99.34	100.12	99.81	99.80	99.80	99.43	99.62	100.68	99.93	99.66	99.51	99.83
Structural formulae based on 32 oxygens													
Li	0.136	0.180	0.196	0.147	0.127	0.200	0.196	0.163	0.259	0.185	0.243	0.000	0.273
Fe2+	0.361	0.345	0.360	0.365	0.374	0.334	0.333	0.285	1.874	1.993	1.959	2.067	2.004
Mn	3.500	3.466	3.438	3.476	3.488	3.457	3.467	3.543	1.865	1.822	1.798	1.937	1.723
Fe3+	0.502	0.506	0.494	0.567	0.564	0.476	0.561	0.516	0.801	0.780	0.781	0.889	0.882
Ti	0.312	0.322	0.325	0.301	0.317	0.331	0.394	0.312	0.309	0.333	0.521	0.384	0.400
Nb	1.202	1.169	1.202	1.262	1.219	1.111	1.174	1.107	1.464	1.326	1.282	1.256	1.100
Ta	7.374	7.451	7.448	7.395	7.404	7.533	7.558	7.527	6.677	7.202	7.122	7.180	7.190
Sn	2.539	2.492	2.471	2.417	2.432	2.515	2.273	2.491	2.212	1.987	1.973	2.073	1.849
W	0.047	0.044	0.037	0.041	0.044	0.027	0.025	0.035	0.494	0.277	0.321	0.217	0.491
Pb	0.003	0.009	0.006	0.011	0.011	0.009	0.003	0.009	0.003	0.000	0.000	0.006	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.006	0.008	0.004	0.006	0.013	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.018	0.007	0.018	0.011	0.007	0.007	0.007	0.011	0.044	0.094	0.001	0.000	0.088
Sb									0.000	0.000	0.000	0.000	0.000
Bi									0.000	0.001	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.010	16.000
Comments:	AC- AE	associated	IC - ID	IE & IF	GC - GH & GZ1 - GZ14 same grain								
	same grain	with	same grain	same grain	contains inclusions of uranmicrolite								
		Mn tantalite	large, unzoned and unaltered		all wodginite								
					all ferrowodginite								

Wodginite Group

Pegmatite 5													
94-80D													
Raw data	GZ1	GZ2	GZ3	GZ4	GZ5	GZ7	GZ8	GZ9	GZ10	GZ11	GZ12	GZ13	GZ14
FeO	7.67	7.96	8.29	8.00	8.36	8.08	7.74	8.35	8.41	8.46	8.59	8.38	7.80
MnO	5.31	5.31	5.02	5.07	4.96	5.12	5.06	4.86	4.89	4.89	4.85	5.05	5.17
TiO2	0.95	1.61	1.02	1.57	1.31	1.47	1.37	1.30	1.35	1.38	1.43	1.33	1.63
Nb2O5	7.16	6.80	6.80	5.56	6.31	6.74	5.07	5.84	5.84	7.12	6.87	6.84	6.78
Ta2O5	60.25	62.45	59.87	65.05	62.11	62.23	65.07	62.62	62.28	60.63	62.04	61.62	63.38
SnO2	12.84	11.13	12.60	10.81	11.10	11.74	11.09	10.99	10.85	10.94	10.78	10.89	11.57
WO3	4.96	3.40	4.67	2.27	4.23	3.04	2.57	4.31	4.74	4.44	4.71	4.83	2.77
PbO	0.02	0.02	0.00	0.08	0.01	0.01	0.00	0.01	0.08	0.00	0.02	0.00	0.10
ThO2	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
UO2	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Sc2O3	0.15	0.06	0.18	0.07	0.09	0.23	0.07	0.10	0.05	0.18	0.09	0.00	0.00
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.03	0.00	0.00	0.00
Total	99.30	98.74	98.45	98.49	98.48	98.66	98.06	98.38	98.50	98.07	99.38	98.93	99.35
Recalculated	94-80D												
oxides	GZ1	GZ2	GZ3	GZ4	GZ5	GZ7	GZ8	GZ9	GZ10	GZ11	GZ12	GZ13	GZ14
Li2O	0.18	0.12	0.11	0.10	0.13	0.08	0.13	0.15	0.15	0.13	0.16	0.17	0.14
FeO	5.22	5.44	5.76	5.61	5.66	5.79	5.40	5.67	5.61	5.79	5.78	5.49	5.48
MnO	5.31	5.31	5.02	5.07	4.96	5.12	5.06	4.86	4.89	4.89	4.85	5.05	5.17
Fe2O3	2.65	2.75	2.75	2.61	2.93	2.49	2.54	2.91	3.05	2.89	3.04	3.13	2.52
TiO2	0.95	1.61	1.02	1.57	1.31	1.47	1.37	1.30	1.35	1.38	1.43	1.33	1.63
Nb2O5	7.16	6.80	6.80	5.56	6.31	6.74	5.07	5.84	5.84	7.12	6.87	6.84	6.78
Ta2O5	60.25	62.45	59.87	65.05	62.11	62.23	65.07	62.62	62.28	60.63	62.04	61.62	63.38
SnO2	12.84	11.13	12.60	10.81	11.10	11.74	11.09	10.99	10.85	10.94	10.78	10.89	11.57
WO3	4.96	3.40	4.67	2.27	4.23	3.04	2.57	4.31	4.74	4.44	4.71	4.83	2.77
PbO	0.02	0.02	0.00	0.08	0.01	0.01	0.00	0.01	0.08	0.00	0.02	0.00	0.10
ThO2	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
UO2	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Sc2O3	0.15	0.06	0.18	0.07	0.09	0.23	0.07	0.10	0.05	0.18	0.09	0.00	0.00
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.03	0.00	0.00	0.00
Total	99.68	99.09	98.77	98.81	98.85	98.94	98.39	98.75	98.89	98.42	99.78	99.35	99.69
Structural formulae based on 32 oxygens													
Li	0.301	0.205	0.179	0.174	0.228	0.139	0.230	0.249	0.258	0.215	0.276	0.292	0.241
Fe2+	1.830	1.914	2.036	1.999	2.004	2.042	1.940	2.016	1.989	2.046	2.019	1.928	1.922
Mn	1.867	1.879	1.784	1.818	1.767	1.818	1.830	1.735	1.744	1.738	1.703	1.779	1.826
Fe3+	0.835	0.869	0.873	0.837	0.934	0.790	0.823	0.930	0.972	0.920	0.956	0.989	0.796
Ti	0.296	0.505	0.322	0.501	0.414	0.464	0.440	0.414	0.428	0.434	0.447	0.417	0.510
Nb	1.344	1.285	1.291	1.064	1.199	1.277	0.979	1.115	1.111	1.350	1.287	1.287	1.278
Ta	6.807	7.097	6.833	7.495	7.099	7.094	7.556	7.184	7.129	6.915	6.991	6.978	7.182
Sn	2.127	1.855	2.108	1.826	1.860	1.962	1.888	1.848	1.821	1.829	1.780	1.808	1.922
W	0.534	0.368	0.508	0.249	0.461	0.330	0.285	0.471	0.517	0.483	0.506	0.521	0.300
Pb	0.002	0.002	0.000	0.009	0.001	0.001	0.000	0.001	0.008	0.000	0.002	0.000	0.012
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014
Sc	0.056	0.021	0.064	0.027	0.032	0.083	0.028	0.037	0.020	0.066	0.032	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.000	0.000	0.002	0.000	0.002	0.000	0.001	0.003	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments:

GC - GH & GZ1 - GZ14 same grain
contains inclusions of uranmicrolite

all ferrowodginite

Wodginite Group

Pegmatite 5														
94-80E														
Raw data	XA	XC	XG	XH	XI	XJ	XK	XL	ZA	ZD	ZF	ZH	ZI	ZJ
FeO	10.88	8.87	9.36	9.57	10.55	8.01	9.04	9.49	10.36	10.97	11.44	11.85	9.58	9.35
MnO	3.85	8.55	8.44	5.22	3.86	6.91	7.39	8.67	8.03	4.02	3.72	3.94	4.01	7.26
TiO2	2.47	1.80	1.84	2.53	2.05	2.03	1.97	1.50	1.15	1.57	1.52	1.40	1.77	1.50
Nb2O5	17.94	17.97	17.15	21.02	14.20	15.57	14.21	15.60	16.57	15.28	13.96	12.61	13.01	20.50
Ta2O5	50.99	44.55	46.19	45.66	55.21	50.32	47.88	40.80	32.37	48.74	47.90	44.60	51.02	42.30
SnO2	8.22	4.85	5.40	6.91	10.33	6.91	7.94	5.66	4.32	10.47	11.40	10.57	10.58	4.61
WO3	6.25	12.54	10.56	7.49	3.51	8.93	11.17	17.36	27.21	7.98	9.13	14.59	7.25	13.88
PbO	0.02	0.13	0.08	0.10	0.13	0.07	0.02	0.05	0.04	0.09	0.09	0.03	0.09	0.11
ThO2	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.11	0.00	0.08	0.20	0.05	0.19	0.06	0.02	0.00	0.05	0.04	0.02	0.07	0.00
Sc2O3	0.07	0.10	0.10	0.07	0.11	0.10	0.06	0.10	0.05	0.33	0.07	0.07	1.05	0.41
Sb2O3	0.08	0.00	0.06	0.09	0.05	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3									0.01	0.00	0.02	0.00	0.00	0.00
Total	100.88	99.36	99.26	98.90	100.05	99.10	99.82	99.31	100.09	99.49	99.28	99.70	98.43	99.92

Recalculated														
94-80E														
oxides	XA	XC	XG	XH	XI	XJ	XK	XL	ZA	ZD	ZF	ZH	ZI	ZJ
Li2O	0.26	0.16	0.02	0.31	0.10	0.28	0.11	0.14	0.47	0.13	0.13	0.21	0.13	0.33
FeO	7.39	3.10	3.79	5.76	7.68	3.88	4.29	3.04	2.47	7.46	7.71	7.17	7.17	3.80
MnO	3.85	8.55	8.44	5.22	3.86	6.91	7.39	8.67	8.03	4.02	3.72	3.94	4.01	7.26
Fe2O3	3.75	6.31	6.13	4.11	3.12	4.48	5.20	7.05	8.55	3.80	4.05	5.06	2.54	6.00
TiO2	2.47	1.80	1.84	2.53	2.05	2.03	1.97	1.50	1.15	1.57	1.52	1.40	1.77	1.50
Nb2O5	17.94	17.97	17.15	21.02	14.20	15.57	14.21	15.60	16.57	15.28	13.96	12.61	13.01	20.50
Ta2O5	50.99	44.55	46.19	45.66	55.21	50.32	47.88	40.80	32.37	48.74	47.90	44.60	51.02	42.30
SnO2	8.22	4.85	5.40	6.91	10.33	6.91	7.94	5.66	4.32	10.47	11.40	10.57	10.58	4.61
WO3	6.25	12.54	10.56	7.49	3.51	8.93	11.17	17.36	27.21	7.98	9.13	14.59	7.25	13.88
PbO	0.02	0.13	0.08	0.10	0.13	0.07	0.02	0.05	0.04	0.09	0.09	0.03	0.09	0.11
ThO2	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.11	0.00	0.08	0.20	0.05	0.19	0.06	0.02	0.00	0.05	0.04	0.02	0.07	0.00
Sc2O3	0.07	0.10	0.10	0.07	0.11	0.10	0.06	0.10	0.05	0.33	0.07	0.07	1.05	0.41
Sb2O3	0.08	0.00	0.06	0.09	0.05	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00
Total	101.40	100.07	99.84	99.51	100.40	99.73	100.38	100.06	101.23	99.91	99.75	100.29	98.70	100.71

Structural formulae based on 32 oxygens

Li	0.397	0.249	0.036	0.481	0.156	0.441	0.179	0.219	0.713	0.210	0.201	0.334	0.208	0.504
Fe2+	2.366	0.993	1.220	1.840	2.543	1.277	1.398	0.980	0.776	2.455	2.552	2.362	2.426	1.200
Mn	1.234	2.745	2.736	1.669	1.287	2.274	2.421	2.796	2.508	1.326	1.238	1.301	1.356	2.285
Fe3+	1.078	1.819	1.776	1.180	0.929	1.325	1.526	2.042	2.419	1.125	1.207	1.500	0.773	1.706
Ti	0.703	0.513	0.530	0.718	0.607	0.593	0.573	0.430	0.318	0.459	0.449	0.411	0.532	0.419
Nb	3.070	3.079	2.967	3.586	2.526	2.735	2.485	2.686	2.764	2.694	2.480	2.221	2.348	3.445
Ta	5.249	4.592	4.807	4.686	5.909	5.317	5.036	4.225	3.246	5.170	5.118	4.726	5.540	4.276
Sn	1.241	0.733	0.824	1.040	1.621	1.071	1.225	0.859	0.635	1.628	1.787	1.642	1.685	0.683
W	0.613	1.232	1.047	0.733	0.358	0.899	1.120	1.713	2.601	0.806	0.930	1.473	0.750	1.337
Pb	0.002	0.013	0.008	0.010	0.014	0.007	0.002	0.005	0.004	0.009	0.010	0.003	0.010	0.011
Th	0.000	0.000	0.000	0.003	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.009	0.000	0.007	0.017	0.004	0.016	0.005	0.002	0.000	0.004	0.003	0.002	0.006	0.000
Sc	0.023	0.033	0.033	0.023	0.038	0.034	0.020	0.033	0.016	0.113	0.024	0.025	0.366	0.134
Sb	0.012	0.000	0.009	0.014	0.008	0.010	0.010	0.009	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments: XA - ZS from same grain - distribution of W is very patchy high W
contains zircon and microlite inclusions and partially encloses cassiterite

tungsteniferous wodginite and ferrowodginite

Wodginite Group

Pegmatite 5														
94-80E														
Raw data	ZN	ZO	ZP	ZQ	ZR	ZS	YA	YB	YC	YD	YE	YF	QA	QB
FeO	9.97	9.79	10.95	11.01	12.21	11.93	11.03	11.28	9.85	11.07	11.40	11.27	9.70	7.83
MnO	7.11	4.16	9.08	3.38	4.15	4.06	3.71	4.08	3.34	3.63	3.60	3.72	3.49	4.27
TiO2	1.62	2.19	0.76	2.26	1.24	1.30	1.78	1.62	1.74	1.83	1.57	1.56	1.27	1.66
Nb2O5	17.79	17.38	9.75	15.03	11.89	12.16	13.32	13.66	13.36	13.29	13.61	13.70	8.32	8.72
Ta2O5	40.68	48.34	22.03	51.95	42.11	42.73	52.04	48.01	51.63	52.59	48.45	48.27	58.80	58.83
SnO2	5.82	10.38	3.95	11.30	10.12	9.67	11.89	10.32	9.89	11.46	11.41	11.83	12.17	15.04
WO3	17.78	5.37	43.78	4.46	17.96	17.39	6.37	10.69	7.30	6.63	9.91	9.89	5.63	0.93
PbO	0.04	0.04	0.05	0.09	0.09	0.01	0.01	0.09	0.06	0.12	0.02	0.04	0.00	0.68
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.13	0.75	0.00	0.06	0.00	0.09	0.03	0.15	0.70	0.14	0.34	0.19	0.00	0.48
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.00	0.00	0.04	0.00	0.00
Total	100.93	98.40	100.34	99.53	99.77	99.34	100.19	99.89	98.04	100.75	100.32	100.46	99.38	98.43

Recalculated														
94-80E														
oxides	ZN	ZO	ZP	ZQ	ZR	ZS	YA	YB	YC	YD	YE	YF	QA	QB
Li2O	0.36	0.13	0.63	0.10	0.24	0.28	0.11	0.17	0.25	0.12	0.15	0.16	0.22	0.01
FeO	3.90	7.35	0.64	8.22	6.82	6.74	7.85	7.23	7.23	7.89	7.84	7.68	6.99	6.81
MnO	7.11	4.16	9.08	3.38	4.15	4.06	3.71	4.08	3.34	3.63	3.60	3.72	3.49	4.27
Fe2O3	6.57	2.60	11.15	3.04	5.84	5.61	3.45	4.39	2.76	3.44	3.84	3.88	2.93	1.10
TiO2	1.62	2.19	0.76	2.26	1.24	1.30	1.78	1.62	1.74	1.83	1.57	1.56	1.27	1.66
Nb2O5	17.79	17.38	9.75	15.03	11.89	12.16	13.32	13.66	13.36	13.29	13.61	13.70	8.32	8.72
Ta2O5	40.68	48.34	22.03	51.95	42.11	42.73	52.04	48.01	51.63	52.59	48.45	48.27	58.80	58.83
SnO2	5.82	10.38	3.95	11.30	10.12	9.67	11.89	10.32	9.89	11.46	11.41	11.83	12.17	15.04
WO3	17.78	5.37	43.78	4.46	17.96	17.39	6.37	10.69	7.30	6.63	9.91	9.89	5.63	0.93
PbO	0.04	0.04	0.05	0.09	0.09	0.01	0.01	0.09	0.06	0.12	0.02	0.04	0.00	0.68
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.13	0.75	0.00	0.06	0.00	0.09	0.03	0.15	0.70	0.14	0.34	0.19	0.00	0.48
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.00	0.00	0.04	0.00	0.00
Total	101.79	98.69	101.80	99.88	100.45	100.04	100.57	100.40	98.49	101.14	100.74	100.94	99.81	98.52

Structural formulae based on 32 oxygens

Li	0.539	0.206	0.954	0.163	0.385	0.437	0.167	0.269	0.409	0.189	0.237	0.255	0.367	0.017
Fe2+	1.226	2.419	0.202	2.707	2.240	2.222	2.595	2.376	2.453	2.598	2.574	2.517	2.419	2.395
Mn	2.231	1.371	2.839	1.121	1.366	1.340	1.236	1.346	1.132	1.200	1.187	1.225	1.214	1.512
Fe3+	1.861	0.769	3.179	0.901	1.727	1.664	1.027	1.299	0.843	1.019	1.135	1.144	0.911	0.347
Ti	0.451	0.641	0.212	0.664	0.363	0.382	0.526	0.475	0.525	0.537	0.459	0.454	0.391	0.523
Nb	2.981	3.061	1.627	2.662	2.087	2.140	2.366	2.406	2.416	2.348	2.394	2.406	1.543	1.650
Ta	4.098	5.120	2.212	5.535	4.448	4.525	5.560	5.086	5.617	5.590	5.126	5.099	6.563	6.695
Sn	0.860	1.612	0.581	1.765	1.568	1.502	1.863	1.603	1.578	1.786	1.770	1.832	1.993	2.510
W	1.707	0.542	4.189	0.453	1.808	1.755	0.649	1.079	0.757	0.671	1.000	0.995	0.599	0.101
Pb	0.004	0.004	0.005	0.009	0.009	0.001	0.001	0.009	0.006	0.013	0.002	0.004	0.000	0.076
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.000	0.000	0.000
Sc	0.041	0.256	0.000	0.020	0.000	0.030	0.010	0.052	0.243	0.049	0.116	0.064	0.000	0.174
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.006	0.000	0.000	0.004	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments: high W attached incl. in
 XA - ZS from same grain - distribution of W is very patchy to cass. cass.
 contains zircon and microlite inclusions and partially encloses cassiterite

tungsteniferous wodginite and ferrowodginite

Wodginite Group

Pegmatite 5														
94-80E														
Raw data	QC	QF	QH	QS	RA	RB	RC	RD	RE	RF	RG	RH	RJ	RK
FeO	10.46	8.62	7.81	11.06	8.92	9.04	10.74	10.01	9.76	9.48	8.44	9.08	9.49	9.79
MnO	3.70	3.46	4.29	3.86	7.61	8.24	7.38	7.71	7.17	6.72	7.37	7.14	7.70	7.51
TiO2	1.14	1.78	2.32	1.23	1.46	1.39	1.10	1.35	1.51	1.39	1.79	1.87	1.43	1.30
Nb2O5	11.60	7.59	7.45	11.98	16.98	15.49	13.24	16.28	17.88	17.18	13.42	12.22	17.86	17.95
Ta2O5	39.56	60.71	63.84	41.69	41.32	39.02	31.07	36.54	38.32	35.63	43.83	43.23	40.08	35.35
SnO2	8.22	14.99	11.33	9.38	5.41	5.21	5.38	4.81	5.33	6.06	8.40	8.15	4.70	3.85
WO3	21.05	1.92	0.77	18.14	17.36	21.10	30.12	21.54	19.22	20.63	16.18	18.04	18.44	22.73
PbO	0.48	0.00	0.56	0.67	0.04	0.08	0.10	0.11	0.03	0.08	0.09	0.06	0.13	0.12
ThO2	0.00	0.00	0.17	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.25	0.83	0.42	0.38	0.22	0.13	0.17	0.21	0.73	1.18	0.28	0.12	0.14	0.73
Sb2O3	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
Bi2O3	0.00	0.59	0.34	0.17	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00
Total	96.51	100.48	99.28	98.78	99.31	99.69	99.28	98.56	99.96	98.35	99.80	99.91	99.99	99.33

Recalculated														
94-80E														
oxides	QC	QF	QH	QS	94-80E	94-80E	94-80E	94-80E	94-80E	94-80E	94-80E	94-80E	94-80E	94-80E
Li2O	0.55	0.02	0.09	0.34	0.38	0.38	0.47	0.32	0.33	0.33	0.28	0.29	0.37	0.41
FeO	5.28	7.94	6.46	6.25	3.04	2.41	2.86	3.15	3.90	4.10	3.52	3.70	3.09	3.14
MnO	3.70	3.46	4.29	3.86	7.61	8.24	7.38	7.71	7.17	6.72	7.37	7.14	7.70	7.51
Fe2O3	5.52	0.68	1.43	5.14	6.37	7.20	8.51	7.44	6.32	5.76	5.34	5.84	6.94	7.16
TiO2	1.14	1.78	2.32	1.23	1.46	1.39	1.10	1.35	1.51	1.39	1.79	1.87	1.43	1.30
Nb2O5	11.60	7.59	7.45	11.98	16.98	15.49	13.24	16.28	17.88	17.18	13.42	12.22	17.86	17.95
Ta2O5	39.56	60.71	63.84	41.69	41.32	39.02	31.07	36.54	38.32	35.63	43.83	43.23	40.08	35.35
SnO2	8.22	14.99	11.33	9.38	5.41	5.21	5.38	4.81	5.33	6.06	8.40	8.15	4.70	3.85
WO3	21.05	1.92	0.77	18.14	17.36	21.10	30.12	21.54	19.22	20.63	16.18	18.04	18.44	22.73
PbO	0.48	0.00	0.56	0.67	0.04	0.08	0.10	0.11	0.03	0.08	0.09	0.06	0.13	0.12
ThO2	0.00	0.00	0.17	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.25	0.83	0.42	0.38	0.22	0.13	0.17	0.21	0.73	1.18	0.28	0.12	0.14	0.73
Sb2O3	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
Bi2O3	0.00	0.59	0.34	0.17	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00
Total	97.41	100.50	99.46	99.45	100.18	100.64	100.38	99.47	100.74	99.06	100.50	100.66	100.90	100.25

Structural formulae based on 32 oxygens

Li	0.898	0.037	0.149	0.548	0.582	0.588	0.721	0.502	0.499	0.514	0.441	0.456	0.570	0.625
Fe2+	1.798	2.757	2.272	2.092	0.976	0.773	0.918	1.015	1.236	1.324	1.148	1.209	0.981	0.998
Mn	1.252	1.207	1.517	1.288	2.438	2.631	2.351	2.471	2.261	2.153	2.402	2.329	2.437	2.365
Fe3+	1.692	0.211	0.453	1.550	1.844	2.077	2.461	2.154	1.803	1.676	1.567	1.715	1.983	2.046
Ti	0.342	0.552	0.726	0.364	0.414	0.394	0.311	0.386	0.422	0.394	0.519	0.541	0.401	0.363
Nb	2.094	1.413	1.405	2.133	2.902	2.640	2.252	2.787	3.011	2.938	2.334	2.127	3.015	3.018
Ta	4.294	6.799	7.243	4.464	4.249	4.001	3.178	3.764	3.880	3.666	4.585	4.526	4.070	3.575
Sn	1.308	2.462	1.884	1.472	0.816	0.784	0.807	0.727	0.791	0.914	1.288	1.251	0.700	0.571
W	2.177	0.205	0.084	1.851	1.701	2.062	2.937	2.114	1.855	2.022	1.613	1.800	1.784	2.191
Pb	0.052	0.000	0.063	0.071	0.004	0.008	0.010	0.011	0.003	0.008	0.009	0.007	0.013	0.012
Th	0.000	0.000	0.016	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.005	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.088	0.296	0.153	0.129	0.073	0.043	0.055	0.070	0.237	0.390	0.094	0.039	0.045	0.236
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.062	0.036	0.018	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments: incl. in incl. in high W
 cass. cass.

QC - QS mottled crystal attached to cassiterite

tungsteniferous wodginite and ferrowodginite

Wodginite Group

Raw data	Pegmatite 5 94-80E			Pegmatite 5 94-80F					Pegmatite 5 94-80G		Pegmatite 5 94-80J	
	RL	RM	ZC	ZG	ZH	ZI	ZJ	ZK	NE	NF	AA	AB
FeO	9.92	9.18	9.29	9.31	8.58	9.89	8.93	8.92	10.08	9.96	7.89	8.28
MnO	7.55	6.20	4.93	4.83	4.87	4.89	4.89	4.97	4.46	4.52	4.89	4.82
TiO2	1.45	2.16	1.62	1.35	0.52	1.16	0.60	1.31	3.08	3.01	1.74	1.91
Nb2O5	13.93	14.51	12.75	12.08	7.54	11.56	7.50	11.32	11.87	12.59	8.95	10.12
Ta2O5	36.98	45.82	56.92	56.02	61.10	54.63	61.10	57.85	55.79	54.62	61.42	59.71
SnO2	6.15	8.33	12.42	12.79	15.09	12.56	14.14	13.37	10.59	10.99	13.31	12.31
WO3	24.14	12.85	1.37	2.09	1.55	3.23	2.00	1.28	2.71	2.90	1.64	2.13
PbO	0.05	0.06	0.13	0.12	0.10	0.12	0.05	0.05	0.12	0.08	0.00	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
UO2	0.00	0.00	0.09	0.08	0.14	0.17	0.03	0.11	0.18	0.17	0.00	0.00
Sc2O3	0.17	0.31							0.16	0.18	0.13	0.05
Sb2O3	0.00	0.00							0.02	0.03	0.00	0.00
Bi2O3	0.00	0.00									0.00	0.00
Total	100.33	99.42	99.52	98.67	99.49	98.22	99.24	99.18	99.07	99.05	99.97	99.32

Recalculated oxides	94-80E		94-80F						94-80G		94-80J	
	94-80E	94-80E	ZC	ZG	ZH	ZI	ZJ	ZK	NE	NF	AA	AB
Li2O	0.39	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.13
FeO	3.10	4.86	6.83	6.78	6.45	6.87	6.49	6.65	7.58	7.53	6.15	6.21
MnO	7.55	6.20	4.93	4.83	4.87	4.89	4.89	4.97	4.46	4.52	4.89	4.82
Fe2O3	7.38	4.68	2.71	2.79	2.34	3.32	2.69	2.50	2.74	2.66	1.88	2.24
TiO2	1.45	2.16	1.62	1.35	0.52	1.16	0.60	1.31	3.08	3.01	1.74	1.91
Nb2O5	13.93	14.51	12.75	12.08	7.54	11.56	7.50	11.32	11.87	12.59	8.95	10.12
Ta2O5	36.98	45.82	56.92	56.02	61.10	54.63	61.10	57.85	55.79	54.62	61.42	59.71
SnO2	6.15	8.33	12.42	12.79	15.09	12.56	14.14	13.37	10.59	10.99	13.31	12.31
WO3	24.14	12.85	1.37	2.09	1.55	3.23	2.00	1.28	2.71	2.90	1.64	2.13
PbO	0.05	0.06	0.13	0.12	0.10	0.12	0.05	0.05	0.12	0.08	0.00	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
UO2	0.00	0.00	0.09	0.08	0.14	0.17	0.03	0.11	0.18	0.17	0.00	0.00
Sc2O3	0.17	0.31							0.16	0.18	0.13	0.05
Sb2O3	0.00	0.00							0.02	0.03	0.00	0.00
Bi2O3	0.00	0.00									0.00	0.00
Total	101.28	100.02	99.77	98.93	99.71	98.52	99.49	99.41	99.31	99.28	100.22	99.62

Structural formulae based on 32 oxygens

Li	0.604	0.383	0.004	0.007	0.000	0.000	0.000	0.004	0.000	0.000	0.191	0.207
Fe2+	0.991	1.586	2.302	2.314	2.266	2.358	2.278	2.273	2.540	2.515	2.116	2.130
Mn	2.400	2.025	1.680	1.666	1.729	1.694	1.735	1.718	1.509	1.523	1.693	1.663
Fe3+	2.123	1.374	0.823	0.856	0.741	1.025	0.850	0.771	0.828	0.799	0.583	0.690
Ti	0.410	0.626	0.490	0.413	0.164	0.357	0.189	0.402	0.925	0.901	0.535	0.585
Nb	2.365	2.529	2.318	2.224	1.429	2.137	1.420	2.088	2.144	2.265	1.656	1.865
Ta	3.777	4.803	6.226	6.203	6.964	6.075	6.960	6.419	6.060	5.910	6.834	6.617
Sn	0.921	1.280	1.992	2.076	2.522	2.048	2.362	2.175	1.687	1.744	2.171	2.001
W	2.350	1.284	0.143	0.221	0.168	0.342	0.217	0.135	0.281	0.299	0.174	0.225
Pb	0.005	0.006	0.014	0.013	0.011	0.013	0.006	0.005	0.013	0.009	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
U	0.000	0.000	0.008	0.007	0.013	0.015	0.003	0.010	0.016	0.015	0.000	0.000
Sc	0.056	0.102							0.056	0.062	0.046	0.016
Sb	0.000	0.000							0.003	0.005	0.000	0.000
Bi	0.000	0.000									0.000	0.000
Total	16.000	16.000	16.000	16.000	16.006	16.064	16.018	16.000	16.061	16.047	16.000	16.000

Comments:

ZC & ZG same grain
 complex ferrowodginite-cassiterite-uranmicrolite
 grain associated with arsenopyrite

tungsteniferous
 wodginite

all ferrowodginite

ferrowodginite

ferrowodginite

Wodginite Group

Raw data	Pegmatite 5 94-80J					Pegmatite 5 94-80K					Pegmatite 5 94-80L		
	AC	AD	AE	AF	AG	RA	RB	RC	RD	RE	BB	BD	BE
FeO	8.03	7.44	8.06	8.00	7.85	8.32	7.36	8.40	8.37	8.33	9.97	9.45	10.34
MnO	4.64	5.46	4.67	4.72	4.61	5.19	5.37	4.67	4.77	4.72	3.55	3.77	3.38
TiO2	1.04	1.68	1.43	1.51	0.98	1.57	0.88	1.44	1.19	1.31	2.43	1.86	1.83
Nb2O5	8.14	9.40	8.60	8.93	7.54	10.09	5.71	6.74	5.68	6.21	9.31	9.23	9.87
Ta2O5	61.77	58.69	61.14	60.76	61.94	57.26	64.54	59.95	63.67	62.92	59.94	59.74	56.79
SnO2	14.90	13.49	14.14	13.89	14.81	11.93	13.48	12.28	12.03	12.27	11.32	12.03	9.36
WO3	1.90	2.91	1.41	2.00	2.05	4.38	2.42	4.93	3.20	2.71	3.63	3.18	7.13
PbO	0.00	0.06	0.00	0.00	0.00	0.05	0.00	0.04	0.02	0.04	0.04	0.05	0.02
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
Sc2O3	0.17	0.11	0.01	0.07	0.11	0.08	0.10	0.07	0.00	0.09	0.27	0.15	0.21
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.58	99.23	99.46	99.87	99.88	98.87	99.86	98.52	98.93	98.59	100.45	99.46	99.10
Recalculated													
oxides	94-80J					94-80K					94-80L		
	AC	AD	AE	AF	AG	RA	RB	RC	RD	RE	BB	BD	BE
Li2O	0.11	0.12	0.10	0.13	0.13	0.14	0.13	0.15	0.12	0.09	0.10	0.12	0.24
FeO	6.37	5.52	6.32	6.22	6.17	5.74	5.30	5.93	5.89	6.06	7.75	7.24	7.16
MnO	4.64	5.46	4.67	4.72	4.61	5.19	5.37	4.67	4.77	4.72	3.55	3.77	3.38
Fe2O3	1.80	2.08	1.89	1.93	1.82	2.80	2.23	2.69	2.70	2.47	2.39	2.38	3.40
TiO2	1.04	1.68	1.43	1.51	0.98	1.57	0.88	1.44	1.19	1.31	2.43	1.86	1.83
Nb2O5	8.14	9.40	8.60	8.93	7.54	10.09	5.71	6.74	5.68	6.21	9.31	9.23	9.87
Ta2O5	61.77	58.69	61.14	60.76	61.94	57.26	64.54	59.95	63.67	62.92	59.94	59.74	56.79
SnO2	14.90	13.49	14.14	13.89	14.81	11.93	13.48	12.28	12.03	12.27	11.32	12.03	9.36
WO3	1.90	2.91	1.41	2.00	2.05	4.38	2.42	4.93	3.20	2.71	3.63	3.18	7.13
PbO	0.00	0.06	0.00	0.00	0.00	0.05	0.00	0.04	0.02	0.04	0.04	0.05	0.02
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
Sc2O3	0.17	0.11	0.01	0.07	0.11	0.08	0.10	0.07	0.00	0.09	0.27	0.15	0.21
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.82	99.51	99.71	100.15	100.15	99.23	100.16	98.88	99.27	98.89	100.72	99.76	99.56
Structural formulae based on 32 oxygens													
Li	0.184	0.196	0.169	0.215	0.222	0.226	0.215	0.256	0.204	0.157	0.163	0.200	0.390
Fe2+	2.201	1.903	2.195	2.147	2.157	1.975	1.874	2.087	2.091	2.150	2.624	2.490	2.450
Mn	1.615	1.894	1.635	1.639	1.621	1.794	1.911	1.653	1.702	1.688	1.208	1.305	1.158
Fe3+	0.559	0.646	0.592	0.598	0.571	0.867	0.709	0.851	0.863	0.789	0.728	0.738	1.047
Ti	0.320	0.518	0.443	0.464	0.305	0.481	0.278	0.451	0.377	0.414	0.735	0.573	0.555
Nb	1.513	1.741	1.607	1.655	1.415	1.863	1.083	1.274	1.083	1.185	1.693	1.704	1.804
Ta	6.905	6.541	6.872	6.775	6.997	6.356	7.371	6.816	7.303	7.220	6.557	6.636	6.247
Sn	2.441	2.205	2.331	2.271	2.453	1.942	2.258	2.047	2.023	2.064	1.815	1.959	1.510
W	0.202	0.309	0.151	0.213	0.221	0.463	0.264	0.534	0.350	0.296	0.378	0.337	0.748
Pb	0.000	0.006	0.000	0.000	0.000	0.005	0.000	0.005	0.003	0.005	0.005	0.005	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017
Sc	0.060	0.040	0.005	0.023	0.039	0.029	0.037	0.027	0.000	0.032	0.093	0.054	0.073
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:				AF & AG same grain			RA - RD same grain					BD & BE same grain	
				all ferrowodginite			all ferrowodginite					all ferrowodginite	

Wodginite Group

Pegmatite 5														
94-80P														
Raw data	MD	ME	MF	MM	MP	MQ	MR	MW	MX	MY	NA	NE	NF	NG
FeO	8.74	9.13	8.97	9.30	9.43	9.32	9.24	9.40	9.39	9.27	8.39	7.98	8.38	8.47
MnO	4.75	4.75	5.46	4.60	4.97	5.04	4.66	4.88	4.91	4.85	4.89	5.89	5.35	5.51
TiO2	1.44	1.06	0.89	1.49	1.18	1.40	1.37	1.48	1.76	1.67	1.94	0.81	1.12	0.92
Nb2O5	8.80	7.81	7.32	7.42	8.07	8.56	7.42	8.42	8.30	8.95	5.72	6.61	7.13	7.45
Ta2O5	60.21	61.48	57.71	61.44	58.30	58.43	60.22	58.69	59.15	57.35	66.30	60.01	61.51	59.07
SnO2	12.77	12.56	12.06	11.98	12.31	11.34	12.52	11.01	11.37	11.76	11.44	12.79	12.78	12.27
WO3	3.45	3.65	7.15	3.40	4.39	5.04	3.88	4.75	4.76	4.83	0.54	5.49	3.01	5.58
PbO	0.32	0.00	0.42	0.00	0.07	0.03	0.19	0.00	0.10	0.36	0.00	0.00	0.26	0.18
ThO2	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
UO2	0.00	0.00	0.00	0.18	0.43	0.39	0.00	0.04	0.00	0.18	0.00	0.10	0.55	0.00
Sc2O3	0.00	0.00	0.00	0.39	0.00	0.23	0.75	0.45	0.63	0.00	0.56	0.00	0.00	0.99
Sb2O3	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
Bi2O3	0.00	0.34	0.27	0.00	0.00	0.32	0.46	0.00	0.19	0.00	0.23	0.00	0.13	0.00
Total	100.48	100.79	100.27	100.20	99.14	100.11	100.71	99.12	100.56	99.23	100.01	99.67	100.22	100.43
Recalculated	94-80P													
oxides	MD	ME	MF	MM	MP	MQ	MR	MW	MX	MY	NA	NE	NF	NG
Li2O	0.11	0.07	0.08	0.01	0.00	0.02	0.00	0.01	0.00	0.05	0.00	0.10	0.03	0.00
FeO	6.28	6.47	5.58	6.90	6.48	6.45	7.06	6.61	6.84	6.38	6.63	5.04	5.87	6.04
MnO	4.75	4.75	5.46	4.60	4.97	5.04	4.66	4.88	4.91	4.85	4.89	5.89	5.35	5.51
Fe2O3	2.68	2.90	3.71	2.61	3.25	3.13	2.34	3.04	2.76	3.17	1.90	3.22	2.75	2.62
TiO2	1.44	1.06	0.89	1.49	1.18	1.40	1.37	1.48	1.76	1.67	1.94	0.81	1.12	0.92
Nb2O5	8.80	7.81	7.32	7.42	8.07	8.56	7.42	8.42	8.30	8.95	5.72	6.61	7.13	7.45
Ta2O5	60.21	61.48	57.71	61.44	58.30	58.43	60.22	58.69	59.15	57.35	66.30	60.01	61.51	59.07
SnO2	12.77	12.56	12.06	11.98	12.31	11.34	12.52	11.01	11.37	11.76	11.44	12.79	12.78	12.27
WO3	3.45	3.65	7.15	3.40	4.39	5.04	3.88	4.75	4.76	4.83	0.54	5.49	3.01	5.58
PbO	0.32	0.00	0.42	0.00	0.07	0.03	0.19	0.00	0.10	0.36	0.00	0.00	0.26	0.18
ThO2	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
UO2	0.00	0.00	0.00	0.18	0.43	0.39	0.00	0.04	0.00	0.18	0.00	0.10	0.55	0.00
Sc2O3	0.00	0.00	0.00	0.39	0.00	0.23	0.75	0.45	0.63	0.00	0.56	0.00	0.00	0.99
Sb2O3	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
Bi2O3	0.00	0.34	0.27	0.00	0.00	0.32	0.46	0.00	0.19	0.00	0.23	0.00	0.13	0.00
Total	100.81	101.11	100.66	100.42	99.43	100.40	100.87	99.38	100.77	99.56	100.15	100.05	100.49	100.62
Structural formulae based on 32 oxygens														
Li	0.177	0.120	0.126	0.014	0.000	0.040	0.000	0.017	0.000	0.081	0.000	0.170	0.045	0.000
Fe2+	2.150	2.230	1.929	2.385	2.250	2.213	2.436	2.286	2.334	2.197	2.327	1.760	2.046	2.086
Mn	1.638	1.650	1.899	1.601	1.742	1.743	1.616	1.697	1.685	1.683	1.729	2.070	1.880	1.910
Fe3+	0.828	0.899	1.154	0.811	1.016	0.968	0.728	0.945	0.849	0.982	0.601	1.011	0.863	0.814
Ti	0.440	0.328	0.275	0.462	0.367	0.431	0.421	0.457	0.537	0.514	0.609	0.253	0.350	0.283
Nb	1.620	1.447	1.360	1.380	1.511	1.581	1.373	1.564	1.519	1.658	1.079	1.241	1.338	1.378
Ta	6.672	6.850	6.445	6.868	6.564	6.489	6.705	6.559	6.517	6.392	7.523	6.777	6.945	6.576
Sn	2.076	2.052	1.975	1.963	2.032	1.846	2.045	1.804	1.837	1.923	1.903	2.118	2.115	2.003
W	0.365	0.388	0.762	0.362	0.471	0.534	0.412	0.505	0.499	0.513	0.058	0.591	0.324	0.593
Pb	0.035	0.000	0.047	0.000	0.008	0.004	0.021	0.000	0.010	0.039	0.000	0.000	0.029	0.020
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.017	0.039	0.036	0.000	0.004	0.000	0.017	0.000	0.009	0.051	0.000
Sc	0.000	0.000	0.000	0.138	0.000	0.082	0.268	0.162	0.222	0.000	0.202	0.000	0.000	0.353
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.036	0.029	0.000	0.000	0.034	0.048	0.000	0.020	0.000	0.025	0.000	0.014	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.073	16.000	16.029	16.000	16.055	16.000	16.000	16.015
Comments:	MD - MF same grain assoc. with cassiterite	incl. in cass. assoc. with ferrotapiolite	MP - MR same grain	MW - MY same grain assoc. cassiterite	incl. in cass.	NE - NJ same grain mantled by cassiterite								
oxide-rich sample; ferrowodginite occurs with cassiterite & alluaudite														
ferrowodginite (variable W) apart from those analyses otherwise labelled														
wodginite														

Wodginite Group

Pegmatite 5															
94-80P															
Raw data	NH	NI	NJ	NO	NP	NQ	NR	NS	BC	CA	CB	CC	CD	CE	
FeO	7.79	7.77	7.67	7.70	7.76	8.32	8.29	7.88	6.21	9.70	9.16	7.34	10.27	6.96	
MnO	5.56	5.85	5.71	5.74	5.72	5.25	5.38	5.69	6.55	4.49	4.57	6.69	4.69	7.06	
TiO2	1.01	0.72	0.83	1.37	0.96	1.07	1.08	0.94	1.29	1.50	1.36	1.46	1.29	1.36	
Nb2O5	4.58	5.28	5.62	6.92	6.16	6.17	6.75	5.84	10.52	11.32	11.39	11.75	11.51	11.61	
Ta2O5	66.03	61.69	61.89	62.59	64.11	62.48	62.47	64.43	57.11	55.81	53.37	54.20	50.36	52.43	
SnO2	11.99	13.22	13.00	13.21	13.69	12.67	12.74	12.05	11.39	11.88	12.06	11.56	11.31	12.04	
WO3	2.85	4.89	4.42	2.74	2.15	3.02	3.19	2.41	4.20	4.70	6.30	5.92	9.29	7.53	
PbO	0.39	0.16	0.00	0.00	0.00	0.00	0.42	0.00	0.05	0.00	0.03	0.03	0.13	0.03	
ThO2	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
UO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.22	0.08	0.92	0.00	0.00	0.58	0.00	0.00	0.63	0.11	0.20	0.02	0.00	0.09	
Sb2O3	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	
Bi2O3	0.06	0.00	0.20	0.00	0.32	0.11	0.00	0.00	0.02	0.00	0.00	0.05	0.00	0.02	
Total	100.48	99.65	100.26	100.29	100.87	100.00	100.30	99.23	98.40	99.57	98.58	99.04	98.88	99.17	
Recalculated	94-80P														
oxides	NH	NI	NJ	NO	NP	NQ	NR	NS	BC	CA	CB	CC	CD	CE	
Li2O	0.05	0.07	0.00	0.07	0.03	0.00	0.05	0.06	0.17	0.09	0.16	0.16	0.13	0.18	
FeO	5.35	5.05	5.67	5.42	5.54	6.19	5.67	5.27	4.12	6.86	6.35	4.31	6.45	3.86	
MnO	5.56	5.85	5.71	5.74	5.72	5.25	5.38	5.69	6.55	4.49	4.57	6.69	4.69	7.06	
Fe2O3	2.67	2.98	2.15	2.51	2.43	2.31	2.87	2.86	2.25	3.10	3.04	3.30	4.16	3.38	
TiO2	1.01	0.72	0.83	1.37	0.96	1.07	1.08	0.94	1.29	1.50	1.36	1.46	1.29	1.36	
Nb2O5	4.58	5.28	5.62	6.92	6.16	6.17	6.75	5.84	10.52	11.32	11.39	11.75	11.51	11.61	
Ta2O5	66.03	61.69	61.89	62.59	64.11	62.48	62.47	64.43	57.11	55.81	53.37	54.20	50.36	52.43	
SnO2	11.99	13.22	13.00	13.21	13.69	12.67	12.74	12.05	11.39	11.88	12.06	11.56	11.31	12.04	
WO3	2.85	4.89	4.42	2.74	2.15	3.02	3.19	2.41	4.20	4.70	6.30	5.92	9.29	7.53	
PbO	0.39	0.16	0.00	0.00	0.00	0.00	0.42	0.00	0.05	0.00	0.03	0.03	0.13	0.03	
ThO2	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
UO2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.22	0.08	0.92	0.00	0.00	0.58	0.00	0.00	0.63	0.11	0.20	0.02	0.00	0.09	
Sb2O3	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	
Bi2O3	0.06	0.00	0.20	0.00	0.32	0.11	0.00	0.00	0.02	0.00	0.00	0.05	0.00	0.02	
Total	100.76	99.98	100.40	100.58	101.12	100.18	100.61	99.54	98.30	99.86	98.83	99.45	99.32	99.59	
Structural formulae based on 32 oxygens															
Li	0.086	0.120	0.000	0.114	0.055	0.000	0.086	0.103	0.278	0.146	0.257	0.255	0.216	0.294	
Fe2+	1.890	1.782	1.994	1.879	1.933	2.172	1.975	1.865	1.433	2.322	2.171	1.462	2.178	1.304	
Mn	1.980	2.081	2.013	2.007	2.013	1.855	1.892	2.032	2.283	1.532	1.568	2.280	1.593	2.398	
Fe3+	0.850	0.947	0.679	0.782	0.764	0.730	0.900	0.912	0.704	0.944	0.935	1.008	1.265	1.028	
Ti	0.321	0.227	0.261	0.427	0.301	0.335	0.335	0.297	0.400	0.454	0.416	0.441	0.388	0.411	
Nb	0.870	1.002	1.059	1.293	1.157	1.163	1.266	1.113	1.957	2.060	2.086	2.136	2.085	2.105	
Ta	7.551	7.047	7.010	7.029	7.244	7.085	7.048	7.389	6.392	6.108	5.882	5.930	5.489	5.715	
Sn	2.010	2.215	2.159	2.176	2.268	2.106	2.107	2.025	1.870	1.906	1.949	1.854	1.807	1.924	
W	0.310	0.532	0.477	0.294	0.232	0.326	0.343	0.264	0.448	0.491	0.661	0.617	0.965	0.782	
Pb	0.044	0.018	0.000	0.000	0.000	0.000	0.046	0.000	0.006	0.000	0.003	0.003	0.013	0.004	
Th	0.000	0.000	0.000	0.000	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.082	0.030	0.334	0.000	0.000	0.212	0.000	0.000	0.225	0.039	0.071	0.008	0.000	0.032	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.006	0.000	0.021	0.000	0.034	0.012	0.000	0.000	0.002	0.000	0.000	0.005	0.000	0.002	
Total	16.000	16.000	16.007	16.000	16.000	16.027	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	
Comments:				NO & NP incls. in same cass.				NQ - NS same grain				CA - CI same grain assoc. with cassiterite			
ferrowodginite (variable W) and a few wodginite															

Wodginite Group

Raw data	Pegmatite 5						Pegmatite 6						
	CH	CI	94-80P				HA	HB	HC	94-90B			
			DA	DB	DC	DD				DG1	DG2	DG3	DG4
FeO	7.44	9.07	9.29	10.11	8.70	7.43	10.45	10.12	10.83	12.10	12.16	12.00	12.07
MnO	6.18	5.15	5.69	5.02	5.66	6.04	3.71	4.03	3.71	3.50	3.53	3.57	3.64
TiO2	1.71	1.41	1.40	1.06	1.08	1.56	2.65	2.69	1.25	1.91	1.94	1.99	1.95
Nb2O5	11.40	8.25	9.21	8.86	9.11	8.20	13.53	13.15	13.31	16.53	16.59	16.50	16.28
Ta2O5	57.65	53.72	50.72	50.39	54.40	58.23	55.42	55.79	55.72	40.35	39.93	40.22	40.17
SnO2	12.37	11.13	10.06	10.76	11.82	11.51	11.74	11.23	12.18	9.75	10.12	10.07	10.01
WO3	3.16	10.10	12.51	12.81	8.89	4.97	1.79	1.78	2.28	13.60	13.62	13.55	13.99
PbO	0.04	0.04	0.10	0.09	0.05	0.00	0.11	0.16	0.12	0.05	0.15	0.13	0.12
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.14	0.07	0.09
UO2	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.12	0.12	0.32	0.12	0.23	0.20
Sc2O3	0.15	0.00	0.00	0.04	0.02	0.04	0.16	0.14	0.11	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
Bi2O3	0.01	0.00	0.00	0.00	0.00	0.01							
Total	100.13	98.88	99.02	99.17	99.75	98.08	99.62	99.21	99.63	98.20	98.36	98.33	98.50
Recalculated			94-80P							94-90B			
oxides	CH	CI	DA	DB	DC	DD	HA	HB	HC	DG1	DG2	DG3	DG4
Li2O	0.10	0.21	0.22	0.19	0.18	0.13	0.00	0.00	0.00	0.24	0.22	0.23	0.23
FeO	5.12	5.43	4.97	5.74	5.16	4.72	8.26	7.86	8.09	7.67	7.76	7.64	7.59
MnO	6.18	5.15	5.69	5.02	5.66	6.04	3.71	4.03	3.71	3.50	3.53	3.57	3.64
Fe2O3	2.53	3.95	4.69	4.74	3.85	2.96	2.39	2.48	3.00	4.92	4.89	4.85	4.97
TiO2	1.71	1.41	1.40	1.06	1.08	1.56	2.65	2.69	1.25	1.91	1.94	1.99	1.95
Nb2O5	11.40	8.25	9.21	8.86	9.11	8.20	13.53	13.15	13.31	16.53	16.59	16.50	16.28
Ta2O5	57.65	53.72	50.72	50.39	54.40	58.23	55.42	55.79	55.72	40.35	39.93	40.22	40.17
SnO2	12.37	11.13	10.06	10.76	11.82	11.51	11.74	11.23	12.18	9.75	10.12	10.07	10.01
WO3	3.16	10.10	12.51	12.81	8.89	4.97	1.79	1.78	2.28	13.60	13.62	13.55	13.99
PbO	0.04	0.04	0.10	0.09	0.05	0.00	0.11	0.16	0.12	0.05	0.15	0.13	0.12
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.14	0.07	0.09
UO2	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.12	0.12	0.32	0.12	0.23	0.20
Sc2O3	0.15	0.00	0.00	0.04	0.02	0.04	0.16	0.14	0.11	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00
Bi2O3	0.01	0.00	0.00	0.00	0.00	0.01							
Total	100.43	99.37	99.57	99.71	100.20	98.36	99.83	99.43	99.90	98.93	99.06	99.05	99.22
Structural formulae based on 32 oxygens													
Li	0.168	0.352	0.362	0.319	0.295	0.223	0.000	0.000	0.006	0.375	0.334	0.360	0.357
Fe2+	1.727	1.867	1.688	1.957	1.760	1.651	2.747	2.627	2.721	2.476	2.499	2.462	2.445
Mn	2.100	1.776	1.939	1.715	1.939	2.126	1.245	1.361	1.259	1.144	1.151	1.164	1.185
Fe3+	0.768	1.222	1.436	1.454	1.182	0.932	0.715	0.747	0.908	1.430	1.418	1.405	1.440
Ti	0.516	0.431	0.422	0.321	0.327	0.488	0.790	0.806	0.377	0.556	0.562	0.576	0.564
Nb	2.066	1.519	1.676	1.615	1.666	1.540	2.424	2.370	2.411	2.884	2.890	2.875	2.833
Ta	6.287	5.953	5.548	5.527	5.983	6.583	5.972	6.048	6.072	4.235	4.184	4.216	4.206
Sn	1.979	1.808	1.613	1.730	1.905	1.907	1.855	1.785	1.946	1.501	1.554	1.548	1.537
W	0.329	1.067	1.304	1.339	0.931	0.535	0.184	0.184	0.237	1.360	1.360	1.354	1.396
Pb	0.004	0.005	0.011	0.010	0.005	0.000	0.012	0.017	0.013	0.006	0.016	0.014	0.013
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.012	0.006	0.008
U	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.011	0.011	0.028	0.010	0.020	0.017
Sc	0.054	0.000	0.001	0.014	0.006	0.014	0.055	0.049	0.038	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000
Bi	0.001	0.000	0.000	0.000	0.000	0.001							
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.004	16.005	16.000	16.000	16.000	16.000	16.000
Comments:	altered part	altered part	DA - DD same grain rimmed by cassiterite				HA - HC same grain note low W content			DG - QL same grain intergrown, but probably earlier crystallizing than cassiterite complex W distribution tungsteniferous ferrowodginite			
	wodginite & ferrowodginite						ferrowodginite			tungsteniferous ferrowodginite			

Wodginite Group

Pegmatite 6														
94-90B														
Raw data	DG4	DG5	DG6	DG7	DG8	DG9	DG10	DG11	DG12	DG13	DG14	DG15	DG16	DG17
FeO	12.07	12.14	11.99	12.06	11.78	11.67	11.59	11.70	11.96	12.07	11.79	11.71	11.56	11.77
MnO	3.64	3.55	3.54	3.52	3.47	3.38	3.36	3.38	3.47	3.46	3.57	3.51	3.49	3.53
TiO2	1.95	1.96	1.92	1.88	1.91	1.93	1.88	1.93	1.91	1.95	2.07	1.99	1.93	1.91
Nb2O5	16.28	16.49	16.66	16.24	16.89	16.72	16.53	16.74	16.77	17.11	16.84	16.95	16.97	16.86
Ta2O5	40.17	40.23	40.27	40.15	40.11	40.25	40.04	40.45	40.62	40.32	40.67	40.18	40.90	40.36
SnO2	10.01	9.99	10.04	9.94	10.36	10.12	9.64	10.08	10.28	10.13	10.24	10.20	10.24	10.15
WO3	13.99	13.74	13.53	13.79	13.69	13.65	14.11	13.46	13.03	13.03	13.02	13.19	12.97	13.06
PbO	0.12	0.11	0.09	0.08	0.08	0.08	0.07	0.11	0.06	0.15	0.10	0.18	0.12	0.12
ThO2	0.09	0.04	0.12	0.09	0.04	0.08	0.00	0.02	0.13	0.00	0.04	0.10	0.02	0.02
UO2	0.20	0.26	0.18	0.36	0.52	0.79	1.05	0.88	0.32	0.39	0.36	0.48	0.50	0.36
Sc2O3	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
Sb2O3	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3														
Total	98.50	98.56	98.34	98.11	98.84	98.67	98.28	98.78	98.57	98.61	98.70	98.49	98.69	98.13
Recalculated	94-90B													
oxides	DG4	DG5	DG6	DG7	DG8	DG9	DG10	DG11	DG12	DG13	DG14	DG15	DG16	DG17
Li2O	0.23	0.22	0.24	0.23	0.28	0.30	0.33	0.29	0.24	0.23	0.25	0.26	0.29	0.25
FeO	7.59	7.72	7.63	7.64	7.57	7.52	7.36	7.56	7.73	7.78	7.61	7.55	7.46	7.54
MnO	3.64	3.55	3.54	3.52	3.47	3.38	3.36	3.38	3.47	3.46	3.57	3.51	3.49	3.53
Fe2O3	4.97	4.92	4.85	4.92	4.68	4.61	4.71	4.60	4.70	4.77	4.64	4.62	4.55	4.69
TiO2	1.95	1.96	1.92	1.88	1.91	1.93	1.88	1.93	1.91	1.95	2.07	1.99	1.93	1.91
Nb2O5	16.28	16.49	16.66	16.24	16.89	16.72	16.53	16.74	16.77	17.11	16.84	16.95	16.97	16.86
Ta2O5	40.17	40.23	40.27	40.15	40.11	40.25	40.04	40.45	40.62	40.32	40.67	40.18	40.90	40.36
SnO2	10.01	9.99	10.04	9.94	10.36	10.12	9.64	10.08	10.28	10.13	10.24	10.20	10.24	10.15
WO3	13.99	13.74	13.53	13.79	13.69	13.65	14.11	13.46	13.03	13.03	13.02	13.19	12.97	13.06
PbO	0.12	0.11	0.09	0.08	0.08	0.08	0.07	0.11	0.06	0.15	0.10	0.18	0.12	0.12
ThO2	0.09	0.04	0.12	0.09	0.04	0.08	0.00	0.02	0.13	0.00	0.04	0.10	0.02	0.02
UO2	0.20	0.26	0.18	0.36	0.52	0.79	1.05	0.88	0.32	0.39	0.36	0.48	0.50	0.36
Sc2O3	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
Sb2O3	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3														
Total	99.22	99.28	99.07	98.84	99.59	99.43	99.07	99.53	99.28	99.32	99.41	99.21	99.44	98.85
Structural formulae based on 32 oxygens														
Li	0.357	0.349	0.379	0.366	0.440	0.468	0.515	0.453	0.374	0.361	0.384	0.409	0.454	0.397
Fe2+	2.445	2.482	2.458	2.471	2.426	2.421	2.378	2.433	2.488	2.498	2.444	2.430	2.399	2.436
Mn	1.185	1.157	1.154	1.155	1.126	1.103	1.099	1.103	1.132	1.126	1.161	1.142	1.135	1.154
Fe3+	1.440	1.423	1.405	1.432	1.351	1.335	1.368	1.331	1.361	1.378	1.340	1.339	1.315	1.363
Ti	0.564	0.566	0.555	0.548	0.550	0.558	0.547	0.557	0.553	0.562	0.596	0.577	0.557	0.554
Nb	2.833	2.867	2.901	2.841	2.927	2.908	2.888	2.911	2.918	2.969	2.921	2.949	2.948	2.943
Ta	4.206	4.208	4.218	4.225	4.182	4.212	4.208	4.231	4.251	4.210	4.245	4.204	4.274	4.238
Sn	1.537	1.532	1.542	1.533	1.584	1.552	1.485	1.546	1.578	1.551	1.568	1.566	1.569	1.562
W	1.396	1.370	1.351	1.383	1.360	1.361	1.413	1.341	1.300	1.296	1.296	1.315	1.292	1.307
Pb	0.013	0.011	0.009	0.009	0.008	0.008	0.008	0.012	0.006	0.015	0.011	0.018	0.012	0.012
Th	0.008	0.004	0.010	0.008	0.003	0.007	0.000	0.002	0.011	0.000	0.004	0.009	0.002	0.002
U	0.017	0.022	0.015	0.031	0.044	0.067	0.090	0.075	0.028	0.033	0.031	0.041	0.043	0.031
Sc	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Bi														
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	DG - QL same grain intergrown, but probably earlier crystallizing than cassiterite complex W distribution tungsteniferous ferrowodginite													

Wodginite Group

Pegmatite 6														
94-90B														
Raw data	DG18	DG20	DG21	DG24	DG25	DG26	DG27	DG28	DG30	DG32	DG34	DG35	DG36	DG39
FeO	11.77	10.73	12.07	11.81	11.86	11.55	11.87	11.64	10.96	10.77	11.62	11.49	11.65	12.22
MnO	3.58	3.09	3.62	3.60	3.54	3.59	3.62	3.46	3.32	3.13	3.51	3.34	3.48	3.75
TiO2	1.91	1.73	1.93	2.04	2.01	1.92	1.94	1.93	1.41	1.53	1.99	2.23	2.14	1.81
Nb2O5	17.02	15.97	17.02	17.65	17.38	17.63	17.15	17.74	14.53	14.80	17.43	17.77	16.76	15.84
Ta2O5	40.20	38.90	39.75	39.57	39.38	39.73	40.01	39.56	31.76	32.62	40.42	42.33	42.18	37.32
SnO2	10.14	9.19	9.67	10.32	10.06	10.27	10.16	9.87	8.48	8.34	9.08	10.58	10.46	9.77
WO3	13.77	15.51	13.66	13.44	13.53	13.46	13.39	13.40	24.42	23.20	13.77	10.50	11.39	17.53
PbO	0.15	0.11	0.14	0.09	0.11	0.18	0.09	0.11	0.09	0.07	0.13	0.07	0.13	0.15
ThO2	0.01	0.02	0.00	0.11	0.20	0.04	0.16	0.14	0.13	0.16	0.00	0.07	0.19	0.01
UO2	0.41	1.47	0.38	0.38	0.34	0.41	0.39	0.56	2.37	2.37	0.77	0.42	0.35	0.18
Sc2O3	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
Sb2O3	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00
Bi2O3														
Total	98.99	96.72	98.25	99.00	98.41	98.79	98.78	98.41	97.49	97.00	98.71	98.80	98.72	98.56
Recalculated	94-90B													
oxides	DG18	DG20	DG21	DG24	DG25	DG26	DG27	DG28	DG30	DG32	DG34	DG35	DG36	DG39
Li2O	0.28	0.48	0.23	0.27	0.26	0.30	0.25	0.31	0.66	0.67	0.33	0.25	0.22	0.29
FeO	7.47	6.65	7.59	7.59	7.59	7.37	7.58	7.44	5.72	5.79	7.28	7.86	7.78	7.21
MnO	3.58	3.09	3.62	3.60	3.54	3.59	3.62	3.46	3.32	3.13	3.51	3.34	3.48	3.75
Fe2O3	4.78	4.53	4.98	4.69	4.74	4.65	4.77	4.67	5.82	5.53	4.83	4.03	4.30	5.57
TiO2	1.91	1.73	1.93	2.04	2.01	1.92	1.94	1.93	1.41	1.53	1.99	2.23	2.14	1.81
Nb2O5	17.02	15.97	17.02	17.65	17.38	17.63	17.15	17.74	14.53	14.80	17.43	17.77	16.76	15.84
Ta2O5	40.20	38.90	39.75	39.57	39.38	39.73	40.01	39.56	31.76	32.62	40.42	42.33	42.18	37.32
SnO2	10.14	9.19	9.67	10.32	10.06	10.27	10.16	9.87	8.48	8.34	9.08	10.58	10.46	9.77
WO3	13.77	15.51	13.66	13.44	13.53	13.46	13.39	13.40	24.42	23.20	13.77	10.50	11.39	17.53
PbO	0.15	0.11	0.14	0.09	0.11	0.18	0.09	0.11	0.09	0.07	0.13	0.07	0.13	0.15
ThO2	0.01	0.02	0.00	0.11	0.20	0.04	0.16	0.14	0.13	0.16	0.00	0.07	0.19	0.01
UO2	0.41	1.47	0.38	0.38	0.34	0.41	0.39	0.56	2.37	2.37	0.77	0.42	0.35	0.18
Sc2O3	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
Sb2O3	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00
Bi2O3														
Total	99.75	97.65	98.99	99.74	99.14	99.55	99.50	99.19	98.73	98.22	99.53	99.45	99.37	99.41
Structural formulae based on 32 oxygens														
Li	0.435	0.772	0.367	0.412	0.406	0.464	0.387	0.478	1.047	1.072	0.521	0.386	0.342	0.460
Fe2+	2.389	2.186	2.441	2.418	2.434	2.354	2.428	2.386	1.855	1.889	2.329	2.521	2.508	2.309
Mn	1.160	1.030	1.178	1.161	1.149	1.163	1.175	1.125	1.090	1.032	1.136	1.085	1.136	1.216
Fe3+	1.376	1.340	1.442	1.343	1.368	1.338	1.375	1.346	1.700	1.623	1.391	1.162	1.246	1.605
Ti	0.549	0.512	0.560	0.584	0.580	0.551	0.558	0.556	0.410	0.448	0.572	0.642	0.619	0.521
Nb	2.942	2.838	2.960	3.038	3.013	3.045	2.970	3.075	2.549	2.609	3.015	3.079	2.921	2.741
Ta	4.181	4.159	4.159	4.099	4.108	4.129	4.169	4.124	3.351	3.458	4.206	4.414	4.422	3.886
Sn	1.546	1.441	1.484	1.567	1.539	1.565	1.552	1.509	1.312	1.296	1.385	1.618	1.607	1.491
W	1.365	1.580	1.362	1.327	1.345	1.333	1.329	1.332	2.456	2.343	1.366	1.044	1.138	1.739
Pb	0.016	0.012	0.015	0.009	0.011	0.019	0.009	0.011	0.009	0.007	0.013	0.007	0.013	0.015
Th	0.001	0.002	0.000	0.010	0.018	0.004	0.014	0.012	0.011	0.014	0.000	0.006	0.017	0.001
U	0.035	0.128	0.033	0.032	0.029	0.035	0.033	0.048	0.205	0.205	0.066	0.036	0.030	0.015
Sc	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.003	0.000	0.000	0.000	0.000
Bi														
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	DG - QL same grain intergrown, but probably earlier crystallizing than cassiterite complex W distribution tungsteniferous ferrowodginite													

Wodginite Group

Pegmatite 6														
94-90B														
Raw data	DG40	DH48	DH49	DH50	DH51	DH52	DH53	DH54	DH55	DH56	DH57	DH58	DH59	DH60
FeO	12.33	11.71	11.46	11.69	12.46	11.73	12.32	11.82	12.55	12.76	12.34	13.04	13.17	13.11
MnO	3.72	3.64	3.40	3.54	3.80	3.49	3.74	3.49	3.95	4.14	3.61	3.96	4.01	3.93
TiO2	1.70	1.89	2.10	2.03	1.46	1.76	1.40	1.64	1.26	1.25	1.16	1.14	1.09	1.17
Nb2O5	15.87	16.27	17.50	16.94	16.14	15.97	14.70	15.86	15.01	16.43	14.16	13.61	13.94	14.19
Ta2O5	36.64	40.53	43.55	42.40	35.08	41.82	36.93	41.61	34.95	34.91	32.43	32.56	32.21	32.66
SnO2	9.72	10.38	10.86	10.61	9.64	10.37	9.76	10.34	7.52	6.31	8.34	8.82	8.53	8.65
WO3	17.61	13.08	10.10	11.66	19.91	13.05	19.11	12.89	22.54	22.63	25.03	25.10	25.37	24.81
PbO	0.14	0.05	0.07	0.12	0.03	0.13	0.09	0.04	0.11	0.09	0.07	0.09	0.11	0.10
ThO2	0.15	0.14	0.10	0.03	0.12	0.06	0.19	0.05	0.01	0.00	0.09	0.03	0.05	0.05
UO2	0.32	0.30	0.28	0.32	0.51	0.30	0.22	0.25	0.26	0.39	1.32	0.12	0.38	0.53
Sc2O3	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
Sb2O3	0.00	0.01	0.00	0.06	0.00	0.00	0.00	0.07	0.00	0.00	0.01	0.00	0.03	0.00
Bi2O3														
Total	98.20	97.99	99.40	99.39	99.16	98.68	98.43	98.06	98.15	98.90	98.55	98.49	98.88	99.19
Recalculated	94-90B													
oxides	DG40	DH48	DH49	DH50	DH51	DH52	DH53	DH54	DH55	DH56	DH57	DH58	DH59	DH60
Li2O	0.28	0.23	0.24	0.23	0.35	0.26	0.32	0.24	0.43	0.45	0.52	0.38	0.38	0.39
FeO	7.27	7.51	7.86	7.76	7.04	7.52	7.02	7.58	6.35	6.23	6.27	6.57	6.58	6.67
MnO	3.72	3.64	3.40	3.54	3.80	3.49	3.74	3.49	3.95	4.14	3.61	3.96	4.01	3.93
Fe2O3	5.62	4.66	4.00	4.36	6.02	4.67	5.89	4.71	6.89	7.25	6.74	7.19	7.33	7.15
TiO2	1.70	1.89	2.10	2.03	1.46	1.76	1.40	1.64	1.26	1.25	1.16	1.14	1.09	1.17
Nb2O5	15.87	16.27	17.50	16.94	16.14	15.97	14.70	15.86	15.01	16.43	14.16	13.61	13.94	14.19
Ta2O5	36.64	40.53	43.55	42.40	35.08	41.82	36.93	41.61	34.95	34.91	32.43	32.56	32.21	32.66
SnO2	9.72	10.38	10.86	10.61	9.64	10.37	9.76	10.34	7.52	6.31	8.34	8.82	8.53	8.65
WO3	17.61	13.08	10.10	11.66	19.91	13.05	19.11	12.89	22.54	22.63	25.03	25.10	25.37	24.81
PbO	0.14	0.05	0.07	0.12	0.03	0.13	0.09	0.04	0.11	0.09	0.07	0.09	0.11	0.10
ThO2	0.15	0.14	0.10	0.03	0.12	0.06	0.19	0.05	0.01	0.00	0.09	0.03	0.05	0.05
UO2	0.32	0.30	0.28	0.32	0.51	0.30	0.22	0.25	0.26	0.39	1.32	0.12	0.38	0.53
Sc2O3	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
Sb2O3	0.00	0.01	0.00	0.06	0.00	0.00	0.00	0.07	0.00	0.00	0.01	0.00	0.03	0.00
Bi2O3														
Total	99.04	98.69	100.05	100.06	100.11	99.41	99.34	98.77	99.27	100.08	99.74	99.59	99.99	100.30
Structural formulae based on 32 oxygens														
Li	0.437	0.362	0.377	0.358	0.540	0.411	0.505	0.376	0.673	0.700	0.809	0.602	0.596	0.604
Fe2+	2.339	2.437	2.514	2.484	2.235	2.434	2.265	2.469	2.034	1.968	2.012	2.103	2.098	2.120
Mn	1.210	1.196	1.102	1.146	1.221	1.142	1.221	1.152	1.281	1.323	1.173	1.285	1.295	1.265
Fe3+	1.627	1.361	1.150	1.257	1.720	1.360	1.710	1.379	1.988	2.060	1.945	2.073	2.102	2.046
Ti	0.492	0.551	0.604	0.584	0.418	0.511	0.405	0.480	0.362	0.353	0.334	0.329	0.312	0.334
Nb	2.759	2.853	3.027	2.930	2.770	2.791	2.563	2.792	2.600	2.805	2.454	2.356	2.402	2.439
Ta	3.833	4.275	4.531	4.413	3.621	4.399	3.875	4.406	3.641	3.585	3.382	3.390	3.340	3.377
Sn	1.492	1.605	1.656	1.619	1.459	1.599	1.501	1.606	1.148	0.951	1.276	1.347	1.296	1.311
W	1.756	1.315	1.001	1.156	1.958	1.308	1.911	1.301	2.238	2.214	2.488	2.491	2.506	2.444
Pb	0.014	0.005	0.007	0.013	0.003	0.013	0.009	0.004	0.011	0.009	0.007	0.009	0.011	0.011
Th	0.013	0.012	0.008	0.003	0.011	0.006	0.016	0.004	0.001	0.000	0.008	0.003	0.005	0.004
U	0.028	0.026	0.023	0.027	0.043	0.026	0.019	0.022	0.022	0.033	0.113	0.010	0.032	0.045
Sc	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.001	0.000	0.010	0.000	0.000	0.000	0.011	0.000	0.000	0.001	0.000	0.004	0.000
Bi														
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	DG - QL same grain intergrown, but probably earlier crystallizing than cassiterite complex W distribution tungsteniferous ferrowodginite													

Wodginite Group

Raw data	Pegmatite 6											Peg. 9
	94-90B											94-318
	QA	QB	QC	QD	QE	QF	QG	QH	QI	QK	QL	MD
FeO	12.88	13.06	12.40	12.35	11.38	11.64	12.14	12.56	11.83	11.50	12.80	11.77
MnO	3.90	3.91	3.65	3.68	3.40	3.40	3.63	3.80	4.25	3.38	4.21	1.69
TiO2	1.62	1.59	2.02	1.61	1.62	2.12	1.94	1.44	1.28	1.43	1.22	1.27
Nb2O5	14.74	14.62	16.66	14.64	15.54	17.20	16.44	14.16	16.55	15.17	13.74	10.26
Ta2O5	35.60	34.51	39.87	35.61	36.94	40.32	40.03	30.30	31.50	32.85	32.94	55.08
SnO2	9.32	8.95	9.80	9.06	9.44	9.90	9.94	7.91	6.11	8.75	10.95	18.80
WO3	21.23	22.54	14.68	21.00	18.03	13.33	14.29	26.31	25.02	23.84	22.98	1.43
PbO	0.10	0.09	0.15	0.14	0.14	0.12	0.14	0.13	0.06	0.11	0.03	0.11
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
UO2	0.02	0.05	0.00	0.07	0.02	0.05	0.00	0.03	0.01	0.01	0.00	0.13
Sc2O3	0.23	0.14	0.32	0.44	0.95	0.42	0.29	0.60	0.51	0.93	0.20	0.08
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.03	0.00	0.00	0.00
Total	99.64	99.44	99.55	98.60	97.47	98.51	98.83	97.27	97.15	97.97	99.06	100.64
Recalculated	94-90B											94-318
oxides	QA	QB	QC	QD	QE	QF	QG	QH	QI	QK	QL	MD
Li2O	0.29	0.32	0.19	0.33	0.33	0.25	0.20	0.41	0.53	0.50	0.25	0.00
FeO	7.14	7.00	7.83	6.98	7.14	7.68	7.69	6.42	5.53	6.44	6.94	10.42
MnO	3.90	3.91	3.65	3.68	3.40	3.40	3.63	3.80	4.25	3.38	4.21	1.69
Fe2O3	6.18	6.53	4.92	5.74	4.47	4.24	4.80	6.55	6.70	5.32	6.33	1.48
TiO2	1.62	1.59	2.02	1.61	1.62	2.12	1.94	1.44	1.28	1.43	1.22	1.27
Nb2O5	14.74	14.62	16.66	14.64	15.54	17.20	16.44	14.16	16.55	15.17	13.74	10.26
Ta2O5	35.60	34.51	39.87	35.61	36.94	40.32	40.03	30.30	31.50	32.85	32.94	55.08
SnO2	9.32	8.95	9.80	9.06	9.44	9.90	9.94	7.91	6.11	8.75	10.95	18.80
WO3	21.23	22.54	14.68	21.00	18.03	13.33	14.29	26.31	25.02	23.84	22.98	1.43
PbO	0.10	0.09	0.15	0.14	0.14	0.12	0.14	0.13	0.06	0.11	0.03	0.11
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
UO2	0.02	0.05	0.00	0.07	0.02	0.05	0.00	0.03	0.01	0.01	0.00	0.13
Sc2O3	0.23	0.14	0.32	0.44	0.95	0.42	0.29	0.60	0.51	0.93	0.20	0.08
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.03	0.00	0.00	0.00
Total	100.37	100.22	100.10	99.30	98.03	99.04	99.38	98.08	98.08	98.73	99.78	100.77
Structural formulae based on 32 oxygens												
Li	0.446	0.492	0.297	0.522	0.516	0.397	0.318	0.651	0.825	0.791	0.391	0.000
Fe2+	2.292	2.247	2.514	2.270	2.356	2.490	2.489	2.102	1.800	2.105	2.246	3.531
Mn	1.251	1.252	1.173	1.194	1.113	1.101	1.178	1.234	1.369	1.093	1.361	0.579
Fe3+	1.785	1.886	1.422	1.681	1.328	1.237	1.399	1.930	1.964	1.564	1.844	0.452
Ti	0.462	0.452	0.575	0.464	0.472	0.610	0.557	0.416	0.365	0.410	0.350	0.386
Nb	2.522	2.501	2.857	2.533	2.720	2.977	2.846	2.457	2.846	2.618	2.373	1.877
Ta	3.664	3.551	4.115	3.705	3.890	4.197	4.168	3.162	3.258	3.409	3.422	6.060
Sn	1.407	1.350	1.483	1.382	1.458	1.511	1.517	1.211	0.927	1.331	1.669	3.033
W	2.083	2.210	1.444	2.083	1.809	1.322	1.418	2.617	2.466	2.358	2.276	0.150
Pb	0.010	0.009	0.016	0.015	0.015	0.012	0.015	0.013	0.006	0.011	0.003	0.012
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
U	0.002	0.004	0.000	0.006	0.002	0.004	0.000	0.002	0.001	0.001	0.000	0.012
Sc	0.075	0.046	0.104	0.146	0.322	0.141	0.096	0.201	0.170	0.309	0.068	0.028
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.004	0.003	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.122
Comments:	DG - QL same grain intergrown, but probably earlier crystallizing than cassiterite complex W distribution										inclusion in cassiterite	
	tungsteniferous ferrowodginite										Fe wodginite	

Wodginite Group

Raw data	Pegmatite 7 94-Peg 7B			Pegmatite 7 94-Peg 7E									
	QE	QM	QP	BB	BD	BJ	BK	BE	BF	BG	EA1	EA2	EA5
FeO	10.77	11.51	10.53	6.15	7.86	6.58	7.41	7.75	6.27	7.06	6.31	5.91	7.57
MnO	4.47	4.12	4.61	7.05	6.95	7.37	6.41	7.13	7.11	7.22	6.50	6.42	6.41
TiO2	1.28	1.24	1.46	0.48	0.55	0.69	0.74	0.50	0.47	0.48	0.54	0.42	0.43
Nb2O5	16.42	15.36	13.75	5.34	7.18	6.80	7.31	6.86	5.40	5.81	6.13	5.84	7.34
Ta2O5	47.78	49.67	54.35	62.82	56.27	62.22	61.93	55.57	62.92	59.04	62.28	61.64	53.90
SnO2	11.33	11.69	11.55	14.03	11.90	13.76	12.02	11.83	14.34	12.87	12.72	13.95	11.40
WO3	5.50	5.26	3.25	3.82	7.15	2.42	2.58	8.07	2.46	5.94	3.24	3.49	10.25
PbO	0.10	0.08	0.10	0.03	0.10	0.10	0.10	0.10	0.08	0.15	0.00	0.00	0.08
ThO2	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.06	0.00	0.02	0.09	0.15	0.14	0.15	0.18	0.06	0.09	0.12	0.22	0.09
Sc2O3				0.03	0.02	0.05	0.05	0.02	0.06	0.02	0.13	0.00	0.00
Sb2O3											0.00	0.00	0.00
Bi2O3											0.00	0.00	0.00
Total	97.71	98.93	99.62	99.84	98.14	100.13	98.71	98.01	99.17	98.68	97.98	97.88	97.48
Recalculated	94-Peg 7B			94-Peg 7E									
oxides	QE	QM	QP	BB	BD	BJ	BK	BE	BF	BG	EA1	EA2	EA5
Li2O	0.04	0.00	0.00	0.10	0.02	0.00	0.03	0.03	0.01	0.02	0.13	0.18	0.23
FeO	7.26	7.92	7.35	3.72	4.22	4.04	4.67	3.97	3.98	3.84	3.96	3.77	3.76
MnO	4.47	4.12	4.61	7.05	6.95	7.37	6.41	7.13	7.11	7.22	6.50	6.42	6.41
Fe2O3	3.84	3.94	3.49	2.66	4.01	2.80	3.01	4.16	2.53	3.54	2.57	2.33	4.15
TiO2	1.28	1.24	1.46	0.48	0.55	0.69	0.74	0.50	0.47	0.48	0.54	0.42	0.43
Nb2O5	16.42	15.36	13.75	5.34	7.18	6.80	7.31	6.86	5.40	5.81	6.13	5.84	7.34
Ta2O5	47.78	49.67	54.35	62.82	56.27	62.22	61.93	55.57	62.92	59.04	62.28	61.64	53.90
SnO2	11.33	11.69	11.55	14.03	11.90	13.76	12.02	11.83	14.34	12.87	12.72	13.95	11.40
WO3	5.50	5.26	3.25	3.82	7.15	2.42	2.58	8.07	2.46	5.94	3.24	3.49	10.25
PbO	0.10	0.08	0.10	0.03	0.10	0.10	0.10	0.10	0.08	0.15	0.00	0.00	0.08
ThO2	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.06	0.00	0.02	0.09	0.15	0.14	0.15	0.18	0.06	0.09	0.12	0.22	0.09
Sc2O3				0.03	0.02	0.05	0.05	0.02	0.06	0.02	0.13	0.00	0.00
Sb2O3											0.00	0.00	0.00
Bi2O3											0.00	0.00	0.00
Total	98.09	99.29	99.94	100.17	98.53	100.39	99.01	98.42	99.41	99.03	98.32	98.25	98.04
Structural formulae based on 32 oxygens													
Li	0.066	0.000	0.000	0.165	0.037	0.000	0.053	0.056	0.013	0.039	0.226	0.311	0.390
Fe2+	2.421	2.625	2.453	1.317	1.485	1.413	1.651	1.399	1.418	1.363	1.422	1.360	1.329
Mn	1.502	1.378	1.552	2.514	2.466	2.600	2.285	2.534	2.560	2.581	2.351	2.329	2.271
Fe3+	1.153	1.176	1.048	0.848	1.269	0.879	0.957	1.320	0.811	1.130	0.831	0.757	1.319
Ti	0.382	0.368	0.437	0.152	0.173	0.216	0.234	0.158	0.150	0.152	0.174	0.135	0.136
Nb	2.946	2.742	2.471	1.016	1.360	1.280	1.391	1.301	1.038	1.109	1.182	1.131	1.389
Ta	5.156	5.334	5.876	7.192	6.411	7.047	7.087	6.340	7.272	6.777	7.229	7.184	6.133
Sn	1.793	1.841	1.831	2.355	1.988	2.285	2.017	1.979	2.430	2.166	2.165	2.384	1.902
W	0.566	0.538	0.335	0.417	0.776	0.261	0.281	0.877	0.271	0.650	0.359	0.388	1.111
Pb	0.011	0.009	0.011	0.003	0.011	0.011	0.011	0.011	0.009	0.017	0.000	0.000	0.009
Th	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U	0.005	0.000	0.002	0.008	0.014	0.013	0.014	0.017	0.006	0.008	0.012	0.021	0.008
Sc				0.011	0.007	0.018	0.018	0.007	0.022	0.007	0.048	0.000	0.001
Sb											0.000	0.000	0.000
Bi											0.000	0.000	0.000
Total	16.000	16.012	16.016	16.000	16.000	16.024	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	QE & QM same grain	assoc. cass.	2 grains - both with variable tungsten content										
			BB - BK same grain					BE - BG same grain					
	ferrowodginite						tungsteniferous wodginite						

Wodginite Group

Pegmatite 7														
94-Peg 7E														
Raw data	EA	EB	ED	BA1	BA2	BA3	BA4	BA5	BA6	BA7	BA8	BA9	BA10	BA11
FeO	5.28	5.77	5.44	5.04	4.98	5.01	5.07	5.11	5.10	5.09	5.18	5.30	5.90	6.09
MnO	7.48	7.23	7.48	7.60	7.61	7.42	7.42	7.43	7.50	7.50	7.45	7.39	6.92	6.88
TiO2	0.41	0.51	0.55	0.54	0.50	0.44	0.51	0.51	0.47	0.43	0.44	0.42	0.53	0.52
Nb2O5	4.48	5.57	5.59	4.37	4.48	4.65	4.45	4.61	4.68	4.77	4.82	4.82	5.80	6.12
Ta2O5	64.19	61.59	64.02	64.39	64.39	63.40	64.17	64.83	63.80	63.34	63.07	63.43	63.04	62.75
SnO2	14.84	12.84	13.00	14.44	14.16	14.48	14.04	13.82	14.45	14.77	14.56	14.48	13.51	13.73
WO3	3.63	5.19	3.57	3.24	3.10	3.37	3.31	3.05	3.26	3.67	3.57	3.54	3.02	3.03
PbO	0.04	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.10
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.00	0.04	0.06	0.00	0.00	0.02
Sc2O3	0.11	0.09	0.19	0.13	0.11	0.06	0.15	0.00	0.00	0.00	0.19	0.08	0.00	0.09
Sb2O3	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
Bi2O3	0.00	0.01	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.03	0.01	0.00
Total	100.46	98.81	99.86	99.75	99.33	98.85	99.13	99.43	99.25	99.64	99.34	99.47	98.73	99.35

Recalculated														
94-Peg 7E														
oxides	EA	EB	ED	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA	V2 BA
Li2O	0.12	0.17	0.14	0.11	0.12	0.14	0.13	0.16	0.14	0.15	0.11	0.13	0.13	0.10
FeO	3.18	3.12	3.10	3.01	2.90	2.96	3.02	2.94	2.96	2.97	3.15	3.16	3.58	3.82
MnO	7.48	7.23	7.48	7.60	7.61	7.42	7.42	7.43	7.50	7.50	7.45	7.39	6.92	6.88
Fe2O3	2.31	2.89	2.56	2.22	2.27	2.23	2.24	2.37	2.33	2.32	2.21	2.34	2.53	2.49
TiO2	0.41	0.51	0.55	0.54	0.50	0.44	0.51	0.51	0.47	0.43	0.44	0.42	0.53	0.52
Nb2O5	4.48	5.57	5.59	4.37	4.48	4.65	4.45	4.61	4.68	4.77	4.82	4.82	5.80	6.12
Ta2O5	64.19	61.59	64.02	64.39	64.39	63.40	64.17	64.83	63.80	63.34	63.07	63.43	63.04	62.75
SnO2	14.84	12.84	13.00	14.44	14.16	14.48	14.04	13.82	14.45	14.77	14.56	14.48	13.51	13.73
WO3	3.63	5.19	3.57	3.24	3.10	3.37	3.31	3.05	3.26	3.67	3.57	3.54	3.02	3.03
PbO	0.04	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.10
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.00	0.04	0.06	0.00	0.00	0.02
Sc2O3	0.11	0.09	0.19	0.13	0.11	0.06	0.15	0.00	0.00	0.00	0.19	0.08	0.00	0.09
Sb2O3	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
Bi2O3	0.00	0.01	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.03	0.01	0.00
Total	100.77	99.23	100.22	100.06	99.65	99.19	99.45	99.79	99.59	99.98	99.64	99.80	99.08	99.67

Structural formulae based on 32 oxygens

Li	0.201	0.296	0.243	0.195	0.212	0.249	0.233	0.270	0.234	0.250	0.192	0.217	0.227	0.179
Fe2+	1.126	1.113	1.097	1.076	1.041	1.067	1.085	1.053	1.062	1.059	1.128	1.127	1.281	1.354
Mn	2.668	2.590	2.660	2.730	2.745	2.684	2.683	2.677	2.704	2.691	2.680	2.656	2.489	2.456
Fe3+	0.735	0.927	0.814	0.713	0.732	0.723	0.724	0.765	0.752	0.745	0.710	0.752	0.813	0.795
Ti	0.130	0.161	0.172	0.173	0.159	0.143	0.162	0.164	0.150	0.137	0.142	0.135	0.168	0.166
Nb	0.853	1.065	1.062	0.838	0.863	0.899	0.859	0.887	0.900	0.914	0.926	0.925	1.114	1.167
Ta	7.353	7.081	7.314	7.429	7.459	7.369	7.445	7.498	7.386	7.298	7.286	7.319	7.283	7.196
Sn	2.493	2.164	2.178	2.443	2.405	2.468	2.389	2.344	2.452	2.495	2.466	2.449	2.289	2.309
W	0.396	0.569	0.389	0.356	0.342	0.374	0.366	0.336	0.360	0.403	0.393	0.389	0.332	0.332
Pb	0.005	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.012
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.006	0.000	0.004	0.005	0.000	0.000	0.002
Sc	0.041	0.032	0.068	0.048	0.040	0.022	0.054	0.000	0.000	0.000	0.070	0.028	0.000	0.033
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.003	0.001	0.000	0.000	0.001	0.000	0.000	0.002	0.002	0.003	0.001	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments:

BA = traverse at 10 µm intervals

tungsteniferous wodginite

Wodginite Group

Pegmatite 7														
94-Peg 7E														
Raw data	CA1	CA2	CA3	CA4	CA5	CA6	CA7	CA8	CA9	CA10	CA11	CA12	CA13	CA14
FeO	5.09	5.06	4.97	5.11	4.97	5.06	5.24	5.45	6.00	6.17	6.05	6.11	6.00	5.88
MnO	7.67	7.71	7.51	7.66	7.39	7.56	7.33	7.23	6.98	6.87	6.93	6.87	6.92	6.92
TiO2	0.59	0.51	0.45	0.48	0.49	0.44	0.41	0.44	0.53	0.50	0.51	0.52	0.44	0.48
Nb2O5	4.43	4.49	4.30	4.41	4.24	4.55	4.56	4.73	6.07	6.16	6.00	5.91	5.83	5.97
Ta2O5	64.42	64.16	63.97	64.20	64.01	63.31	63.30	63.53	62.80	62.58	62.72	62.04	62.00	61.89
SnO2	14.17	14.08	14.76	13.94	14.64	14.51	14.53	14.43	13.64	13.65	13.57	13.70	13.89	13.69
WO3	3.26	3.50	3.33	3.38	2.96	3.74	3.60	3.48	3.11	3.10	3.31	3.60	3.70	3.75
PbO	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO2	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
UO2	0.06	0.00	0.00	0.00	0.00	0.03	0.02	0.07	0.05	0.00	0.00	0.01	0.00	0.00
Sc2O3	0.07	0.05	0.15	0.04	0.03	0.00	0.00	0.13	0.15	0.00	0.00	0.00	0.09	0.00
Sb2O3	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
Bi2O3	0.05	0.00	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.07	0.00	0.00
Total	99.81	99.56	99.44	99.24	98.78	99.18	98.99	99.51	99.33	99.03	99.09	98.84	98.87	98.59
Recalculated	94-Peg 7E													
oxides	CA1	CA2	CA3	CA4	CA5	CA6	CA7	CA8	CA9	CA10	CA11	CA12	CA13	CA14
Li2O	0.11	0.13	0.12	0.12	0.13	0.14	0.14	0.12	0.10	0.11	0.13	0.12	0.12	0.15
FeO	2.96	2.83	3.02	2.86	3.01	2.87	3.08	3.35	3.75	3.79	3.66	3.73	3.68	3.51
MnO	7.67	7.71	7.51	7.66	7.39	7.56	7.33	7.23	6.98	6.87	6.93	6.87	6.92	6.92
Fe2O3	2.34	2.44	2.13	2.47	2.13	2.39	2.36	2.29	2.46	2.60	2.62	2.60	2.54	2.59
TiO2	0.59	0.51	0.45	0.48	0.49	0.44	0.41	0.44	0.53	0.50	0.51	0.52	0.44	0.48
Nb2O5	4.43	4.49	4.30	4.41	4.24	4.55	4.56	4.73	6.07	6.16	6.00	5.91	5.83	5.97
Ta2O5	64.42	64.16	63.97	64.20	64.01	63.31	63.30	63.53	62.80	62.58	62.72	62.04	62.00	61.89
SnO2	14.17	14.08	14.76	13.94	14.64	14.51	14.53	14.43	13.64	13.65	13.57	13.70	13.89	13.69
WO3	3.26	3.50	3.33	3.38	2.96	3.74	3.60	3.48	3.11	3.10	3.31	3.60	3.70	3.75
PbO	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO2	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
UO2	0.06	0.00	0.00	0.00	0.00	0.03	0.02	0.07	0.05	0.00	0.00	0.01	0.00	0.00
Sc2O3	0.07	0.05	0.15	0.04	0.03	0.00	0.00	0.13	0.15	0.00	0.00	0.00	0.09	0.00
Sb2O3	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
Bi2O3	0.05	0.00	0.00	0.00	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.07	0.00	0.00
Total	100.13	99.90	99.74	99.58	99.09	99.53	99.33	99.82	99.64	99.37	99.44	99.18	99.21	98.96
Structural formulae based on 32 oxygens														
Li	0.192	0.215	0.207	0.207	0.223	0.244	0.243	0.200	0.176	0.195	0.219	0.208	0.204	0.258
Fe2+	1.054	1.011	1.083	1.025	1.089	1.030	1.106	1.199	1.331	1.346	1.300	1.328	1.312	1.254
Mn	2.754	2.772	2.710	2.764	2.688	2.726	2.651	2.601	2.493	2.459	2.481	2.464	2.484	2.488
Fe3+	0.750	0.783	0.688	0.798	0.694	0.771	0.764	0.737	0.785	0.833	0.838	0.835	0.813	0.832
Ti	0.188	0.162	0.145	0.154	0.157	0.140	0.131	0.141	0.167	0.158	0.161	0.166	0.141	0.152
Nb	0.849	0.862	0.829	0.850	0.822	0.876	0.881	0.907	1.157	1.177	1.146	1.132	1.116	1.145
Ta	7.425	7.406	7.409	7.443	7.474	7.334	7.350	7.334	7.199	7.192	7.207	7.147	7.144	7.142
Sn	2.394	2.382	2.506	2.369	2.506	2.464	2.474	2.443	2.293	2.300	2.286	2.315	2.346	2.316
W	0.358	0.385	0.367	0.373	0.329	0.413	0.398	0.383	0.340	0.339	0.362	0.395	0.406	0.413
Pb	0.000	0.001	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.005	0.000	0.000	0.000	0.000	0.002	0.002	0.006	0.005	0.000	0.000	0.001	0.000	0.000
Sc	0.025	0.020	0.056	0.014	0.010	0.000	0.000	0.046	0.054	0.001	0.000	0.000	0.033	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.005	0.000	0.000	0.000	0.008	0.000	0.000	0.002	0.000	0.000	0.000	0.008	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments:

CA traverse across crystal at 10 micron intervals
same grain as BA

tungsteniferous wodginite

Wodginite Group

Pegmatite 7														
94-Peg 7E														
Raw data	CA15	CA16	CA17	CA18	CA19	CA20	CA21	CA22	CA23	CA24	CA25	CA26	CA27	CA28
FeO	5.98	5.95	5.88	5.70	6.10	5.98	5.95	5.90	5.97	5.94	6.08	6.02	6.11	6.06
MnO	6.89	7.00	7.02	7.16	6.88	6.96	6.94	6.95	7.04	6.89	6.80	7.08	6.92	6.90
TiO2	0.53	0.49	0.51	0.39	0.59	0.60	0.55	0.63	0.68	0.59	0.61	0.61	0.61	0.58
Nb2O5	6.02	5.61	5.83	5.76	5.96	6.01	5.68	5.82	5.62	5.85	5.83	5.95	5.94	5.90
Ta2O5	62.67	61.34	61.71	60.74	62.93	63.07	63.04	63.72	64.04	63.68	63.63	63.74	64.05	64.36
SnO2	13.50	12.96	13.38	14.04	13.30	13.15	12.92	12.95	12.73	13.00	12.69	12.71	12.66	12.86
WO3	3.35	4.89	4.31	4.97	3.18	3.00	3.02	2.88	2.69	2.90	2.82	2.80	2.82	2.74
PbO	0.06	0.08	0.00	0.00	0.01	0.06	0.03	0.04	0.02	0.01	0.05	0.00	0.00	0.03
ThO2	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
UO2	0.00	0.05	0.08	0.04	0.10	0.00	0.00	0.00	0.15	0.00	0.15	0.07	0.03	0.00
Sc2O3	0.08	0.08	0.15	0.16	0.11	0.14	0.00	0.20	0.00	0.06	0.00	0.04	0.01	0.00
Sb2O3	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
Bi2O3	0.00	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.07	0.00	0.00	0.00
Total	99.08	98.45	98.92	98.95	99.15	98.97	98.16	99.09	98.94	98.92	98.73	99.01	99.16	99.42

Recalculated														
94-Peg 7E														
oxides	CA15	CA16	CA17	CA18	CA19	CA20	CA21	CA22	CA23	CA24	CA25	CA26	CA27	CA28
Li2O	0.13	0.16	0.14	0.15	0.11	0.11	0.12	0.12	0.11	0.14	0.13	0.11	0.13	0.14
FeO	3.66	3.35	3.50	3.33	3.78	3.69	3.53	3.67	3.56	3.61	3.69	3.57	3.64	3.64
MnO	6.89	7.00	7.02	7.16	6.88	6.96	6.94	6.95	7.04	6.89	6.80	7.08	6.92	6.90
Fe2O3	2.53	2.83	2.59	2.59	2.53	2.51	2.65	2.43	2.64	2.54	2.62	2.69	2.70	2.65
TiO2	0.53	0.49	0.51	0.39	0.59	0.60	0.55	0.63	0.68	0.59	0.61	0.61	0.61	0.58
Nb2O5	6.02	5.61	5.83	5.76	5.96	6.01	5.68	5.82	5.62	5.85	5.83	5.95	5.94	5.90
Ta2O5	62.67	61.34	61.71	60.74	62.93	63.07	63.04	63.72	64.04	63.68	63.63	63.74	64.05	64.36
SnO2	13.50	12.96	13.38	14.04	13.30	13.15	12.92	12.95	12.73	13.00	12.69	12.71	12.66	12.86
WO3	3.35	4.89	4.31	4.97	3.18	3.00	3.02	2.88	2.69	2.90	2.82	2.80	2.82	2.74
PbO	0.06	0.08	0.00	0.00	0.01	0.06	0.03	0.04	0.02	0.01	0.05	0.00	0.00	0.03
ThO2	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
UO2	0.00	0.05	0.08	0.04	0.10	0.00	0.00	0.00	0.15	0.00	0.15	0.07	0.03	0.00
Sc2O3	0.08	0.08	0.15	0.16	0.11	0.14	0.00	0.20	0.00	0.06	0.00	0.04	0.01	0.00
Sb2O3	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
Bi2O3	0.00	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.07	0.00	0.00	0.00
Total	99.42	98.85	99.27	99.31	99.48	99.29	98.51	99.40	99.28	99.27	99.09	99.36	99.52	99.79

Structural formulae based on 32 oxygens

Li	0.222	0.272	0.238	0.252	0.193	0.187	0.213	0.200	0.195	0.237	0.228	0.193	0.226	0.240
Fe2+	1.303	1.200	1.247	1.185	1.345	1.312	1.271	1.307	1.272	1.288	1.320	1.270	1.296	1.291
Mn	2.468	2.519	2.515	2.563	2.461	2.494	2.513	2.489	2.531	2.474	2.447	2.537	2.478	2.466
Fe3+	0.811	0.913	0.832	0.829	0.808	0.804	0.858	0.779	0.847	0.816	0.843	0.861	0.864	0.846
Ti	0.167	0.157	0.162	0.125	0.186	0.190	0.177	0.202	0.218	0.188	0.196	0.194	0.193	0.183
Nb	1.150	1.077	1.115	1.099	1.139	1.149	1.097	1.114	1.078	1.121	1.121	1.138	1.135	1.125
Ta	7.202	7.086	7.095	6.977	7.228	7.257	7.328	7.331	7.392	7.339	7.357	7.336	7.361	7.384
Sn	2.274	2.195	2.256	2.365	2.240	2.218	2.202	2.184	2.154	2.196	2.151	2.145	2.134	2.163
W	0.366	0.538	0.472	0.544	0.348	0.329	0.334	0.316	0.295	0.319	0.311	0.307	0.309	0.300
Pb	0.007	0.009	0.000	0.000	0.001	0.007	0.004	0.004	0.002	0.001	0.006	0.000	0.000	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.005	0.008	0.003	0.009	0.000	0.000	0.000	0.015	0.000	0.014	0.006	0.003	0.000
Sc	0.029	0.029	0.056	0.057	0.041	0.053	0.000	0.075	0.000	0.021	0.000	0.014	0.002	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.004	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.008	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments:

CA traverse across crystal at 10 micron intervals
same grain as BA

tungsteniferous wodginite

Wodginite Group

Pegmatite 7														
94-Peg 7E														
Raw data	CA29	CA30	CA31	CA32	CA33	CA34	CA35	CA36	CA37	CA38	CA39	CA41	CA42	CA43
FeO	5.99	5.84	5.92	5.98	6.02	5.96	5.97	5.88	5.93	5.88	5.77	5.38	5.57	5.62
MnO	7.05	6.86	6.96	7.01	7.03	6.91	7.04	7.01	6.98	6.99	7.32	7.40	7.33	7.33
TiO2	0.60	0.64	0.58	0.55	0.63	0.63	0.63	0.63	0.59	0.61	0.57	0.56	0.53	0.49
Nb2O5	5.92	5.78	5.74	5.74	5.71	5.81	5.69	5.72	5.83	5.69	5.96	5.63	5.66	5.63
Ta2O5	64.10	64.58	64.33	64.02	64.19	64.33	64.23	64.13	64.57	64.14	62.78	63.15	63.03	63.36
SnO2	12.83	12.91	12.96	12.87	12.86	12.84	12.79	12.92	12.84	12.92	12.93	13.19	13.03	13.19
WO3	2.72	2.53	2.73	2.78	2.66	2.66	2.75	2.70	2.68	2.67	3.99	3.34	3.64	3.63
PbO	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.06	0.05	0.00	0.00	0.00	0.00
ThO2	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
UO2	0.00	0.07	0.00	0.04	0.11	0.01	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.01	0.00	0.06	0.19	0.00	0.07	0.10	0.16	0.00	0.06	0.00	0.10
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.06	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.04
Total	99.21	99.23	99.22	99.01	99.36	99.33	99.18	99.06	99.58	99.11	99.34	98.71	98.79	99.39

Recalculated														
94-Peg 7E														
oxides	CA29	CA30	CA31	CA32	CA33	CA34	CA35	CA36	CA37	CA38	CA39	CA41	CA42	CA43
Li2O	0.13	0.16	0.14	0.13	0.10	0.12	0.12	0.12	0.13	0.11	0.15	0.14	0.15	0.14
FeO	3.55	3.56	3.55	3.54	3.66	3.72	3.54	3.56	3.59	3.63	3.18	3.05	3.09	3.22
MnO	7.05	6.86	6.96	7.01	7.03	6.91	7.04	7.01	6.98	6.99	7.32	7.40	7.33	7.33
Fe2O3	2.67	2.48	2.59	2.67	2.58	2.44	2.66	2.53	2.55	2.46	2.82	2.55	2.71	2.63
TiO2	0.60	0.64	0.58	0.55	0.63	0.63	0.63	0.63	0.59	0.61	0.57	0.56	0.53	0.49
Nb2O5	5.92	5.78	5.74	5.74	5.71	5.81	5.69	5.72	5.83	5.69	5.96	5.63	5.66	5.63
Ta2O5	64.10	64.58	64.33	64.02	64.19	64.33	64.23	64.13	64.57	64.14	62.78	63.15	63.03	63.36
SnO2	12.83	12.91	12.96	12.87	12.86	12.84	12.79	12.92	12.84	12.92	12.93	13.19	13.03	13.19
WO3	2.72	2.53	2.73	2.78	2.66	2.66	2.75	2.70	2.68	2.67	3.99	3.34	3.64	3.63
PbO	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.06	0.05	0.00	0.00	0.00	0.00
ThO2	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
UO2	0.00	0.07	0.00	0.04	0.11	0.01	0.09	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.01	0.00	0.06	0.19	0.00	0.07	0.10	0.16	0.00	0.06	0.00	0.10
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.06	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.04
Total	99.56	99.59	99.58	99.37	99.69	99.65	99.54	99.40	99.93	99.43	99.74	99.07	99.18	99.75

Structural formulae based on 32 oxygens

Li	0.216	0.272	0.243	0.216	0.179	0.207	0.214	0.214	0.225	0.193	0.263	0.248	0.262	0.235
Fe2+	1.262	1.269	1.264	1.264	1.301	1.323	1.262	1.271	1.275	1.294	1.128	1.090	1.103	1.145
Mn	2.522	2.459	2.492	2.518	2.516	2.470	2.524	2.515	2.493	2.507	2.609	2.662	2.635	2.620
Fe3+	0.855	0.796	0.830	0.857	0.827	0.780	0.851	0.811	0.813	0.791	0.900	0.822	0.871	0.840
Ti	0.190	0.204	0.185	0.175	0.202	0.199	0.199	0.199	0.185	0.193	0.180	0.178	0.170	0.156
Nb	1.131	1.106	1.098	1.100	1.091	1.110	1.089	1.095	1.112	1.090	1.134	1.081	1.085	1.075
Ta	7.365	7.431	7.401	7.382	7.380	7.387	7.392	7.388	7.401	7.390	7.181	7.296	7.271	7.271
Sn	2.162	2.177	2.185	2.176	2.168	2.161	2.159	2.182	2.158	2.183	2.169	2.235	2.203	2.219
W	0.298	0.277	0.299	0.305	0.292	0.291	0.302	0.296	0.293	0.293	0.435	0.368	0.400	0.397
Pb	0.000	0.001	0.000	0.002	0.004	0.000	0.000	0.000	0.007	0.006	0.000	0.000	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.007	0.000	0.004	0.010	0.001	0.008	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sc	0.000	0.000	0.002	0.000	0.023	0.069	0.000	0.027	0.038	0.059	0.000	0.020	0.000	0.038
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.000	0.000	0.007	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.004
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments:

CA traverse across crystal at 10 micron intervals
same grain as BA

tungsteniferous wodginite

Wodginite Group

Raw data	Pegmatite 7 94-Peg 7E									Pegmatite 7 94-Peg 7X			
	CA44	CA45	CA46	CA47	CA48	CA49	CA50	CA51	CA52	NK	NN	LL	LM
FeO	5.43	5.39	5.49	5.43	5.27	5.11	5.19	5.26	5.24	10.30	10.04	10.61	11.18
MnO	7.31	7.34	7.36	7.53	7.44	7.61	7.52	7.18	7.16	4.22	4.39	3.78	3.93
TiO2	0.51	0.52	0.51	0.51	0.54	0.36	0.39	0.46	0.45	0.75	0.89	1.24	1.15
Nb2O5	5.53	5.42	5.51	5.29	5.40	4.55	4.49	4.62	4.61	10.66	8.43	13.93	13.69
Ta2O5	62.94	63.17	63.53	63.98	63.58	62.53	61.52	63.18	63.07	55.18	56.67	49.17	46.55
SnO2	13.00	12.98	13.08	13.41	13.40	14.34	14.09	14.00	14.61	12.16	12.06	10.71	10.27
WO3	3.57	3.54	3.62	3.47	3.50	4.46	5.46	4.30	3.56	4.28	4.90	8.91	11.80
PbO	0.09	0.05	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.08	0.08	0.00	0.11
ThO2	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
UO2	0.02	0.00	0.21	0.03	0.03	0.03	0.09	0.02	0.01	0.09	0.11	0.00	0.03
Sc2O3	0.14	0.00	0.00	0.00	0.07	0.21	0.00	0.01	0.02	0.15	0.21	0.75	0.88
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Bi2O3	0.00	0.03	0.07	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.03
Total	98.53	98.45	99.37	99.66	99.22	99.20	98.79	99.02	98.74	97.87	97.80	99.10	99.64

Recalculated	94-Peg 7E									94-Peg7X			
oxides	CA44	CA45	CA46	CA47	CA48	CA49	CA50	CA51	CA52	PU	PV	LL	LM
Li2O	0.14	0.16	0.16	0.14	0.16	0.12	0.18	0.19	0.15	0.00	0.00	0.16	0.14
FeO	3.09	2.97	3.06	3.01	2.98	2.91	2.73	3.01	3.18	7.23	6.99	7.42	7.44
MnO	7.31	7.34	7.36	7.53	7.44	7.61	7.52	7.18	7.16	4.22	4.39	3.78	3.93
Fe2O3	2.55	2.65	2.65	2.66	2.50	2.41	2.69	2.46	2.25	3.36	3.33	3.40	4.00
TiO2	0.51	0.52	0.51	0.51	0.54	0.36	0.39	0.46	0.45	0.75	0.89	1.24	1.15
Nb2O5	5.53	5.42	5.51	5.29	5.40	4.55	4.49	4.62	4.61	10.66	8.43	13.93	13.69
Ta2O5	62.94	63.17	63.53	63.98	63.58	62.53	61.52	63.18	63.07	55.18	56.67	49.17	46.55
SnO2	13.00	12.98	13.08	13.41	13.40	14.34	14.09	14.00	14.61	12.16	12.06	10.71	10.27
WO3	3.57	3.54	3.62	3.47	3.50	4.46	5.46	4.30	3.56	4.28	4.90	8.91	11.80
PbO	0.09	0.05	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.08	0.08	0.00	0.11
ThO2	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
UO2	0.02	0.00	0.21	0.03	0.03	0.03	0.09	0.02	0.01	0.09	0.11	0.00	0.03
Sc2O3	0.14	0.00	0.00	0.00	0.07	0.21	0.00	0.01	0.02	0.15	0.21	0.75	0.88
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Bi2O3	0.00	0.03	0.07	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.03
Total	98.88	98.83	99.76	100.03	99.59	99.53	99.20	99.42	99.08	98.17	98.09	99.48	100.04

Structural formulae based on 32 oxygens

Li	0.245	0.274	0.274	0.239	0.271	0.214	0.303	0.332	0.260	0.003	0.000	0.260	0.223
Fe2+	1.109	1.067	1.092	1.067	1.063	1.042	0.981	1.079	1.147	2.511	2.456	2.479	2.463
Mn	2.636	2.653	2.634	2.692	2.667	2.742	2.716	2.589	2.593	1.477	1.554	1.262	1.302
Fe3+	0.825	0.856	0.848	0.849	0.801	0.776	0.870	0.793	0.728	1.049	1.054	1.020	1.190
Ti	0.162	0.166	0.163	0.162	0.172	0.115	0.125	0.147	0.146	0.233	0.280	0.368	0.339
Nb	1.065	1.045	1.054	1.010	1.034	0.874	0.865	0.888	0.892	1.992	1.593	2.484	2.419
Ta	7.292	7.329	7.307	7.342	7.320	7.232	7.130	7.315	7.337	6.202	6.442	5.274	4.948
Sn	2.209	2.208	2.205	2.256	2.262	2.432	2.395	2.377	2.492	2.004	2.010	1.684	1.600
W	0.394	0.392	0.397	0.379	0.384	0.492	0.603	0.475	0.395	0.458	0.531	0.911	1.196
Pb	0.010	0.005	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.009	0.009	0.000	0.012
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.002	0.000	0.020	0.002	0.003	0.003	0.009	0.002	0.001	0.008	0.010	0.000	0.003
Sc	0.052	0.000	0.000	0.000	0.025	0.077	0.000	0.003	0.007	0.054	0.076	0.259	0.300
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
Bi	0.000	0.004	0.008	0.000	0.000	0.000	0.004	0.000	0.001	0.000	0.000	0.000	0.003
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.019	16.000	16.000

Comments: CA traverse across crystal at 10 micron intervals associated with large
same grain as BA cassiterite grains

tungsteniferous wodginite

ferrowodginite

Wodginite Group

Raw data	Pegmatite 7 94-Peg 7X				Separation Rapids pluton 96-72A								
	LN	LO	LP	LQ	AA	AB	AC	AD	AE	AF	AG	AH	AK
FeO	10.52	10.35	10.87	10.23	10.23	8.00	7.19	8.42	6.61	6.76	6.97	8.35	9.95
MnO	3.92	4.14	5.02	4.97	3.19	4.68	5.41	3.98	5.73	5.66	5.68	4.40	3.47
TiO2	1.35	1.24	1.22	1.16	0.99	0.44	0.12	0.07	0.15	0.07	0.09	0.45	0.76
Nb2O5	12.93	13.36	21.25	22.04	9.46	2.62	1.61	1.07	1.35	1.79	1.89	2.71	10.25
Ta2O5	52.62	51.50	47.45	49.68	61.65	70.17	71.37	71.90	71.29	70.32	70.47	70.39	60.51
SnO2	11.31	11.75	5.49	4.27	13.65	12.94	13.21	13.34	13.33	14.12	13.40	12.91	13.45
WO3	6.57	7.32	8.26	6.55	0.62	0.58	0.44	0.41	0.53	0.38	0.46	0.59	0.71
PbO	0.04	0.07	0.11	0.23	0.05	0.00	0.00	0.02	0.00	0.00	0.04	0.02	0.04
ThO2	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
UO2	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Sc2O3	0.54	0.54	0.43	0.41	0.00	0.10	0.08	0.15	0.00	0.00	0.00	0.14	0.05
Sb2O3	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
Bi2O3	0.03	0.01	0.09	0.00	0.00	0.03	0.00	0.00	0.06	0.04	0.00	0.00	0.00
Total	99.82	100.28	100.20	99.59	99.89	99.60	99.48	99.37	99.04	99.13	99.00	99.94	99.19

Recalculated	94-Peg7X				96-72A								
oxides	LN	LO	LP	LQ	AA	AB	AC	AD	AE	AF	AG	AH	AK
Li2O	0.10	0.12	0.27	0.36	0.04	0.07	0.07	0.07	0.09	0.07	0.06	0.07	0.05
FeO	7.55	7.32	6.21	5.72	8.15	5.97	5.13	6.46	4.59	4.82	4.83	6.28	7.77
MnO	3.92	4.14	5.02	4.97	3.19	4.68	5.41	3.98	5.73	5.66	5.68	4.40	3.47
Fe2O3	3.20	3.26	5.02	4.83	2.31	2.26	2.29	2.14	2.21	2.12	2.35	2.25	2.39
TiO2	1.35	1.24	1.22	1.16	0.99	0.44	0.12	0.07	0.15	0.07	0.09	0.45	0.76
Nb2O5	12.93	13.36	21.25	22.04	9.46	2.62	1.61	1.07	1.35	1.79	1.89	2.71	10.25
Ta2O5	52.62	51.50	47.45	49.68	61.65	70.17	71.37	71.90	71.29	70.32	70.47	70.39	60.51
SnO2	11.31	11.75	5.49	4.27	13.65	12.94	13.21	13.34	13.33	14.12	13.40	12.91	13.45
WO3	6.57	7.32	8.26	6.55	0.62	0.58	0.44	0.41	0.53	0.38	0.46	0.59	0.71
PbO	0.04	0.07	0.11	0.23	0.05	0.00	0.00	0.02	0.00	0.00	0.04	0.02	0.04
ThO2	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
UO2	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Sc2O3	0.54	0.54	0.43	0.41	0.00	0.10	0.08	0.15	0.00	0.00	0.00	0.14	0.05
Sb2O3	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
Bi2O3	0.03	0.01	0.09	0.00	0.00	0.03	0.00	0.00	0.06	0.04	0.00	0.00	0.00
Total	100.15	100.62	100.82	100.27	100.11	99.83	99.73	99.61	99.32	99.38	99.27	100.19	99.44

Structural formulae based on 32 oxygens

Li	0.157	0.184	0.419	0.554	0.072	0.121	0.118	0.126	0.167	0.118	0.102	0.114	0.089
Fe2+	2.524	2.430	1.975	1.833	2.808	2.163	1.877	2.389	1.698	1.777	1.780	2.277	2.694
Mn	1.316	1.378	1.596	1.589	1.114	1.716	2.005	1.483	2.136	2.105	2.114	1.606	1.213
Fe3+	0.962	0.974	1.436	1.393	0.717	0.737	0.756	0.712	0.737	0.704	0.780	0.734	0.744
Ti	0.403	0.365	0.345	0.329	0.306	0.142	0.040	0.022	0.048	0.022	0.031	0.145	0.236
Nb	2.316	2.375	3.604	3.760	1.761	0.512	0.319	0.213	0.269	0.355	0.375	0.528	1.914
Ta	5.670	5.508	4.840	5.097	6.907	8.269	8.498	8.606	8.538	8.399	8.415	8.256	6.797
Sn	1.786	1.843	0.821	0.642	2.243	2.235	2.306	2.342	2.340	2.472	2.346	2.220	2.215
W	0.675	0.747	0.803	0.640	0.066	0.065	0.050	0.047	0.060	0.043	0.052	0.066	0.075
Pb	0.004	0.008	0.011	0.024	0.005	0.000	0.000	0.002	0.000	0.000	0.004	0.002	0.005
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Sc	0.185	0.186	0.141	0.136	0.000	0.037	0.030	0.058	0.000	0.000	0.000	0.051	0.016
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.003	0.001	0.009	0.000	0.000	0.003	0.000	0.000	0.007	0.004	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments: LL - LQ cluster of ferrowodginite grains secondary between other ferrowodginite grains AA - AH large unzoned grain ferrowodginite - wodginite grain

Wodginite Group

Raw data	Separation Rapids pluton 96-72A					Marko's 96-AT3	Marko's 96-AT5	Marko's pegmatite 96-AT8			
	AL	AM	AP	AQ	AR	AF	BG	EE	EF	EG	EP
FeO	6.99	6.83	6.82	9.55	10.28	10.55	4.18	2.90	2.73	9.72	10.61
MnO	5.18	5.59	5.58	2.92	3.38	2.16	8.16	9.58	9.69	3.15	2.25
TiO2	0.02	0.00	0.03	1.03	0.77	7.43	7.52	7.60	7.59	7.77	7.94
Nb2O5	1.28	1.59	1.47	9.89	10.60	13.46	15.76	14.01	13.72	14.43	14.81
Ta2O5	70.01	70.61	70.73	60.55	60.86	55.11	53.73	56.52	57.14	55.61	54.92
SnO2	15.14	14.00	13.97	12.42	13.49	11.19	9.02	9.43	9.63	8.62	8.16
WO3	0.58	0.49	0.44	0.62	0.65	0.09	0.33	0.08	0.13	0.05	0.04
PbO	0.00	0.00	0.00	0.05	0.01	0.03	0.15	0.03	0.04	0.12	0.07
ThO2	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.05	0.00	1.07	0.09	0.21	0.35	0.11	0.12	0.13	0.24
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Total	99.20	99.15	99.05	98.18	100.12	100.24	100.75	100.25	100.89	99.67	99.03
Recalculated oxides	96-72A					96-AT3	96-AT7	96-AT8			
	AL	AM	AP	AQ	AR	AF	BG	EE	EF	EG	EP
Li2O	0.07	0.07	0.07	0.03	0.04	0.00	0.07	0.07	0.08	0.03	0.02
FeO	5.25	4.86	4.84	8.28	8.06	10.42	3.91	2.54	2.42	9.19	10.13
MnO	5.18	5.59	5.58	2.92	3.38	2.16	8.16	9.58	9.69	3.15	2.25
Fe2O3	1.90	2.15	2.17	1.31	2.42	0.15	0.28	0.39	0.34	0.59	0.51
TiO2	0.02	0.00	0.03	1.03	0.77	7.43	7.52	7.60	7.59	7.77	7.94
Nb2O5	1.28	1.59	1.47	9.89	10.60	13.46	15.76	14.01	13.72	14.43	14.81
Ta2O5	70.01	70.61	70.73	60.55	60.86	55.11	53.73	56.52	57.14	55.61	54.92
SnO2	15.14	14.00	13.97	12.42	13.49	11.19	9.02	9.43	9.63	8.62	8.16
WO3	0.58	0.49	0.44	0.62	0.65	0.09	0.33	0.08	0.13	0.05	0.04
PbO	0.00	0.00	0.00	0.05	0.01	0.03	0.15	0.03	0.04	0.12	0.07
ThO2	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.05	0.00	1.07	0.09	0.21	0.35	0.11	0.12	0.13	0.24
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Total	99.43	99.40	99.31	98.24	100.37	100.26	99.28	100.36	100.90	99.69	99.07
Structural formulae based on 32 oxygens											
Li	0.125	0.122	0.127	0.046	0.064	0.000	0.111	0.107	0.118	0.040	0.027
Fe2+	1.941	1.797	1.790	2.916	2.765	3.326	1.248	0.807	0.768	2.930	3.240
Mn	1.933	2.081	2.083	1.032	1.171	0.698	2.625	3.083	3.110	1.017	0.726
Fe3+	0.632	0.713	0.723	0.414	0.748	0.042	0.079	0.113	0.097	0.169	0.146
Ti	0.005	0.000	0.010	0.323	0.237	2.134	2.148	2.170	2.163	2.226	2.277
Nb	0.255	0.316	0.292	1.865	1.958	2.322	2.706	2.406	2.348	2.485	2.555
Ta	8.383	8.442	8.471	6.869	6.761	5.720	5.550	5.839	5.886	5.762	5.697
Sn	2.658	2.455	2.453	2.065	2.197	1.702	1.366	1.428	1.454	1.310	1.241
W	0.066	0.055	0.051	0.067	0.068	0.009	0.032	0.008	0.012	0.005	0.004
Pb	0.000	0.000	0.000	0.006	0.001	0.003	0.015	0.003	0.004	0.013	0.007
Th	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000				0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.000	0.019	0.000	0.390	0.031	0.069	0.117	0.036	0.039	0.044	0.081
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.027	16.000	16.000	16.000	16.000	16.000
Comments:	AK - AR same grain intergrown but earlier than ferrotapiolite					incl. in cassiterite	incl. in cassiterite	EE & EF same incl. all are inclusions in cassiterite also contains microlite incls.			
	ferrowodginite - wodginite grain					Ti wodginite Fe-Ti wodginite		Ti wodginite		Fe-Ti wodginite	

Wodginite Group

Raw data	Marko's pegmatite 96-AT11A				Marko's pegmatite 96-AT12					Marko's pegmatite 96-AT17			
	QF	QJ	QK	QL	GF	GK	GL	GI	GJ	RA	RB	RC	RD
FeO	10.66	9.26	8.35	8.19	7.12	6.81	2.88	10.65	10.50	10.99	10.82	10.39	10.62
MnO	2.16	3.75	4.57	4.71	6.13	5.88	9.38	2.44	2.85	2.09	2.26	2.19	2.27
TiO2	7.42	7.92	7.90	7.77	7.67	8.12	7.24	7.86	7.97	7.73	7.54	7.27	7.66
Nb2O5	14.55	15.69	15.31	15.29	13.95	14.60	13.65	16.71	16.19	12.92	13.14	14.03	13.09
Ta2O5	55.46	54.92	54.86	54.84	55.33	55.31	56.36	52.46	52.58	57.78	57.91	56.67	57.46
SnO2	8.58	8.25	8.27	8.37	8.68	7.59	9.25	8.05	8.10	8.64	8.64	8.88	8.65
WO3	0.05	0.07	0.06	0.11	0.19	0.24	0.42	0.13	0.08	0.12	0.11	0.09	0.09
PbO	0.00	0.06	0.05	0.09	0.07	0.04	0.00	0.17	0.06	0.01	0.02	0.00	0.00
ThO2	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
UO2	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Sc2O3	0.21	0.38	0.31	0.35	0.34	0.25	0.29	0.28	0.22	0.30	0.18	0.14	0.16
Sb2O3	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
Bi2O3	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Total	99.14	100.30	99.68	99.72	99.50	98.84	99.47	98.74	98.55	100.58	100.60	99.67	100.02
Recalculated oxides	96-AT11A				96-AT12					96-AT17			
	QF	QJ	QK	QL	GF	GK	GL	GI	GJ	RA	RB	RC	RD
Li2O	0.05	0.02	0.02	0.02	0.00	0.04	0.08	0.01	0.00	0.00	0.01	0.08	0.02
FeO	10.06	8.82	7.89	7.74	6.49	6.33	2.55	10.05	9.79	10.46	10.18	9.85	10.07
MnO	2.06	3.75	4.57	4.71	6.13	5.88	9.38	2.44	2.85	2.09	2.26	2.19	2.27
Fe2O3	0.52	0.46	0.48	0.48	0.68	0.51	0.35	0.63	0.76	0.56	0.69	0.57	0.58
TiO2	7.42	7.92	7.90	7.77	7.67	8.12	7.24	7.86	7.97	7.73	7.54	7.27	7.66
Nb2O5	14.45	15.69	15.31	15.29	13.95	14.60	13.65	16.71	16.19	12.92	13.14	14.03	13.09
Ta2O5	55.36	54.92	54.86	54.84	55.33	55.31	56.36	52.46	52.58	57.78	57.91	56.67	57.46
SnO2	8.58	8.25	8.27	8.37	8.68	7.59	9.25	8.05	8.10	8.64	8.64	8.88	8.65
WO3	0.05	0.07	0.06	0.11	0.19	0.24	0.42	0.13	0.08	0.12	0.11	0.09	0.09
PbO	0.00	0.06	0.05	0.09	0.07	0.04	0.00	0.17	0.06	0.01	0.02	0.00	0.00
ThO2	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
UO2	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Sc2O3	0.21	0.38	0.31	0.35	0.34	0.25	0.29	0.28	0.22	0.30	0.18	0.14	0.16
Sb2O3	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
Bi2O3	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Total	98.81	100.33	99.72	99.76	99.55	98.92	99.58	98.79	98.60	100.61	100.66	99.77	100.08
Structural formulae based on 32 oxygens													
Li	0.080	0.023	0.026	0.024	0.000	0.069	0.125	0.011	0.000	0.000	0.021	0.125	0.035
Fe2+	3.247	2.777	2.504	2.456	2.076	2.026	0.823	3.191	3.114	3.339	3.249	3.164	3.228
Mn	0.672	1.193	1.465	1.511	1.980	1.901	3.052	0.781	0.916	0.675	0.729	0.711	0.737
Fe3+	0.152	0.129	0.138	0.136	0.196	0.148	0.101	0.180	0.217	0.160	0.197	0.164	0.169
Ti	2.146	2.235	2.248	2.212	2.200	2.330	2.091	2.239	2.275	2.212	2.161	2.093	2.204
Nb	2.513	2.663	2.617	2.616	2.407	2.520	2.369	2.860	2.778	2.224	2.262	2.429	2.265
Ta	5.793	5.607	5.643	5.646	5.742	5.741	5.884	5.401	5.425	5.982	5.998	5.901	5.979
Sn	1.317	1.234	1.247	1.263	1.321	1.156	1.416	1.215	1.226	1.312	1.312	1.356	1.319
W	0.005	0.007	0.006	0.010	0.019	0.024	0.042	0.013	0.008	0.012	0.011	0.009	0.009
Pb	0.000	0.006	0.005	0.009	0.007	0.004	0.000	0.017	0.006	0.001	0.002	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
Sc	0.071	0.124	0.101	0.116	0.114	0.081	0.097	0.091	0.072	0.099	0.058	0.047	0.053
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.063	16.000	16.000	16.000	16.036	16.014	16.000	16.000	16.000
Comments:	QJ - QL same incl. all are inclusions in cassiterite also contains microlite incls.				GF & GK same incl. all are inclusions in cassiterite			GI & GJ same incl. Ti wodginite Fe-Ti wodginite		RA - RF same incl. euhedral zoned inclusion in cassiterite with extreme FeTi composition all ferrotitanowodginite			

Wodginite Group

Raw data	Marko's 96-AT17		Marko's pegmatite 96-AT19B										
	RE	RF	DA	DD	DF	DG	DH	DJ	DL	DM	DN	DT	DW
FeO	10.83	10.90	4.36	2.31	2.70	2.80	2.58	4.93	2.62	2.57	2.25	2.84	4.90
MnO	2.03	2.01	8.08	9.77	9.20	9.44	9.52	8.87	9.27	9.38	9.88	9.21	7.15
TiO2	7.70	7.67	1.42	1.17	0.87	1.10	0.96	1.15	0.94	0.81	1.11	0.81	2.53
Nb2O5	12.96	14.35	7.43	7.34	6.34	6.51	8.07	14.02	7.32	6.85	7.79	6.67	7.90
Ta2O5	57.70	56.51	63.55	64.10	64.97	64.58	62.76	62.56	63.53	63.58	62.43	63.46	62.53
SnO2	8.57	8.70	14.77	14.71	15.56	15.64	15.87	7.33	15.99	16.65	15.91	15.39	14.09
WO3	0.16	0.11	0.72	0.00	0.28	0.47	0.44	0.15	0.08	0.55	0.25	0.49	0.23
PbO	0.00	0.11	0.00	0.26	0.12	0.09	0.00	0.59	0.04	0.00	0.66	0.00	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
UO2	0.01	0.00	0.00	0.11	0.18	0.08	0.00	0.08	0.00	0.00	0.00	0.48	0.47
Sc2O3	0.28	0.20	0.00	0.01	0.00	0.00	0.24	0.86	0.04	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	0.00	0.00	0.17	0.00	0.16	0.00	0.12	0.00	0.12	0.00	0.00	0.00	0.00
Total	100.25	100.55	100.48	99.76	100.39	100.71	100.56	100.55	99.97	100.39	100.28	99.36	99.80

Recalculated oxides	96-AT17		96-AT19B										
	RE	RF	DA	DD	DF	DG	DH	DJ	DL	DM	DN	DT	DW
Li2O	0.02	0.04	0.09	0.11	0.12	0.09	0.09	0.09	0.11	0.12	0.07	0.11	0.08
FeO	10.37	10.37	2.91	0.93	1.44	1.45	1.47	2.34	1.49	1.39	0.94	1.47	3.81
MnO	2.03	2.01	8.08	9.77	9.20	9.44	9.52	8.87	9.27	9.38	9.88	9.21	7.15
Fe2O3	0.49	0.56	1.59	1.52	1.38	1.49	1.22	2.82	1.24	1.30	1.45	1.51	1.20
TiO2	7.70	7.67	1.42	1.17	0.87	1.10	0.96	1.15	0.94	0.81	1.11	0.81	2.53
Nb2O5	12.96	14.35	7.43	7.34	6.34	6.51	8.07	14.02	7.32	6.85	7.79	6.67	7.90
Ta2O5	57.70	56.51	63.55	64.10	64.97	64.58	62.76	62.56	63.53	63.58	62.43	63.46	62.53
SnO2	8.57	8.70	14.77	14.71	15.56	15.64	15.87	7.33	15.99	16.65	15.91	15.39	14.09
WO3	0.16	0.11	0.72	0.00	0.28	0.47	0.44	0.15	0.08	0.55	0.25	0.49	0.23
PbO	0.00	0.11	0.00	0.26	0.12	0.09	0.00	0.59	0.04	0.00	0.66	0.00	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
UO2	0.01	0.00	0.00	0.11	0.18	0.08	0.00	0.08	0.00	0.00	0.00	0.48	0.47
Sc2O3	0.28	0.20	0.00	0.01	0.00	0.00	0.24	0.86	0.04	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	0.00	0.00	0.17	0.00	0.16	0.00	0.12	0.00	0.12	0.00	0.00	0.00	0.00
Total	100.28	100.62	100.72	100.02	100.64	100.94	100.76	100.88	100.19	100.63	100.48	99.60	99.99

Structural formulae based on 32 oxygens

Li	0.023	0.058	0.159	0.184	0.207	0.155	0.155	0.152	0.189	0.200	0.116	0.180	0.135
Fe2+	3.320	3.288	1.010	0.326	0.508	0.507	0.512	0.788	0.523	0.487	0.328	0.522	1.315
Mn	0.656	0.643	2.831	3.461	3.271	3.327	3.333	2.996	3.283	3.313	3.482	3.298	2.491
Fe3+	0.140	0.159	0.496	0.482	0.439	0.468	0.381	0.856	0.392	0.410	0.457	0.482	0.372
Ti	2.213	2.183	0.440	0.369	0.275	0.344	0.297	0.345	0.297	0.254	0.346	0.257	0.782
Nb	2.237	2.455	1.388	1.388	1.203	1.225	1.508	2.527	1.384	1.292	1.466	1.275	1.470
Ta	5.993	5.814	7.146	7.295	7.414	7.310	7.052	6.783	7.223	7.214	7.065	7.294	6.997
Sn	1.306	1.313	2.434	2.454	2.604	2.596	2.614	1.165	2.666	2.769	2.639	2.594	2.311
W	0.016	0.011	0.077	0.000	0.031	0.050	0.047	0.016	0.009	0.059	0.027	0.053	0.025
Pb	0.000	0.011	0.000	0.029	0.014	0.010	0.000	0.064	0.005	0.000	0.074	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000
U	0.001	0.000	0.000	0.010	0.016	0.007	0.000	0.007	0.000	0.000	0.000	0.045	0.043
Sc	0.094	0.065	0.000	0.003	0.000	0.000	0.087	0.300	0.015	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.018	0.000	0.017	0.000	0.013	0.000	0.013	0.000	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments:

these are not inclusions in cassiterite
marginal replacement by microlite in DA & DT

Fe-Ti wodginite

all wodginite

Wodginite Group

Pegmatite 5														
96-AT23														
Raw data	NF	NG	NH	NU	NV	NJ	NN	NO	NP	NQ	NR	PA	PB	PC
FeO	11.65	11.73	11.19	11.04	11.45	11.40	11.99	11.24	11.43	11.26	11.01	12.65	12.13	11.58
MnO	4.41	4.40	4.48	4.34	4.32	4.76	4.94	4.63	4.69	4.56	4.55	5.06	4.77	4.55
TiO2	1.77	1.95	2.00	1.92	1.91	1.97	1.51	2.17	1.95	1.99	2.29	1.68	1.69	2.29
Nb2O5	16.87	17.54	17.80	17.20	17.19	17.08	15.85	18.71	17.97	18.38	19.02	15.31	15.37	16.85
Ta2O5	37.48	38.21	38.53	37.84	37.15	36.87	32.95	38.95	37.48	38.24	39.96	31.23	31.81	39.72
SnO2	9.34	9.66	9.49	9.63	9.73	9.61	8.84	9.75	9.62	9.88	9.90	8.57	8.48	9.57
WO3	16.43	15.05	14.76	15.38	15.98	16.22	22.48	13.35	15.37	14.26	11.91	24.10	23.14	12.99
PbO	0.11	0.05	0.08	0.10	0.10	0.12	0.07	0.09	0.11	0.13	0.07	0.09	0.03	0.07
ThO2	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
UO2	0.00	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.10	0.01
Sc2O3	0.32	0.42	0.60	0.69	0.61	0.36	0.20	0.35	0.38	0.39	0.47	0.29	0.84	0.39
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00
Total	98.37	99.02	98.93	98.23	98.42	98.41	98.84	99.28	98.99	99.08	99.20	99.01	98.35	98.11

Recalculated														
96-AT23														
oxides	NF	NG	NH	NU	NV	NJ	NN	NO	NP	NQ	NR	PA	PB	PC
Li2O	0.24	0.19	0.22	0.23	0.22	0.20	0.33	0.20	0.21	0.22	0.18	0.25	0.24	0.10
FeO	6.77	7.14	6.89	6.84	7.00	6.64	5.95	6.96	6.78	6.87	7.11	6.25	6.48	7.28
MnO	4.41	4.40	4.48	4.34	4.32	4.76	4.94	4.63	4.69	4.56	4.55	5.06	4.77	4.55
Fe2O3	5.27	4.94	4.61	4.49	4.77	5.14	6.51	4.62	5.02	4.73	4.20	6.92	6.06	4.67
TiO2	1.77	1.95	2.00	1.92	1.91	1.97	1.51	2.17	1.95	1.99	2.29	1.68	1.69	2.29
Nb2O5	16.87	17.54	17.80	17.20	17.19	17.08	15.85	18.71	17.97	18.38	19.02	15.31	15.37	16.85
Ta2O5	37.48	38.21	38.53	37.84	37.15	36.87	32.95	38.95	37.48	38.24	39.96	31.23	31.81	39.72
SnO2	9.34	9.66	9.49	9.63	9.73	9.61	8.84	9.75	9.62	9.88	9.90	8.57	8.48	9.57
WO3	16.43	15.05	14.76	15.38	15.98	16.22	22.48	13.35	15.37	14.26	11.91	24.13	23.14	12.99
PbO	0.11	0.05	0.08	0.10	0.10	0.12	0.07	0.09	0.11	0.13	0.07	0.09	0.03	0.07
ThO2	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
UO2	0.00	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.10	0.01
Sc2O3	0.32	0.42	0.60	0.69	0.61	0.36	0.20	0.35	0.38	0.39	0.47	0.29	0.84	0.39
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00
Total	98.99	99.56	99.47	98.76	98.96	98.99	99.64	99.82	99.57	99.64	99.68	99.78	99.00	98.48

Structural formulae based on 32 oxygens

Li	0.375	0.293	0.340	0.366	0.334	0.311	0.502	0.300	0.323	0.331	0.272	0.383	0.376	0.150
Fe2+	2.188	2.290	2.213	2.218	2.262	2.142	1.909	2.216	2.167	2.197	2.266	1.994	2.089	2.361
Mn	1.426	1.412	1.439	1.406	1.394	1.535	1.582	1.475	1.499	1.459	1.454	1.614	1.531	1.482
Fe3+	1.533	1.426	1.332	1.310	1.386	1.491	1.880	1.324	1.445	1.360	1.204	1.988	1.758	1.363
Ti	0.508	0.557	0.568	0.553	0.546	0.564	0.428	0.614	0.555	0.564	0.648	0.476	0.482	0.661
Nb	2.913	3.005	3.048	2.972	2.960	2.942	2.708	3.185	3.070	3.138	3.242	2.605	2.635	2.929
Ta	3.892	3.937	3.969	3.933	3.849	3.820	3.386	3.989	3.851	3.928	4.098	3.197	3.281	4.153
Sn	1.422	1.459	1.433	1.469	1.478	1.460	1.332	1.465	1.450	1.488	1.488	1.286	1.283	1.468
W	1.626	1.477	1.449	1.524	1.578	1.601	2.201	1.303	1.505	1.396	1.163	2.354	2.275	1.295
Pb	0.011	0.005	0.008	0.010	0.010	0.012	0.008	0.009	0.011	0.013	0.007	0.010	0.003	0.007
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.001	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.009	0.001
Sc	0.106	0.139	0.199	0.231	0.202	0.120	0.065	0.116	0.124	0.127	0.153	0.094	0.277	0.130
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.005	0.000	0.000	0.001	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments: NF - NV same incl. NN - NR same incl.
all are inclusions in cassiterite
also contains microlite incls.

tungsteniferous ferrowodginite with complex zonation patterns

Wodginite Group

Pegmatite 5														
96-AT23														
Raw data	PD1	PD2	PD3	PD4	PD5	PD6	PD7	PD8	PD9	PD10	PD11	PD12	PD13	PD14
FeO	13.03	13.18	12.45	12.45	12.46	12.46	12.40	12.51	12.46	12.48	12.48	12.53	12.56	12.51
MnO	4.66	4.78	4.16	4.18	4.07	4.03	4.02	4.05	3.96	4.00	3.99	4.04	4.01	4.01
TiO ₂	1.59	1.59	2.34	2.25	2.22	2.20	2.29	2.29	2.29	2.28	2.27	2.29	2.26	2.26
Nb ₂ O ₅	14.94	14.80	18.12	18.11	17.97	18.23	18.12	18.10	18.16	18.07	18.44	18.24	18.20	18.02
Ta ₂ O ₅	31.18	30.76	38.75	38.58	38.33	38.39	38.37	38.30	38.50	38.57	38.35	38.39	38.52	38.44
SnO ₂	8.45	8.52	10.06	10.03	10.12	10.06	10.10	10.10	9.90	10.03	10.16	10.12	9.98	10.06
WO ₃	24.89	25.41	13.28	13.34	13.33	13.48	13.60	13.46	13.36	13.48	13.55	13.39	13.42	13.65
PbO	0.08	0.10	0.11	0.14	0.12	0.18	0.15	0.18	0.04	0.08	0.04	0.11	0.15	0.10
ThO ₂	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
UO ₂	0.00	0.01	0.00	0.07	0.03	0.03	0.05	0.05	0.02	0.07	0.00	0.04	0.04	0.00
Sc ₂ O ₃	0.35	0.35	0.53	0.33	0.51	0.40	0.37	0.46	0.35	0.47	0.39	0.43	0.35	0.44
Sb ₂ O ₃	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
Bi ₂ O ₃	0.05	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.00	0.00
Total	99.31	99.55	99.86	99.50	99.19	99.49	99.57	99.53	99.10	99.60	99.76	99.62	99.50	99.50

Recalculated														
96-AT23														
oxides	PD1	PD2	PD3	PD4	PD5	PD6	PD7	PD8	PD9	PD10	PD11	PD12	PD13	PD14
Li ₂ O	0.27	0.25	0.06	0.08	0.06	0.09	0.10	0.07	0.11	0.09	0.11	0.08	0.09	0.09
FeO	6.56	6.56	8.13	7.96	8.13	8.04	8.00	8.13	8.05	8.14	8.10	8.15	8.08	8.11
MnO	4.66	4.78	4.16	4.18	4.07	4.03	4.02	4.05	3.96	4.00	3.99	4.04	4.01	4.01
Fe ₂ O ₃	6.98	7.14	4.68	4.88	4.70	4.80	4.76	4.74	4.78	4.70	4.74	4.75	4.86	4.77
TiO ₂	1.59	1.59	2.34	2.25	2.22	2.20	2.29	2.29	2.29	2.28	2.27	2.29	2.26	2.26
Nb ₂ O ₅	14.94	14.80	18.12	18.11	17.97	18.23	18.12	18.10	18.16	18.07	18.44	18.24	18.20	18.02
Ta ₂ O ₅	31.18	30.76	38.75	38.58	38.33	38.39	38.37	38.30	38.50	38.57	38.35	38.39	38.52	38.44
SnO ₂	8.45	8.52	10.06	10.03	10.12	10.06	10.10	10.10	9.90	10.03	10.16	10.12	9.98	10.06
WO ₃	24.89	25.41	13.28	13.34	13.33	13.48	13.60	13.46	13.36	13.48	13.55	13.39	13.42	13.65
PbO	0.08	0.10	0.11	0.14	0.12	0.18	0.15	0.18	0.04	0.08	0.04	0.11	0.15	0.10
ThO ₂	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
UO ₂	0.00	0.01	0.00	0.07	0.03	0.03	0.05	0.05	0.02	0.07	0.00	0.04	0.04	0.00
Sc ₂ O ₃	0.35	0.35	0.53	0.33	0.51	0.40	0.37	0.46	0.35	0.47	0.39	0.43	0.35	0.44
Sb ₂ O ₃	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
Bi ₂ O ₃	0.05	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.00	0.00	0.00
Total	99.99	100.26	100.22	99.94	99.59	99.93	99.96	99.93	99.50	99.99	100.18	100.02	99.94	99.94

Structural formulae based on 32 oxygens

Li	0.412	0.382	0.090	0.121	0.089	0.139	0.157	0.105	0.161	0.130	0.162	0.117	0.138	0.134
Fe ²⁺	2.095	2.089	2.576	2.531	2.593	2.555	2.544	2.585	2.567	2.586	2.565	2.585	2.568	2.577
Mn	1.485	1.519	1.323	1.334	1.305	1.288	1.283	1.291	1.268	1.275	1.269	1.288	1.280	1.279
Fe ³⁺	2.006	2.044	1.333	1.395	1.349	1.373	1.362	1.356	1.372	1.345	1.352	1.357	1.388	1.365
Ti	0.450	0.449	0.661	0.639	0.631	0.624	0.648	0.649	0.651	0.645	0.639	0.647	0.639	0.639
Nb	2.541	2.510	3.077	3.086	3.072	3.106	3.085	3.083	3.103	3.076	3.128	3.103	3.099	3.068
Ta	3.190	3.137	3.957	3.956	3.943	3.934	3.931	3.925	3.957	3.950	3.912	3.927	3.947	3.939
Sn	1.268	1.274	1.506	1.508	1.526	1.511	1.517	1.518	1.492	1.507	1.520	1.518	1.499	1.511
W	2.427	2.470	1.293	1.303	1.307	1.316	1.328	1.315	1.309	1.316	1.317	1.305	1.310	1.333
Pb	0.008	0.010	0.011	0.014	0.012	0.018	0.016	0.018	0.004	0.008	0.004	0.011	0.015	0.010
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.001	0.000	0.006	0.003	0.003	0.004	0.004	0.001	0.006	0.000	0.003	0.003	0.000
Sc	0.113	0.114	0.174	0.107	0.169	0.133	0.123	0.151	0.115	0.155	0.127	0.141	0.114	0.145
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.004	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.005	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000

Comments: rim core

tungsteniferous ferrowodginite with complex zonation patterns

Wodginite Group

Raw data	Pegmatite 5 96-AT23					East Beryl pegmatite 97-1A					SW Beryl aplite 97-69			
	PD15	PD16	PD17	PD18	PD19	NB	NG1	NG2	NG3	NG4	NG5	CA	CC	
FeO	12.45	12.47	12.57	12.51	13.16	0.30	0.36	0.36	0.36	0.37	0.34	10.29	10.59	
MnO	4.00	4.07	4.09	3.99	4.55	10.39	10.96	10.89	10.94	11.01	10.95	2.47	2.43	
TiO2	2.22	2.21	2.19	2.31	1.63	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.82	
Nb2O5	18.03	18.06	18.22	18.09	15.11	4.70	4.58	5.19	5.26	5.23	5.05	8.04	8.85	
Ta2O5	38.09	38.04	38.34	38.14	31.14	67.13	65.94	65.41	65.50	65.08	65.39	62.33	61.39	
SnO2	10.08	10.14	10.04	9.98	8.48	16.93	17.31	17.42	17.21	17.22	17.25	14.52	14.64	
WO3	13.57	13.72	13.78	13.57	24.43	0.19	0.20	0.29	0.35	0.33	0.23	0.10	0.24	
PbO	0.15	0.10	0.14	0.14	0.12	0.06	0.01	0.06	0.03	0.00	0.00	0.04	0.01	
ThO2	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	
UO2	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.52	0.28	0.49	0.37	0.29	0.10	0.04	0.18	0.00	0.00	0.01	0.13	0.00	
Sb2O3	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	
Bi2O3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	
Total	99.15	99.14	99.90	99.15	99.06	99.79	99.40	99.80	99.66	99.24	99.23	98.66	98.54	
Recalculated	96-AT23					97-1A					97-69			
oxides	PD15	PD16	PD17	PD18	PD19	NB	NG1	NG2	NG3	NG4	NG5	CA	CC	
Li2O	0.07	0.10	0.08	0.09	0.26	0.11	0.00	0.02	0.00	0.00	0.00	0.03	0.04	
FeO	8.11	7.94	8.11	8.07	6.70	0.00	0.00	0.00	0.00	0.00	0.00	8.73	8.77	
MnO	4.00	4.07	4.09	3.99	4.55	10.39	10.96	10.89	10.94	11.01	10.95	2.47	2.43	
Fe2O3	4.69	4.92	4.83	4.82	6.98	0.34	0.40	0.41	0.40	0.41	0.38	1.70	1.99	
TiO2	2.22	2.21	2.19	2.31	1.63	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.82	
Nb2O5	18.03	18.06	18.22	18.09	15.11	4.70	4.58	5.19	5.26	5.23	5.05	8.04	8.85	
Ta2O5	38.09	38.04	38.34	38.14	31.14	67.13	65.94	65.41	65.50	65.08	65.39	62.33	61.39	
SnO2	10.08	10.14	10.04	9.98	8.48	16.93	17.31	17.42	17.21	17.22	17.25	14.52	14.64	
WO3	13.57	13.72	13.78	13.57	24.43	0.19	0.20	0.29	0.35	0.33	0.23	0.10	0.24	
PbO	0.15	0.10	0.14	0.14	0.12	0.06	0.01	0.06	0.03	0.00	0.00	0.04	0.01	
ThO2	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	
UO2	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc2O3	0.52	0.28	0.49	0.37	0.29	0.10	0.04	0.18	0.00	0.00	0.01	0.13	0.00	
Sb2O3	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	
Bi2O3	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	
Total	99.54	99.58	100.31	99.56	99.68	99.94	99.44	99.86	99.70	99.28	99.27	99.20	99.17	
Structural formulae based on 32 oxygens														
Li	0.114	0.154	0.120	0.137	0.394	0.194	0.000	0.027	0.000	0.000	0.000	0.050	0.066	
Fe2+	2.589	2.532	2.567	2.571	2.142	0.000	0.000	0.000	0.000	0.000	0.000	3.070	3.074	
Mn	1.283	1.304	1.299	1.278	1.452	3.800	4.029	3.966	3.997	4.036	4.019	0.877	0.859	
Fe3+	1.347	1.410	1.376	1.382	2.009	0.109	0.130	0.131	0.129	0.132	0.123	0.539	0.626	
Ti	0.630	0.627	0.619	0.655	0.463	0.000	0.000	0.000	0.000	0.000	0.000	0.346	0.257	
Nb	3.083	3.087	3.090	3.091	2.577	0.916	0.898	1.008	1.026	1.023	0.989	1.524	1.672	
Ta	3.918	3.910	3.912	3.919	3.194	7.879	7.780	7.649	7.682	7.660	7.710	7.104	6.978	
Sn	1.520	1.529	1.502	1.504	1.275	2.914	2.995	2.988	2.959	2.973	2.982	2.427	2.440	
W	1.330	1.344	1.340	1.329	2.387	0.021	0.022	0.032	0.040	0.037	0.025	0.010	0.026	
Pb	0.015	0.010	0.014	0.014	0.012	0.007	0.001	0.007	0.003	0.000	0.000	0.004	0.001	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Sc	0.173	0.093	0.160	0.121	0.095	0.036	0.015	0.067	0.000	0.000	0.003	0.047	0.001	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.000	
Total	16.000	16.000	16.000	16.000	16.000	15.876	15.871	15.876	15.835	15.862	15.854	16.000	16.000	
Comments:						rim					two inclusions in manganotantalite		all inclusions	
											structural formulae odd because of high Mn		in cassiterite	
											from the 93-265 locality			
	tungsteniferous ferrowodginite													
	with complex zonation patterns										all wodginite		ferrowodginite	

Wodginite Group

Raw data	SW Be aplite 97-69		Big Whopper pegmatite 97-BW7A									Big Whopper 97-BW7B	
	CE	CF	GE	GF	GG	GQ	GA	GB	GD	GM	GO	JU	JV
FeO	10.91	10.95	8.27	8.41	8.46	5.76	6.40	9.47	8.02	10.07	9.15	9.16	9.00
MnO	2.43	2.41	4.34	4.58	4.59	6.79	6.09	3.91	3.73	3.26	3.43	4.33	4.39
TiO2	2.01	2.05	0.78	0.89	0.81	0.74	0.71	0.46	0.09	0.99	0.65	0.87	0.85
Nb2O5	10.62	10.73	8.27	10.23	10.02	8.71	7.96	11.02	4.40	11.11	8.13	11.76	10.24
Ta2O5	60.68	60.02	62.90	60.41	60.11	62.12	62.69	61.30	66.30	59.36	62.20	55.10	57.59
SnO2	12.23	11.96	14.29	13.32	13.86	14.66	15.21	12.10	16.01	13.39	14.72	12.23	12.18
WO3	0.38	0.39	0.43	0.50	0.47	0.31	0.39	0.40	0.14	0.51	0.37	3.92	3.32
PbO	0.02	0.03	0.05	0.01	0.03	0.04	0.00	0.13	0.00	0.00	0.00	0.00	0.00
ThO2	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
UO2	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
Sc2O3	0.21	0.19	0.00	0.08	0.05	0.00	0.18	0.10	0.00	0.06	0.01	0.16	0.07
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.05	0.03	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.00
Total	99.17	98.47	99.36	98.51	98.45	99.18	99.67	98.95	98.75	98.84	98.76	97.56	97.69
Recalculated	97-69		97-BW7A									97-BW7B	
oxides	CE	CF	GE	GF	GG	GQ	GA	GB	GD	GM	GO	JU	JV
Li2O	0.03	0.03	0.11	0.08	0.06	0.10	0.07	0.10	0.12	0.06	0.08	0.14	0.13
FeO	9.07	9.06	6.49	6.44	6.51	4.06	4.92	7.05	6.62	8.01	7.43	6.53	6.39
MnO	2.43	2.41	4.34	4.58	4.59	6.79	6.09	3.91	3.73	3.26	3.43	4.33	4.39
Fe2O3	1.99	2.04	1.94	2.14	2.13	1.86	1.62	2.63	1.51	2.25	1.86	2.84	2.83
TiO2	2.01	2.05	0.78	0.89	0.81	0.74	0.71	0.46	0.09	0.99	0.65	0.87	0.85
Nb2O5	10.62	10.73	8.27	10.23	10.02	8.71	7.96	11.02	4.40	11.11	8.13	11.76	10.24
Ta2O5	60.68	60.02	62.90	60.41	60.11	62.12	62.69	61.30	66.30	59.36	62.20	55.10	57.59
SnO2	12.23	11.96	14.29	13.32	13.86	14.66	15.21	12.10	16.01	13.39	14.72	12.23	12.18
WO3	0.38	0.39	0.43	0.50	0.47	0.31	0.39	0.40	0.14	0.51	0.37	3.92	3.32
PbO	0.02	0.03	0.05	0.01	0.03	0.04	0.00	0.13	0.00	0.00	0.00	0.00	0.00
ThO2	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
UO2	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
Sc2O3	0.21	0.19	0.00	0.08	0.05	0.00	0.18	0.10	0.00	0.06	0.01	0.16	0.07
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.05	0.03	0.00	0.01	0.00	0.00	0.01	0.02	0.02	0.00
Total	99.67	98.90	99.58	98.73	98.66	99.39	99.84	99.20	98.91	98.99	98.91	97.89	97.99
Structural formulae based on 32 oxygens													
Li	0.056	0.044	0.179	0.136	0.099	0.167	0.117	0.162	0.213	0.094	0.144	0.225	0.215
Fe2+	3.102	3.117	2.278	2.251	2.279	1.425	1.727	2.452	2.416	2.770	2.632	2.265	2.239
Mn	0.839	0.837	1.537	1.612	1.619	2.404	2.156	1.371	1.371	1.136	1.225	1.509	1.547
Fe3+	0.611	0.633	0.612	0.674	0.669	0.589	0.510	0.824	0.495	0.700	0.594	0.887	0.892
Ti	0.615	0.631	0.245	0.279	0.252	0.232	0.221	0.143	0.028	0.305	0.206	0.269	0.267
Nb	1.954	1.987	1.563	1.922	1.888	1.645	1.503	2.061	0.864	2.068	1.549	2.189	1.924
Ta	6.719	6.686	7.152	6.830	6.814	7.059	7.123	6.896	7.827	6.650	7.130	6.170	6.514
Sn	1.986	1.954	2.381	2.209	2.304	2.443	2.534	1.996	2.771	2.200	2.474	2.008	2.020
W	0.040	0.041	0.046	0.054	0.050	0.033	0.042	0.043	0.016	0.055	0.040	0.418	0.358
Pb	0.002	0.003	0.005	0.001	0.003	0.005	0.000	0.014	0.000	0.000	0.000	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.073	0.068	0.000	0.028	0.018	0.000	0.066	0.037	0.000	0.020	0.005	0.056	0.026
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.005	0.004	0.000	0.001	0.000	0.000	0.001	0.002	0.002	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	CE & CF same grain		from petalite part of section			five grains from albitite part of section					two tiny grains		
	mainly ferrowodginite											ferrowodginite	

Wodginite Group

Raw data	GWN 97-GWN5					Pegmatite 7 97-P7-1								
	KN	SD	SE	SF	SG	SH	SI	SK	SL	SN	SQ	SR	SV	
FeO	6.13	10.04	9.76	9.91	10.21	10.15	9.91	10.27	10.03	10.09	10.15	10.05	10.03	
MnO	6.94	3.74	3.86	3.63	3.54	3.44	3.72	3.51	3.71	3.66	3.60	3.76	3.70	
TiO2	1.16	2.63	2.07	2.45	2.55	1.94	2.04	3.31	3.24	3.18	2.90	3.01	2.31	
Nb2O5	9.98	13.98	12.85	13.23	14.49	12.53	13.40	13.86	13.17	13.76	13.77	14.45	14.17	
Ta2O5	58.27	54.59	55.49	55.96	54.50	56.25	53.53	55.00	55.07	55.05	54.77	54.18	54.02	
SnO2	13.25	11.73	11.83	11.44	11.79	12.49	12.09	11.25	11.34	10.81	11.42	11.17	11.97	
WO3	1.77	2.25	2.72	2.22	2.18	2.56	3.51	2.25	2.20	2.50	2.22	2.30	2.50	
PbO	0.00	0.08	0.13	0.04	0.04	0.09	0.08	0.03	0.07	0.06	0.06	0.13	0.07	
ThO2	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	
UO2	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	
Sc2O3	0.03	0.10	0.14	0.18	0.06	0.18	0.17	0.18	0.12	0.17	0.21	0.13	0.14	
Sb2O3	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	
Bi2O3	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	97.54	99.16	98.88	99.11	99.37	99.66	98.47	99.69	98.98	99.31	99.14	99.21	98.95	
Recalculated	97-GWN5					97-P7-1								
oxides	KN	SD	SE	SF	SG	SH	SI	SK	SL	SN	SQ	SR	SV	
Li2O	0.08	0.07	0.09	0.09	0.09	0.08	0.10	0.06	0.04	0.08	0.05	0.07	0.08	
FeO	4.03	7.92	7.52	7.84	8.08	8.03	7.64	8.35	8.07	8.03	8.16	7.96	7.88	
MnO	6.94	3.74	3.86	3.63	3.54	3.44	3.72	3.51	3.71	3.66	3.60	3.76	3.70	
Fe2O3	2.30	2.36	2.49	2.30	2.37	2.35	2.52	2.14	2.18	2.29	2.22	2.33	2.39	
TiO2	1.16	2.63	2.07	2.45	2.55	1.94	2.04	3.31	3.24	3.18	2.90	3.01	2.31	
Nb2O5	9.98	13.98	12.85	13.23	14.49	12.53	13.40	13.86	13.17	13.76	13.77	14.45	14.17	
Ta2O5	58.27	54.59	55.49	55.96	54.50	56.25	53.53	55.00	55.07	55.05	54.77	54.18	54.02	
SnO2	13.25	11.73	11.83	11.44	11.79	12.49	12.09	11.25	11.34	10.81	11.42	11.17	11.97	
WO3	1.77	2.25	2.72	2.22	2.18	2.56	3.51	2.25	2.20	2.50	2.22	2.30	2.50	
PbO	0.00	0.08	0.13	0.04	0.04	0.09	0.08	0.03	0.07	0.06	0.06	0.13	0.07	
ThO2	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	
UO2	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	
Sc2O3	0.03	0.10	0.14	0.18	0.06	0.18	0.17	0.18	0.12	0.17	0.21	0.13	0.14	
Sb2O3	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	
Bi2O3	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total	97.82	99.44	99.19	99.40	99.67	99.93	98.79	99.93	99.21	99.58	99.38	99.47	99.23	
Structural formulae based on 32 oxygens														
Li	0.130	0.108	0.146	0.153	0.145	0.137	0.166	0.089	0.064	0.120	0.082	0.106	0.124	
Fe2+	1.414	2.628	2.528	2.617	2.668	2.689	2.563	2.742	2.679	2.650	2.703	2.624	2.621	
Mn	2.455	1.256	1.312	1.226	1.183	1.165	1.263	1.166	1.250	1.224	1.209	1.257	1.247	
Fe3+	0.727	0.704	0.751	0.692	0.705	0.708	0.760	0.632	0.652	0.681	0.661	0.690	0.715	
Ti	0.363	0.783	0.624	0.735	0.757	0.582	0.614	0.979	0.969	0.943	0.865	0.893	0.691	
Nb	1.884	2.506	2.334	2.387	2.587	2.267	2.430	2.461	2.366	2.454	2.467	2.575	2.547	
Ta	6.616	5.888	6.063	6.074	5.852	6.122	5.840	5.875	5.950	5.907	5.902	5.808	5.842	
Sn	2.206	1.855	1.895	1.821	1.856	1.993	1.933	1.762	1.795	1.701	1.805	1.755	1.898	
W	0.192	0.232	0.283	0.230	0.223	0.266	0.365	0.229	0.226	0.255	0.228	0.235	0.257	
Pb	0.000	0.008	0.014	0.005	0.004	0.009	0.008	0.003	0.007	0.006	0.006	0.013	0.007	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	
Sc	0.012	0.033	0.049	0.061	0.020	0.062	0.058	0.062	0.043	0.058	0.071	0.044	0.050	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	
Comments:	small isolated grain	SD - SH same grain partially mantled by cassiterite				incl. in cass assoc. SD etc		SK - SN same grain partially replaced by ferrotantalite		SQ & SR same grain				
wodginite all are ferrowodginite - some closely associated with cassiterite														

Wodginite Group

Raw data	Pegmatite 10 97-P10-1								Pegmatite 10 97-P10-3			West pegmatite 97-WP2		
	VA	VB	VG	VS	WD	JP	KB	KK	NG	NH	NM	CA	CB	
FeO	10.60	10.33	10.40	13.12	12.77	12.01	12.97	10.34	12.70	12.46	12.33	12.49	12.77	
MnO	1.99	2.00	1.94	1.64	1.49	1.58	1.62	2.25	1.24	1.40	1.25	2.51	2.40	
TiO2	0.67	0.60	0.61	1.51	3.94	4.96	1.48	1.56	1.77	1.93	2.14	0.74	0.77	
Nb2O5	5.81	5.51	5.85	15.41	16.91	14.61	15.93	8.69	14.27	14.27	12.76	15.27	16.03	
Ta2O5	67.90	66.59	65.47	51.87	50.89	53.33	49.68	60.82	52.96	52.86	55.01	50.74	50.28	
SnO2	11.39	12.54	14.05	11.57	10.81	10.25	11.44	13.56	11.74	11.86	11.55	11.75	11.90	
WO3	0.06	0.12	0.25	3.01	1.68	0.81	4.29	0.57	2.48	2.60	2.09	4.41	4.32	
PbO	0.00	0.00	0.11	0.08	0.00	0.05	0.08	0.00	0.10	0.09	0.01	0.05	0.07	
ThO2	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	
UO2	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	
Sc2O3	0.08	0.00	0.07	0.21	0.06	0.27	0.19	0.13	0.24	0.22	0.17	0.10	0.04	
Sb2O3	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	
Bi2O3	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	
Total	98.52	97.74	98.80	98.47	98.56	97.87	97.66	97.94	97.49	97.69	97.30	98.06	98.57	
Recalculated														
oxides	VA	VB	VG	VS	WD	JP	KB	KK	NG	NH	NM	CA	CB	
Li2O	0.14	0.13	0.10	0.00	0.01	0.00	0.06	0.07	0.04	0.05	0.06	0.04	0.04	
FeO	8.41	8.35	8.67	10.27	10.76	10.63	10.05	8.80	10.32	10.15	10.15	9.15	9.37	
MnO	1.99	2.00	1.94	1.64	1.49	1.58	1.62	2.25	1.24	1.40	1.25	2.51	2.40	
Fe2O3	2.35	2.14	1.86	3.10	2.20	1.51	3.24	1.71	2.60	2.52	2.37	3.65	3.72	
TiO2	0.67	0.60	0.61	1.51	3.94	4.96	1.48	1.56	1.77	1.93	2.14	0.74	0.77	
Nb2O5	5.81	5.51	5.85	15.41	16.91	14.61	15.93	8.69	14.27	14.27	12.76	15.27	16.03	
Ta2O5	67.90	66.59	65.47	51.87	50.89	53.33	49.68	60.82	52.96	52.86	55.01	50.74	50.28	
SnO2	11.39	12.54	14.05	11.57	10.81	10.25	11.44	13.56	11.74	11.86	11.55	11.75	11.90	
WO3	0.06	0.12	0.25	3.01	1.68	0.81	4.29	0.57	2.48	2.60	2.09	4.41	4.32	
PbO	0.00	0.00	0.11	0.08	0.00	0.05	0.08	0.00	0.10	0.09	0.01	0.05	0.07	
ThO2	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	
UO2	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	
Sc2O3	0.08	0.00	0.07	0.21	0.06	0.27	0.19	0.13	0.24	0.22	0.17	0.10	0.04	
Sb2O3	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	
Bi2O3	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	
Total	98.80	98.00	98.98	98.69	98.76	98.00	98.05	98.17	97.75	97.95	97.55	98.40	98.93	
Structural formulae based on 32 oxygens														
Li	0.241	0.226	0.164	0.002	0.010	0.000	0.092	0.112	0.064	0.080	0.093	0.061	0.058	
Fe2+	3.036	3.041	3.119	3.436	3.501	3.503	3.352	3.089	3.502	3.434	3.475	3.081	3.127	
Mn	0.723	0.733	0.704	0.553	0.489	0.527	0.547	0.799	0.423	0.476	0.431	0.852	0.807	
Fe3+	0.762	0.702	0.601	0.933	0.645	0.447	0.973	0.540	0.793	0.766	0.729	1.107	1.117	
Ti	0.217	0.194	0.197	0.453	1.150	1.466	0.443	0.493	0.537	0.585	0.657	0.222	0.229	
Nb	1.126	1.079	1.132	2.774	2.968	2.599	2.871	1.648	2.609	2.600	2.352	2.768	2.879	
Ta	7.913	7.843	7.619	5.617	5.374	5.705	5.386	6.939	5.824	5.793	6.101	5.532	5.432	
Sn	1.946	2.165	2.398	1.837	1.673	1.607	1.819	2.268	1.893	1.906	1.878	1.879	1.885	
W	0.007	0.014	0.028	0.311	0.169	0.082	0.444	0.062	0.260	0.271	0.221	0.458	0.445	
Pb	0.000	0.000	0.013	0.009	0.000	0.006	0.008	0.000	0.011	0.010	0.001	0.005	0.007	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
U	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
Sc	0.029	0.000	0.025	0.074	0.020	0.093	0.064	0.047	0.085	0.078	0.061	0.034	0.012	
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Bi	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	
Total	16.000	16.000	16.000	16.000	16.000	16.036	16.000	16.000	16.000	16.000	16.000	16.000	16.000	
Comments:	VA & VB same grain incl. in cass.	incl. in col./wodg. cass. grain	col./wodg. grain				KK & KL same grain incls. in cass.		inclusions in cassiterite			CA & CB same grain		
	cassiterite also contains inclusions of ferrotapiolite and microlite													
	all ferrowodginite									all ferrowodginite		ferrowodginite		

Wodginite Group

Raw data	West pegmatite 97-WP2								Big Mack pegmatite 98-83Cii				Whopper 98-SS29
	CC	CH	SA	SC	SD	SH	SI	SJ	UB	UD	UE	UG	DM
FeO	12.42	11.98	11.75	11.53	12.17	12.54	12.59	12.54	10.62	10.42	10.67	10.89	8.00
MnO	2.45	2.72	2.41	2.50	2.37	2.21	2.20	2.28	2.82	2.86	2.77	2.83	3.75
TiO2	0.79	0.74	0.51	0.54	0.71	0.67	0.66	0.73	6.82	6.42	6.58	6.61	0.82
Nb2O5	15.48	15.41	11.88	12.51	15.45	15.03	15.31	15.23	10.17	11.46	11.69	14.13	8.08
Ta2O5	51.80	51.53	58.00	57.05	52.95	51.80	51.34	51.22	57.57	56.35	58.18	55.94	62.95
SnO2	12.07	12.09	12.37	12.37	12.34	12.00	11.71	11.91	8.61	9.02	7.45	7.25	14.78
WO3	3.30	3.22	2.21	1.47	2.69	3.94	4.31	4.47	2.33	1.94	0.94	0.79	0.32
PbO	0.05	0.10	0.14	0.04	0.05	0.14	0.06	0.07	0.27	0.10	0.04	0.12	0.03
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.00
Sc2O3	0.13	0.12	0.17	0.02	0.16	0.07	0.02	0.06	0.40	0.30	0.48	0.37	0.10
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06
Total	98.48	97.91	99.44	98.03	98.94	98.39	98.20	98.58	99.64	98.92	98.84	98.95	98.89
Recalculated oxides	CB	CH	SA	SC	SD	SH	SI	SJ	UB	UD	UE	UG	DM
Li2O	0.02	0.03	0.05	0.05	0.05	0.06	0.08	0.07	0.00	0.00	0.00	0.00	0.18
FeO	9.32	8.92	8.99	8.81	9.29	9.31	9.24	9.24	9.49	9.32	9.53	9.57	6.72
MnO	2.45	2.72	2.41	2.50	2.37	2.21	2.20	2.28	2.82	2.86	2.77	2.83	3.75
Fe2O3	3.38	3.34	3.01	2.98	3.13	3.51	3.65	3.59	1.25	1.23	1.27	1.47	1.42
TiO2	0.79	0.74	0.51	0.54	0.71	0.67	0.66	0.73	6.82	6.42	6.58	6.61	0.82
Nb2O5	15.48	15.41	11.88	12.51	15.45	15.03	15.31	15.23	10.17	11.46	11.69	14.13	8.08
Ta2O5	51.80	51.53	58.00	57.05	52.95	51.80	51.34	51.22	57.57	56.35	58.18	55.94	62.95
SnO2	12.07	12.09	12.37	12.37	12.34	12.00	11.71	11.91	8.61	9.02	7.45	7.25	14.78
WO3	3.30	3.22	2.21	1.47	2.69	3.94	4.31	4.47	2.33	1.94	0.94	0.79	0.32
PbO	0.05	0.10	0.14	0.04	0.05	0.14	0.06	0.07	0.27	0.10	0.04	0.12	0.03
ThO2	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
UO2	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.00
Sc2O3	0.13	0.12	0.17	0.02	0.16	0.07	0.02	0.06	0.40	0.30	0.48	0.37	0.10
Sb2O3	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
Bi2O3	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06
Total	98.79	98.22	99.73	98.33	99.24	98.73	98.58	98.94	99.74	98.98	98.95	99.08	99.20
Structural formulae based on 32 oxygens													
Li	0.036	0.046	0.075	0.080	0.077	0.092	0.134	0.116	0.000	0.000	0.000	0.000	0.298
Fe2+	3.129	3.017	3.077	3.045	3.116	3.141	3.113	3.104	3.101	3.056	3.119	3.089	2.363
Mn	0.830	0.926	0.833	0.871	0.801	0.752	0.747	0.772	0.933	0.949	0.920	0.926	1.336
Fe3+	1.022	1.014	0.927	0.925	0.946	1.066	1.106	1.083	0.369	0.362	0.374	0.426	0.451
Ti	0.238	0.224	0.157	0.167	0.213	0.202	0.200	0.219	2.005	1.893	1.937	1.919	0.258
Nb	2.797	2.804	2.187	2.328	2.788	2.726	2.774	2.749	1.796	2.031	2.069	2.465	1.537
Ta	5.632	5.639	6.426	6.385	5.749	5.653	5.595	5.563	6.116	6.008	6.195	5.872	7.200
Sn	1.924	1.939	2.010	2.030	1.965	1.920	1.871	1.897	1.341	1.409	1.163	1.116	2.478
W	0.342	0.336	0.233	0.157	0.278	0.409	0.448	0.462	0.236	0.197	0.095	0.079	0.035
Pb	0.005	0.011	0.015	0.004	0.005	0.015	0.006	0.008	0.028	0.010	0.004	0.012	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.006	0.000	0.000	0.002	0.000	0.000
Sc	0.045	0.042	0.060	0.008	0.055	0.023	0.007	0.019	0.135	0.101	0.165	0.124	0.036
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.006
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.062	16.015	16.043	16.028	16.000
Comments:									associated & intergrown with struverite				tiny
									some similarity with ixiolite				grain
									may explain odd structural formulae				assoc.
													microlite
	all ferrowodginite								all ferrotitanowodginite				Fe wodginite

Wodginite Group

Raw data	Glitter pegmatite 99-GZ5					Glitter 99-GZ6	Big Mack pegmatite EFR-6067A			
	BC	BD	BF	BI	BY	CD	FC	FD	FE	FF
FeO	11.55	11.80	11.55	12.29	12.30	10.60	10.92	10.47	10.19	10.25
MnO	1.92	2.05	1.97	1.96	2.20	2.35	3.53	3.54	3.59	3.60
TiO2	0.37	0.44	0.37	0.51	0.69	1.23	1.71	1.90	1.77	1.65
Nb2O5	11.79	13.66	12.20	15.80	16.76	8.96	14.32	14.45	14.00	13.50
Ta2O5	59.58	58.14	59.29	55.00	56.64	61.91	50.23	50.18	52.96	53.54
SnO2	13.94	13.77	13.69	13.10	10.51	13.63	11.25	10.94	11.63	11.52
WO3	0.11	0.12	0.11	0.12	0.25	0.04	5.23	4.64	3.08	2.81
PbO	0.07	0.11	0.05	0.04	0.10	0.01	0.02	0.11	0.04	0.13
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	0.12	0.08	0.15	0.08	0.09	0.09	0.12	0.35	0.15	0.35
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.49	100.21	99.42	98.96	99.55	98.86	97.34	96.58	97.41	97.36
Recalculated	99-GZ5					99-GZ6	EFR-6067A			
oxides	BC	BD	BF	BI	BY	CD	FC	FD	FE	FF
Li2O	0.06	0.06	0.07	0.03	0.10	0.05	0.08	0.07	0.09	0.04
FeO	9.35	9.45	9.30	9.74	9.27	8.80	7.95	7.86	7.76	7.90
MnO	1.92	2.05	1.97	1.96	2.20	2.35	3.53	3.54	3.59	3.60
Fe2O3	2.40	2.55	2.46	2.78	3.29	1.97	3.31	2.90	2.70	2.62
TiO2	0.37	0.44	0.37	0.51	0.69	1.23	1.71	1.90	1.77	1.65
Nb2O5	11.79	13.66	12.20	15.80	16.76	8.96	14.32	14.45	14.00	13.50
Ta2O5	59.58	58.14	59.29	55.00	56.64	61.91	50.23	50.18	52.96	53.54
SnO2	13.94	13.77	13.69	13.10	10.51	13.63	11.25	10.94	11.63	11.52
WO3	0.11	0.12	0.11	0.12	0.25	0.04	5.23	4.64	3.08	2.81
PbO	0.07	0.11	0.05	0.04	0.10	0.01	0.02	0.11	0.04	0.13
ThO2	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
UO2	0.12	0.08	0.15	0.08	0.09	0.09	0.00	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.35	0.15	0.35
Sb2O3	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	99.72	100.43	99.65	99.21	99.89	99.03	97.75	96.95	97.77	97.66
Structural formulae based on 32 oxygens										
Li	0.104	0.093	0.114	0.046	0.160	0.090	0.124	0.117	0.140	0.059
Fe2+	3.220	3.197	3.198	3.284	3.092	3.079	2.671	2.659	2.626	2.686
Mn	0.669	0.698	0.682	0.666	0.738	0.829	1.203	1.212	1.229	1.241
Fe3+	0.744	0.777	0.761	0.844	0.987	0.621	1.000	0.884	0.823	0.802
Ti	0.115	0.134	0.113	0.154	0.204	0.385	0.517	0.578	0.538	0.506
Nb	2.188	2.487	2.260	2.870	3.005	1.691	2.603	2.644	2.560	2.482
Ta	6.650	6.369	6.605	6.008	6.109	7.023	5.490	5.521	5.827	5.922
Sn	2.281	2.212	2.236	2.098	1.662	2.268	1.803	1.765	1.877	1.868
W	0.011	0.013	0.012	0.012	0.025	0.004	0.545	0.487	0.322	0.297
Pb	0.007	0.012	0.006	0.004	0.010	0.001	0.002	0.012	0.005	0.014
Th	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
U	0.011	0.007	0.014	0.007	0.008	0.008	0.000	0.000	0.000	0.000
Sc	0.000	0.000	0.000	0.000	0.000	0.000	0.042	0.122	0.054	0.125
Sb	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000	16.000
Comments:	BC - BF			incl.	incl.	inclusion	FC mantles col.			
	inclusions in			in cass.	in cass.	in	FD - FF same grain			
	same cassiterite					cassiterite	Emerald Fields Resource			
							Corporation sample			
							all ferrowodginite			

Ferrotapiolite

	Peg. 5 94-80P		SW Beryl pegmatite 96-9										SW Be peg. 96-11A	
	MH	GC	GD	GE	FD	FE	FI	FJ	GD2	FQ	FR	FS	FT	PI
FeO	13.24	15.08	15.00	14.85	14.48	14.03	14.11	14.08	14.04	14.28	14.72	14.44	14.29	13.86
MnO	1.07	0.02	0.01	0.00	0.02	0.02	0.13	0.17	0.20	0.05	0.04	0.03	0.03	0.36
TiO2	0.92	3.60	3.31	3.45	3.40	3.29	3.65	3.90	2.53	4.32	4.18	2.98	3.54	0.86
Nb2O5	3.54	10.61	10.34	10.24	9.60	6.81	8.25	8.17	6.64	9.10	9.17	6.38	7.14	3.41
Ta2O5	80.16	69.39	69.38	69.85	70.83	74.06	71.10	71.23	75.58	70.79	70.69	74.77	74.31	80.08
SnO2	1.28	0.53	0.56	0.48	0.54	0.55	2.19	1.31	1.59	1.63	1.10	1.31	1.11	1.08
WO3	0.00	0.38	0.36	0.33	0.36	0.27	0.34	0.25	0.24	0.41	0.31	0.22	0.33	0.61
PbO	0.55	0.09	0.06	0.00	0.00	0.02	0.04	0.02	0.06	0.04	0.02	0.03	0.00	0.01
ThO2	0.00	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.01	0.00
UO2	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.05	0.02	0.09	0.02	0.00	0.00	0.00
Sb2O3	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
Bi2O3	0.00	0.03	0.00	0.00	0.06	0.01	0.00	0.02	0.02	0.04	0.01	0.00	0.01	0.06
Sc2O3	0.07	0.15	0.11	0.07	0.08	0.07	0.00	0.05	0.00	0.05	0.16	0.01	0.15	0.17
CaO		0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.10
Total	100.82	99.87	99.20	99.26	99.41	99.11	99.80	99.25	100.91	100.88	100.43	100.16	100.91	100.58

Structural formulae based on 6 oxygens

Fe	0.909	0.968	0.973	0.963	0.942	0.933	0.919	0.920	0.926	0.911	0.942	0.955	0.928	0.950
Mn	0.074	0.001	0.001	0.000	0.001	0.001	0.008	0.011	0.013	0.003	0.003	0.002	0.002	0.025
Ti	0.057	0.208	0.193	0.201	0.199	0.197	0.214	0.229	0.150	0.248	0.241	0.177	0.207	0.053
Nb	0.131	0.368	0.363	0.359	0.338	0.245	0.290	0.289	0.237	0.314	0.317	0.228	0.251	0.126
Ta	1.789	1.448	1.464	1.473	1.499	1.601	1.505	1.513	1.621	1.468	1.471	1.608	1.570	1.786
Sn	0.042	0.016	0.017	0.015	0.017	0.017	0.068	0.041	0.050	0.050	0.034	0.041	0.034	0.035
W	0.000	0.008	0.007	0.007	0.007	0.005	0.007	0.005	0.005	0.008	0.006	0.005	0.007	0.013
Pb	0.012	0.002	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.000
Th	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Sc	0.005	0.010	0.007	0.005	0.005	0.005	0.000	0.003	0.000	0.004	0.010	0.001	0.010	0.012
Ca		0.003	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.008
Total	3.019	3.032	3.029	3.022	3.012	3.004	3.012	3.014	3.003	3.010	3.025	3.018	3.009	3.011
Mn/(Mn+Fe)	0.075	0.001	0.001	0.000	0.001	0.001	0.009	0.012	0.014	0.004	0.003	0.002	0.002	0.026
Ta/(Ta+Nb)	0.932	0.797	0.801	0.804	0.816	0.867	0.838	0.840	0.873	0.824	0.823	0.876	0.862	0.934

Comments:

assoc.
with
wodgein-
ite

GC - FD ferrotapiolite rim on
ferrotantalite - see FA, GA & GB

FI, FJ & GD2 same grain

incl. in
cass. PJ

not associated
with ferro-
tantalite

NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).

Ferrotapiolite

	SW Beryl peg. 96053A		Sep. Rapids pluton 96-72A						SW Beryl pegmatite 96-81							
	SA	SB	AI	AJ	AN	AO	AS	AT	NE	NF	NG	NH	NI	NJ	NK	NL
FeO	14.38	14.53	13.93	13.90	13.76	13.63	13.86	13.89	13.63	13.95	13.68	13.76	13.43	13.74	13.81	13.46
MnO	0.09	0.09	0.74	0.74	0.75	0.85	0.82	0.81	0.45	0.30	0.28	0.25	0.43	0.29	0.36	0.25
TiO2	0.69	0.69	1.02	0.95	1.16	0.81	0.54	0.84	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
Nb2O5	8.22	8.22	7.72	6.92	6.23	6.29	4.64	6.77	4.12	5.60	4.08	5.50	3.59	4.14	4.86	3.64
Ta2O5	74.61	74.61	75.59	76.47	77.51	77.65	80.03	77.43	81.20	79.16	80.87	79.84	81.66	79.52	78.97	82.14
SnO2	0.99	0.87	1.14	1.02	1.04	0.98	0.75	0.89	0.62	1.13	0.97	0.86	0.57	1.63	1.10	0.29
WO3	0.22	0.19	0.25	0.26	0.37	0.25	0.28	0.26	0.33	0.56	0.22	0.19	0.14	0.23	0.45	0.00
PbO	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.70	0.00	0.00
ThO2	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	0.12	0.63	0.00
UO2	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.00	0.00	0.12	0.16	0.00	0.18	0.40	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.06	0.03	0.00	0.45	0.00	0.28	0.29	0.00
Sc2O3	0.04	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.72	0.00	0.00	0.01	0.01	0.15
CaO	0.00	0.00														
Total	99.23	99.20	100.39	100.31	100.88	100.49	100.93	100.91	100.42	100.82	100.94	101.02	100.33	100.84	100.88	99.93

Structural formulae based on 6 oxygens

Fe	0.973	0.984	0.931	0.936	0.924	0.921	0.945	0.932	0.945	0.952	0.938	0.942	0.936	0.952	0.951	0.940
Mn	0.006	0.006	0.050	0.051	0.051	0.058	0.057	0.055	0.032	0.021	0.020	0.017	0.030	0.020	0.025	0.018
Ti	0.042	0.042	0.061	0.058	0.070	0.049	0.033	0.050	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000
Nb	0.301	0.301	0.279	0.252	0.226	0.230	0.171	0.246	0.154	0.207	0.151	0.203	0.135	0.155	0.181	0.137
Ta	1.642	1.643	1.644	1.675	1.691	1.707	1.775	1.689	1.829	1.758	1.802	1.777	1.851	1.792	1.769	1.865
Sn	0.032	0.028	0.036	0.033	0.033	0.032	0.024	0.028	0.021	0.037	0.032	0.028	0.019	0.054	0.036	0.010
W	0.005	0.004	0.005	0.005	0.008	0.005	0.006	0.005	0.007	0.012	0.005	0.004	0.003	0.005	0.010	0.000
Pb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.016	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.012	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.003	0.000	0.003	0.007	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.009	0.000	0.006	0.006	0.000
Sc	0.003	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.052	0.000	0.000	0.001	0.001	0.011
Ca	0.000	0.000														
Total	3.002	3.007	3.007	3.009	3.004	3.003	3.012	3.007	2.989	2.990	3.001	2.985	2.990	3.006	2.998	2.981
Mn/(Mn+Fe)	0.006	0.006	0.051	0.051	0.052	0.060	0.056	0.056	0.033	0.021	0.021	0.018	0.032	0.021	0.026	0.019
Ta/(Ta+Nb)	0.845	0.845	0.855	0.869	0.882	0.881	0.912	0.873	0.922	0.895	0.923	0.897	0.932	0.920	0.907	0.931

Comments:

SA & SB same grain incl. in cass.; assoc. with ferro- tantalite

AI - AT same grain

AI - AT same grain

NE - NH

NJ - NL

assoc. with ferrowodginite assoc. with ferro-wod-ginite

same cluster

same grain

all data from ferrotantalite - ferrotapiolite clusters (ferrotantalite earlier)

Ferrotapiolite

SW Beryl pegmatite 96-81																
	NI2	NJ2	NK2	NL2	NN	NO	NP	NQ	NU	NV	GA	GB	GE	GG	GI	GJ
FeO	13.95	13.95	13.81	13.91	13.73	14.29	14.08	14.11	13.88	13.57	14.06	13.88	14.06	13.89	13.90	13.83
MnO	0.29	0.37	0.36	0.36	0.36	0.24	0.30	0.45	0.27	0.24	0.35	0.33	0.15	0.26	0.34	0.43
TiO2	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.00	0.00	0.26	0.25	0.94	3.35	0.95	0.85
Nb2O5	8.00	7.92	4.86	6.89	6.00	8.15	7.16	6.58	6.26	4.72	6.04	6.29	7.20	7.31	5.11	4.95
Ta2O5	76.09	77.01	78.97	77.55	78.31	77.04	77.86	77.72	78.42	79.02	78.71	77.40	76.76	73.81	78.85	78.23
SnO2	0.89	0.58	1.10	0.71	0.98	0.27	0.48	0.61	1.04	1.12	0.38	0.74	0.48	1.06	0.51	0.45
WO3	0.32	0.30	0.45	0.37	0.26	0.49	0.20	0.25	0.36	0.09	0.63	0.29	0.28	0.36	0.30	0.26
PbO	0.00	0.00	0.00	0.01	0.64	0.07	0.27	0.24	0.00	0.62	0.00	0.09	0.00	0.02	0.00	0.05
ThO2	0.03	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00
UO2	0.00	0.04	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.17	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.07	0.00	0.00	0.08	0.00	0.50	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00
Sc2O3	0.08	0.00	0.00	0.00	0.41	0.00	0.05	0.00	0.00	0.06	0.01	0.00	0.00	0.07	0.03	0.00
CaO											0.01	0.00	0.00	0.00	0.00	0.00
Total	99.66	100.17	99.64	99.80	100.69	100.91	100.64	100.69	100.46	99.65	100.46	99.27	99.91	100.13	99.98	99.06
Structural formulae based on 6 oxygens																
Fe	0.949	0.946	0.958	0.952	0.937	0.962	0.957	0.962	0.948	0.947	0.958	0.956	0.950	0.911	0.950	0.956
Mn	0.020	0.025	0.025	0.025	0.025	0.016	0.021	0.031	0.019	0.017	0.024	0.023	0.010	0.017	0.023	0.030
Ti	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.000	0.000	0.016	0.016	0.057	0.198	0.058	0.053
Nb	0.294	0.290	0.182	0.255	0.221	0.296	0.263	0.243	0.231	0.178	0.223	0.234	0.263	0.259	0.189	0.185
Ta	1.683	1.698	1.782	1.726	1.738	1.686	1.720	1.723	1.742	1.792	1.745	1.734	1.687	1.574	1.753	1.759
Sn	0.029	0.019	0.036	0.023	0.032	0.009	0.015	0.020	0.034	0.037	0.012	0.024	0.015	0.033	0.017	0.015
W	0.007	0.006	0.010	0.008	0.005	0.010	0.004	0.005	0.008	0.002	0.013	0.006	0.006	0.007	0.006	0.006
Pb	0.000	0.000	0.000	0.000	0.014	0.001	0.006	0.005	0.000	0.014	0.000	0.002	0.000	0.000	0.000	0.001
Th	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.001	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.006	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.006	0.000	0.000	0.000	0.029	0.000	0.003	0.000	0.000	0.004	0.001	0.000	0.000	0.005	0.002	0.000
Ca											0.001	0.000	0.000	0.000	0.000	0.000
Total	2.988	2.985	2.996	2.989	3.003	2.992	2.995	3.009	2.986	2.998	2.994	2.995	2.990	3.004	2.999	3.005
Mn/(Mn+Fe)	0.021	0.026	0.026	0.026	0.026	0.017	0.021	0.031	0.020	0.018	0.025	0.024	0.011	0.019	0.024	0.031
Ta/(Ta+Nb)	0.851	0.854	0.907	0.871	0.887	0.851	0.867	0.877	0.883	0.910	0.887	0.881	0.865	0.859	0.903	0.905

Comments:

NN - NP

NU &
NV

GI & GJ

same grain

same
grain

same grain

all data from ferrotantalite - ferrotapiolite clusters (ferrotantalite earlier)

Ferrotapiolite

	SW Be	SW Be	School of Fish pegmatite								Pegmatite 10			Peg. 10	
	peg-	peg-	97-71								97-P10-1			97-P10-4	
	96-81X	97-69	HL	HM	HN	FP	FQ	FR	FS	FT	KJ	VD	VE	VF	EI
	GD	CB													
FeO	14.36	13.83	13.33	13.29	13.33	13.95	13.55	12.86	13.41	13.20	13.98	14.01	11.36	14.28	13.47
MnO	0.28	0.58	0.14	0.13	0.15	0.28	0.55	0.44	0.42	0.43	0.31	0.08	0.06	0.15	0.13
TiO2	0.19	1.55	5.12	5.26	5.86	4.23	4.09	6.26	4.60	4.50	1.72	4.02	2.00	1.60	1.54
Nb2O5	5.18	5.92	7.09	6.96	6.95	8.01	8.57	8.18	6.91	7.05	6.82	7.40	6.28	5.89	6.65
Ta2O5	78.69	77.13	71.09	71.04	71.11	70.64	69.47	69.42	72.14	72.17	75.91	70.79	73.75	76.03	74.33
SnO2	1.13	0.56	2.20	2.33	1.88	2.27	2.91	2.06	1.81	1.75	1.18	2.91	1.89	1.10	2.93
WO3	0.27	0.31	0.31	0.28	0.25	0.35	0.33	0.29	0.29	0.23	0.36	0.46	0.37	0.36	0.24
PbO	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThO2	0.00	0.03	0.00	0.03	0.00	0.04	0.00	0.01	0.03	0.03	0.00	0.00	0.05	0.00	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.06	0.05
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Bi2O3	0.00	0.04	0.01	0.03	0.03	0.00	0.02	0.00	0.00	0.02	0.03	0.02	0.00	0.00	0.00
Sc2O3	0.07	0.10	0.20	0.20	0.36	0.13	0.12	0.35	0.15	0.20	0.03	0.07	0.01	0.02	0.00
CaO	0.02	0.03	0.00	0.02	0.01	0.00	0.00	0.09	0.02	0.04	0.01	0.00	2.77	0.00	0.01
Total	100.18	100.05	99.49	99.59	99.93	99.91	99.65	100.00	99.77	99.62	100.39	99.74	98.66	99.48	99.34
Structural formulae based on 6 oxygens															
Fe	0.985	0.933	0.862	0.858	0.852	0.902	0.876	0.812	0.871	0.859	0.933	0.912	0.763	0.968	0.910
Mn	0.019	0.039	0.009	0.009	0.010	0.018	0.036	0.028	0.028	0.028	0.021	0.005	0.004	0.010	0.009
Ti	0.012	0.094	0.298	0.305	0.337	0.246	0.238	0.356	0.268	0.263	0.103	0.235	0.121	0.097	0.093
Nb	0.192	0.216	0.248	0.243	0.240	0.280	0.300	0.279	0.243	0.248	0.246	0.260	0.228	0.216	0.243
Ta	1.756	1.692	1.495	1.492	1.478	1.485	1.460	1.426	1.524	1.527	1.648	1.499	1.612	1.676	1.633
Sn	0.037	0.018	0.068	0.072	0.057	0.070	0.090	0.062	0.056	0.054	0.037	0.090	0.061	0.036	0.094
W	0.006	0.006	0.006	0.006	0.005	0.007	0.007	0.006	0.006	0.005	0.007	0.009	0.008	0.007	0.005
Pb	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Th	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000
Bi	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Sc	0.005	0.007	0.013	0.013	0.024	0.009	0.008	0.023	0.010	0.014	0.002	0.004	0.001	0.001	0.000
Ca	0.002	0.003	0.000	0.002	0.001	0.000	0.000	0.007	0.002	0.003	0.001	0.000	0.239	0.000	0.001
Total	3.015	3.009	3.000	3.001	3.006	3.018	3.015	3.001	3.009	3.003	3.001	3.015	3.040	3.013	2.989
Mn/(Mn+Fe)	0.019	0.040	0.011	0.010	0.012	0.020	0.039	0.033	0.031	0.032	0.022	0.005	0.005	0.011	0.010
Ta/(Ta+Nb)	0.901	0.887	0.858	0.860	0.860	0.841	0.830	0.836	0.863	0.860	0.870	0.852	0.876	0.886	0.871

Comments:

isolat- ed grain	incl. in cass.	many grains close to a tourmaline/microlite-rich veinlet	VD & VE same grain	incl. in cass.	exsolved blob in cass.
			inclu- sions in cass.		

Ferrotapiolite

Big Mack pegmatite																
98-83F																
	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10	DA11	DA12	DA13	DA14	DA15	DA16
FeO	14.05	14.18	14.15	14.23	14.16	14.06	14.08	14.18	14.20	14.21	14.18	14.18	14.18	14.35	14.28	14.23
MnO	0.59	0.58	0.57	0.56	0.56	0.59	0.59	0.57	0.53	0.54	0.51	0.52	0.54	0.52	0.53	0.53
TiO2	0.43	0.45	0.44	0.44	0.46	0.44	0.47	0.47	0.48	0.49	0.46	0.44	0.43	0.46	0.46	0.46
Nb2O5	7.34	7.43	7.60	7.22	7.30	7.55	7.45	7.44	7.41	7.36	7.47	7.49	7.51	7.35	7.41	7.47
Ta2O5	76.46	76.22	76.26	76.29	75.93	75.81	75.81	76.13	76.13	76.25	76.07	75.93	76.35	76.35	76.33	76.81
SnO2	0.74	0.74	0.66	0.68	0.75	0.73	0.71	0.77	0.70	0.68	0.72	0.80	0.72	0.71	0.67	0.70
WO3	0.32	0.30	0.31	0.28	0.34	0.35	0.35	0.29	0.36	0.38	0.32	0.32	0.33	0.37	0.38	0.27
PbO	0.01	0.11	0.00	0.00	0.04	0.01	0.04	0.00	0.00	0.07	0.05	0.00	0.00	0.06	0.04	0.04
ThO2	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.04	0.00	0.01	0.00	0.01	0.00
UO2	0.00	0.00	0.05	0.02	0.00	0.00	0.03	0.02	0.03	0.00	0.00	0.04	0.02	0.04	0.06	0.00
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.07	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Sc2O3	0.07	0.00	0.00	0.00	0.11	0.02	0.08	0.00	0.00	0.00	0.00	0.02	0.00	0.04	0.00	0.00
CaO	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Total	100.03	100.02	100.02	99.73	99.65	99.56	99.65	99.90	99.90	100.01	99.82	99.73	100.08	100.26	100.16	100.51
Structural formulae based on 6 oxygens																
Fe	0.951	0.960	0.957	0.967	0.962	0.955	0.956	0.960	0.962	0.962	0.961	0.962	0.959	0.969	0.965	0.959
Mn	0.040	0.040	0.039	0.039	0.038	0.041	0.041	0.039	0.036	0.037	0.035	0.036	0.037	0.035	0.036	0.036
Ti	0.026	0.027	0.027	0.027	0.028	0.027	0.029	0.029	0.029	0.030	0.028	0.027	0.026	0.028	0.028	0.028
Nb	0.269	0.272	0.278	0.265	0.268	0.277	0.273	0.273	0.271	0.269	0.274	0.275	0.274	0.268	0.271	0.272
Ta	1.683	1.678	1.677	1.686	1.677	1.675	1.673	1.677	1.677	1.679	1.677	1.675	1.679	1.677	1.678	1.683
Sn	0.024	0.024	0.021	0.022	0.024	0.024	0.023	0.025	0.023	0.022	0.023	0.026	0.023	0.023	0.022	0.023
W	0.007	0.006	0.006	0.006	0.007	0.007	0.007	0.006	0.007	0.008	0.007	0.007	0.007	0.008	0.008	0.006
Pb	0.000	0.002	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.002	0.001	0.000	0.000	0.001	0.001	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.005	0.000	0.000	0.000	0.008	0.001	0.006	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000
Ca	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000
Total	3.006	3.011	3.006	3.012	3.013	3.007	3.010	3.009	3.009	3.009	3.008	3.008	3.006	3.014	3.010	3.006
Mn/(Mn+Fe)	0.041	0.040	0.039	0.039	0.038	0.041	0.041	0.039	0.036	0.037	0.035	0.036	0.037	0.035	0.036	0.036
Ta/(Ta+Nb)	0.862	0.860	0.858	0.864	0.862	0.858	0.860	0.860	0.861	0.862	0.860	0.859	0.860	0.862	0.861	0.861

Comments:

unzoned grain; DA 2700 μm traverse; DA, DB & DC - three relatively large unzoned grains separated from pegmatite

Ferrotapiolite

	Big Mack pegmatite 98-83F															Glitter 99-GZ1	Glitter 99-GZ4
	DB1	DB2	DB3	DB4	DB5	DC1	DC2	DC3	DC4	DC5	DC6	DC7	DC8	DC9	DC10	AF	EP
FeO	14.22	14.04	14.25	14.31	14.35	14.20	14.21	14.19	14.10	14.36	14.42	14.45	14.26	14.28	14.33	14.32	13.63
MnO	0.49	0.47	0.48	0.49	0.45	0.55	0.49	0.49	0.48	0.44	0.43	0.46	0.43	0.46	0.48	0.24	0.24
TiO2	0.41	0.45	0.42	0.44	0.59	0.45	0.49	0.43	0.57	0.64	0.77	0.66	0.63	0.55	0.49	0.52	0.61
Nb2O5	7.04	7.23	7.29	7.40	7.65	7.17	7.50	7.26	7.68	7.77	7.80	7.82	7.70	7.36	7.60	10.24	6.26
Ta2O5	77.56	76.94	76.37	76.32	75.82	76.38	76.05	76.20	74.92	74.95	74.73	75.52	75.53	75.60	76.28	73.46	77.33
SnO2	0.62	0.63	0.75	0.62	0.83	0.71	0.84	0.67	0.91	0.95	0.99	0.87	0.84	0.76	0.65	1.10	0.41
WO3	0.28	0.28	0.33	0.34	0.40	0.34	0.33	0.25	0.33	0.39	0.40	0.39	0.30	0.33	0.38	0.27	0.18
PbO	0.00	0.03	0.05	0.04	0.00	0.00	0.03	0.00	0.04	0.03	0.07	0.02	0.08	0.03	0.00	0.05	0.06
ThO2	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.01	0.04	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.01
UO2	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	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
Bi2O3	0.04	0.00	0.05	0.07	0.02	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.09	0.00	0.08
Sc2O3	0.00	0.06	0.00	0.13	0.19	0.00	0.11	0.00	0.02	0.15	0.00	0.03	0.04	0.13	0.03	0.10	0.22
CaO	0.02	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.11
Total	100.65	100.14	100.02	100.20	100.32	99.80	100.07	99.56	99.13	99.70	99.61	100.21	99.79	99.52	100.34	100.31	99.13
Structural formulae based on 6 oxygens																	
Fe	0.959	0.950	0.966	0.967	0.964	0.964	0.959	0.966	0.960	0.969	0.974	0.970	0.963	0.969	0.965	0.949	0.936
Mn	0.034	0.033	0.033	0.033	0.031	0.038	0.034	0.034	0.033	0.030	0.030	0.031	0.030	0.032	0.033	0.016	0.017
Ti	0.025	0.027	0.025	0.027	0.036	0.028	0.030	0.026	0.035	0.039	0.047	0.040	0.038	0.034	0.030	0.031	0.037
Nb	0.257	0.265	0.267	0.270	0.278	0.263	0.274	0.267	0.282	0.284	0.284	0.284	0.281	0.270	0.277	0.367	0.232
Ta	1.702	1.693	1.684	1.676	1.656	1.687	1.670	1.687	1.658	1.645	1.641	1.650	1.660	1.668	1.671	1.583	1.726
Sn	0.020	0.020	0.024	0.020	0.027	0.023	0.027	0.022	0.029	0.030	0.032	0.028	0.027	0.025	0.021	0.035	0.013
W	0.006	0.006	0.007	0.007	0.008	0.007	0.007	0.005	0.007	0.008	0.008	0.008	0.006	0.007	0.008	0.005	0.004
Pb	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.002	0.000	0.002	0.001	0.000	0.001	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002
Sc	0.000	0.004	0.000	0.009	0.013	0.000	0.008	0.000	0.002	0.010	0.000	0.002	0.002	0.009	0.002	0.007	0.016
Ca	0.001	0.002	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.010
Total	3.005	3.001	3.009	3.013	3.013	3.010	3.010	3.009	3.009	3.016	3.017	3.014	3.010	3.015	3.009	2.995	2.995
Mn/(Mn+Fe)	0.034	0.033	0.033	0.033	0.031	0.038	0.034	0.034	0.034	0.030	0.029	0.031	0.030	0.032	0.033	0.017	0.018
Ta/(Ta+Nb)	0.869	0.865	0.863	0.861	0.856	0.865	0.859	0.863	0.854	0.853	0.852	0.853	0.855	0.861	0.858	0.812	0.881

Comments:

unzoned grain; DB 1300 µm
traverse

unzoned grain; DC 3100 µm traverse

inclusion in
cass.

inclusion in
cass.

assoc.
Fe col.
incls.

Pyrochlore Group

	Bismutomicrolite			Microlite			Antimonian microlite					Stibiomicrolite Sb mic.		
	East Beryl pegmatite			East Beryl pegmatite			Lou's pegmatite					Lou's peg.		Lou's
	93-265A			93-265Rii			93-272B					93-272B	93-272D	
	ZV	ZW	ZX	LB	LC	LD	RC	RD	RE	RL	RQ	RK	RS	PE
Na2O	0.03	0.00	0.15	2.65	3.24	2.53	1.99	1.80	2.36	1.33	1.68	0.47	0.95	0.60
CaO	0.71	0.51	0.47	8.86	9.91	9.41	12.72	13.06	12.94	13.35	12.91	12.54	12.94	12.37
Al2O3	5.22	5.07	3.83									0.06	0.00	0.58
FeO	4.40	4.81	4.75	1.14	1.23	2.01	0.39	0.49	0.31	0.37	0.29	1.71	0.73	1.14
MnO	0.56	1.43	2.77	0.37	0.32	0.29	0.59	0.63	0.55	0.75	0.65	0.99	0.82	0.64
MgO	0.27	0.35	0.02											
TiO2	0.09	0.10	0.12	0.11	0.11	0.18	3.32	3.62	2.53	4.61	4.61	4.88	4.27	1.93
Nb2O5	4.84	5.00	6.32	0.77	0.97	1.07	7.11	7.42	6.81	6.42	5.99	11.40	6.10	6.30
Ta2O5	37.26	41.00	42.21	80.08	78.19	78.52	63.04	62.66	65.84	62.12	62.64	47.40	59.47	58.46
SnO2	2.07	3.28	4.52	0.55	0.55	0.55	1.37	1.48	1.14	0.98	0.86	3.10	1.85	4.48
WO3	0.57	0.86	2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.14	0.19
PbO	5.65	4.27	4.82	0.49	0.40	0.42	0.64	0.62	0.59	0.39	0.62	0.58	0.37	0.07
ThO2	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.02
UO2	3.44	2.59	2.10	1.82	1.91	1.77	0.12	0.15	0.19	0.17	0.26	0.11	0.17	0.17
Sb2O3	0.34	0.29	0.21	0.17	0.19	0.20	7.23	7.70	5.46	8.42	8.00	15.75	10.66	11.79
Bi2O3	13.83	10.16	9.63	0.07	0.02	0.02	0.03	0.03	0.05	0.00	0.03	0.02	0.03	0.00
Sc2O3	0.05	0.03	0.02	0.02	0.02	0.00	0.00	0.03	0.02	0.03	0.03	0.03	0.05	0.02
Cs2O														
BaO														
K2O														
Y2O3														
SiO2														
F	0.25	0.25	0.05	2.28	2.51	2.39	2.00	1.78	2.35	1.50	1.58	0.93	1.43	0.98
H2O*	2.58	2.71	3.01	1.26	0.99	1.13	1.79	2.08	1.41	2.37	2.26	3.02	2.37	2.81
Subtotal	82.16	82.71	87.18	100.64	100.58	100.50	102.34	103.59	102.55	102.82	102.47	102.99	102.35	102.55
O=F	0.11	0.11	0.02	0.96	1.06	1.01	0.84	0.75	0.99	0.63	0.67	0.39	0.60	0.41
Total	82.06	82.61	87.16	99.68	99.52	99.49	101.50	102.84	101.56	102.19	101.81	102.60	101.75	102.13
Structural formulae based on 6 oxygens														
Ti	0.007	0.007	0.008	0.007	0.008	0.012	0.213	0.230	0.163	0.293	0.294	0.319	0.280	0.128
Nb	0.224	0.215	0.268	0.031	0.040	0.044	0.275	0.283	0.264	0.245	0.230	0.448	0.241	0.251
Ta	1.039	1.062	1.077	1.942	1.933	1.924	1.465	1.438	1.534	1.428	1.446	1.120	1.412	1.400
W	0.015	0.021	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.004
Sn	0.085	0.125	0.169	0.020	0.020	0.020	0.047	0.050	0.039	0.033	0.029	0.107	0.064	0.157
Al	0.631	0.569	0.424									0.006	0.000	0.060
Fe	0.377	0.383	0.373	0.085	0.093	0.151	0.028	0.035	0.022	0.026	0.021	0.124	0.053	0.084
Mn	0.049	0.115	0.220	0.028	0.025	0.022	0.043	0.045	0.040	0.054	0.047	0.073	0.061	0.048
Mg	0.041	0.050	0.003											
Ca	0.078	0.052	0.047	0.847	0.965	0.909	1.165	1.180	1.188	1.209	1.174	1.167	1.210	1.167
Na	0.006	0.000	0.027	0.458	0.571	0.442	0.330	0.294	0.392	0.218	0.276	0.079	0.161	0.102
K														
Ba														
Pb	0.156	0.110	0.122	0.012	0.010	0.010	0.015	0.014	0.014	0.009	0.014	0.014	0.009	0.002
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
U	0.078	0.055	0.044	0.036	0.039	0.035	0.002	0.003	0.004	0.003	0.005	0.002	0.003	0.003
Sb	0.014	0.011	0.008	0.006	0.007	0.007	0.255	0.268	0.193	0.294	0.280	0.564	0.384	0.428
Bi	0.366	0.250	0.233	0.002	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.000	0.001	0.000
Cs														
Sc	0.004	0.002	0.002	0.002	0.002	0.000	0.000	0.002	0.001	0.002	0.002	0.002	0.004	0.002
Y														
Si														
F	0.081	0.075	0.015	0.643	0.721	0.681	0.541	0.475	0.637	0.401	0.424	0.256	0.395	0.273
OH*	0.919	0.925	0.985	0.357	0.279	0.319	0.459	0.525	0.363	0.599	0.576	0.744	0.605	0.727
Total	4.170	4.028	4.079	4.475	4.712	4.578	4.838	4.843	4.855	4.815	4.819	5.026	4.885	4.836
Comments:	single crystal inclusion in wodginit altered sample			LB - LD same grain								C, D & E sa very high Sn values incl. in cass. for microlite assoc. Sc columbite		

NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).

Pyrochlore Group

	Stibiomicrolite				Microlite							Microlite				
	Lou's pegmatite				Marko's pegmatite							Marko's pegmatite				
	93-272E				94-44A							94-44D				
	WG	WM	WN	WI	VD	VE	VI	VO	VP	VV	VW	KC	KD	KK	JE	JF
Na2O	1.75	0.58	1.60	0.72	4.86	4.79	4.89	5.03	5.06	5.06	4.84	5.36	5.21	4.52	4.92	4.92
CaO	13.59	13.80	13.72	12.24	11.91	12.46	12.49	12.24	12.14	12.11	12.31	11.78	11.72	11.31	12.08	11.99
Al2O3																
FeO	0.70	1.06	0.20	0.42	0.02	0.02	0.06	0.05	0.06	0.05	0.07	0.01	0.07	0.25	0.07	0.08
MnO	0.55	0.28	0.40	0.30	0.07	0.09	0.07	0.04	0.04	0.10	0.03	0.07	0.08	0.10	0.09	0.03
MgO																
TiO2	5.95	5.34	4.15	6.29	0.91	0.98	1.11	1.01	0.82	0.84	1.23	0.63	0.63	0.63	0.61	0.66
Nb2O5	7.10	11.47	5.38	8.98	2.70	4.97	3.54	3.17	2.94	2.95	6.15	2.55	2.44	2.35	2.77	2.33
Ta2O5	54.29	48.01	63.95	42.98	74.78	70.79	74.49	74.47	75.03	74.15	68.74	73.22	74.29	74.63	74.32	73.46
SnO2	2.17	2.70	1.09	15.30	1.27	1.75	0.85	1.10	0.89	1.39	1.67	1.21	1.15	1.16	1.21	1.06
WO3	0.08	0.00	0.00	0.12	0.00	0.06	0.05	0.00	0.03	0.00	0.15	0.00	0.00	0.00	0.00	0.00
PbO	0.43	0.54	0.39	0.48	0.05	0.02	0.02	0.03	0.00	0.03	0.09	0.12	0.10	0.07	0.19	0.21
ThO2	0.00	0.00	0.02	0.00	0.05	0.05	0.01	0.01	0.03	0.00	0.01	0.04	0.00	0.05	0.05	0.04
UO2	0.12	0.11	0.39	0.19	0.08	0.03	0.00	0.02	0.00	0.05	0.05	0.64	0.53	0.48	0.63	0.94
Sb2O3	11.62	12.73	6.29	10.60	0.98	1.20	0.56	0.93	0.51	0.82	1.51	1.12	1.08	1.09	1.02	1.05
Bi2O3	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.04	0.02	0.02	0.00	0.04	0.04	0.00	0.02	0.02
Sc2O3	0.03	0.02	0.00	0.03	0.00	0.00	0.05	0.02	0.02	0.00	0.00	0.00	0.02	0.02	0.02	0.00
Cs2O																
BaO																
K2O																
Y2O3																
SiO2																
F	1.34	1.23	2.02	1.11	3.87	3.98	3.74	3.86	3.89	4.11	4.18	4.09	3.95	3.72	4.08	4.30
H2O*	2.56	2.68	1.76	3.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	102.30	100.57	101.36	102.79	101.57	101.19	101.92	102.02	101.48	101.68	101.03	100.88	101.31	100.38	102.08	101.09
O=F	0.56	0.52	0.85	0.47	1.63	1.68	1.57	1.63	1.64	1.73	1.76	1.72	1.66	1.57	1.72	1.81
Total	101.73	100.05	100.51	102.32	99.94	99.51	100.35	100.39	99.84	99.95	99.27	99.16	99.65	98.81	100.36	99.28

Structural formulae based on 6 oxygens

Ti	0.384	0.344	0.267	0.356	0.060	0.064	0.072	0.066	0.054	0.056	0.080	0.043	0.043	0.043	0.041	0.045
Nb	0.275	0.444	0.208	0.305	0.107	0.196	0.139	0.125	0.117	0.118	0.241	0.105	0.099	0.095	0.112	0.096
Ta	1.265	1.119	1.488	0.878	1.788	1.678	1.758	1.770	1.797	1.778	1.618	1.808	1.817	1.821	1.804	1.820
W	0.002	0.000	0.000	0.002	0.000	0.001	0.001	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.000
Sn	0.074	0.092	0.037	0.459	0.045	0.061	0.029	0.038	0.031	0.049	0.058	0.044	0.041	0.041	0.043	0.039
Al																
Fe	0.050	0.076	0.014	0.026	0.001	0.001	0.004	0.004	0.004	0.004	0.005	0.001	0.005	0.019	0.005	0.006
Mn	0.040	0.020	0.029	0.019	0.005	0.007	0.005	0.003	0.003	0.007	0.002	0.005	0.006	0.008	0.007	0.002
Mg																
Ca	1.248	1.267	1.258	0.986	1.122	1.164	1.162	1.146	1.145	1.144	1.142	1.146	1.129	1.087	1.155	1.171
Na	0.291	0.096	0.265	0.105	0.828	0.809	0.823	0.852	0.864	0.865	0.812	0.944	0.908	0.786	0.852	0.869
K																
Ba																
Pb	0.010	0.012	0.009	0.010	0.001	0.000	0.000	0.001	0.000	0.001	0.002	0.003	0.002	0.002	0.005	0.005
Th	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.001
U	0.002	0.002	0.007	0.003	0.002	0.001	0.000	0.000	0.000	0.001	0.001	0.013	0.011	0.010	0.013	0.019
Sb	0.411	0.450	0.222	0.328	0.036	0.043	0.020	0.034	0.019	0.030	0.054	0.042	0.040	0.040	0.038	0.039
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Cs																
Sc	0.002	0.001	0.000	0.002	0.000	0.000	0.004	0.002	0.002	0.000	0.000	0.000	0.002	0.002	0.002	0.000
Y																
Si																
F	0.363	0.333	0.546	0.264	1.076	1.097	1.027	1.067	1.083	1.146	1.144	1.175	1.123	1.055	1.152	1.239
OH*	0.637	0.667	0.454	0.736	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	5.054	4.926	4.805	4.479	5.073	5.123	5.045	5.109	5.121	5.198	5.163	5.331	5.228	5.009	5.228	5.352

Comments: wispy incl. in cass. stannioan
antimonian

KC - JE same grain
replaces wodginite

Pyrochlore Group

	Microlite Marko's pegmatite 94-44E								Microlite Marko's pegmatite 94-44E					Sb Mic. Marko's 94-44I
	KC	KD	KG	KL	PI	PN	PR	PS	HA	HF	HJ	HM	HN	SW
	Na2O	5.36	5.32	5.31	5.47	4.74	3.69	5.29	3.91	5.10	5.37	3.49	5.38	5.02
CaO	11.95	12.14	11.73	11.60	11.72	8.80	11.91	8.64	11.80	11.82	9.62	11.67	11.29	12.78
Al2O3					0.09									0.38
FeO	0.03	0.01	0.03	0.05	0.06	0.50	0.06	0.47	0.03	0.06	0.64	0.03	0.03	0.67
MnO	0.03	0.11	0.04	0.10	0.39	3.88	0.14	3.97	0.09	0.10	6.26	0.10	0.03	1.08
MgO														
TiO2	0.63	0.66	0.71	0.68	0.93	1.02	0.90	0.91	0.82	0.74	1.17	0.85	1.02	12.63
Nb2O5	3.46	3.73	4.32	4.01	4.62	8.79	4.24	10.91	3.52	3.28	14.85	4.03	4.15	9.91
Ta2O5	73.61	72.53	71.91	73.16	72.54	68.68	71.63	66.14	73.55	73.75	59.24	70.79	71.37	35.03
SnO2	1.17	1.20	1.23	1.58	1.12	0.98	1.17	1.03	1.60	1.48	1.24	2.42	2.75	3.11
WO3	0.03	0.03	0.00	0.01	0.04	0.10	0.10	0.18	0.00	0.00	0.00	0.00	0.00	0.48
PbO	0.07	0.05	0.03	0.00	0.02	0.05	0.07	0.05	0.02	0.03	0.02	0.05	0.00	0.13
ThO2	0.02	0.02	0.04	0.05	0.02	0.01	0.01	0.00	0.04	0.05	0.00	0.20	0.00	0.05
UO2	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.15	0.20	0.03	0.17	0.25	0.21
Sb2O3	0.87	1.04	1.15	1.15					1.03	1.01	1.09	1.35	1.50	20.91
Bi2O3	0.04	0.09	0.06	0.00					0.05	0.02	0.02	0.00	0.00	0.07
Sc2O3	0.00	0.02	0.00	0.00					0.00	0.00	0.00	0.02	0.00	0.10
Cs2O														
BaO														
K2O														
Y2O3														
SiO2														
F	3.73	3.96	4.01	4.07	4.31	3.08	3.90	3.36	4.12	4.15	3.59	4.56	4.48	0.44
H2O*	0.00	0.00	0.00	0.00	0.00	0.69	0.00	0.45	0.00	0.00	0.25	0.00	0.00	3.82
Subtotal	101.00	100.91	100.57	102.19	100.60	100.27	99.42	100.02	101.92	102.06	101.51	101.62	101.89	101.80
O=F	1.57	1.67	1.69	1.71	1.81	1.30	1.64	1.41	1.73	1.75	1.51	1.92	1.89	0.19
Total	99.43	99.24	98.88	100.48	98.79	98.97	97.78	98.60	100.19	100.31	99.99	99.70	100.00	101.62
Structural formulae based on 6 oxygens														
Ti	0.042	0.044	0.047	0.045	0.061	0.064	0.060	0.057	0.054	0.049	0.073	0.056	0.066	0.750
Nb	0.139	0.151	0.173	0.159	0.181	0.333	0.170	0.410	0.139	0.131	0.555	0.161	0.162	0.354
Ta	1.777	1.762	1.736	1.741	1.710	1.567	1.726	1.495	1.751	1.768	1.332	1.698	1.677	0.753
W	0.001	0.001	0.000	0.000	0.001	0.002	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.010
Sn	0.041	0.043	0.044	0.055	0.039	0.033	0.041	0.034	0.056	0.052	0.041	0.085	0.095	0.098
Al					0.009									0.035
Fe	0.002	0.001	0.002	0.004	0.004	0.035	0.004	0.033	0.002	0.004	0.044	0.002	0.002	0.044
Mn	0.002	0.008	0.003	0.007	0.029	0.276	0.011	0.280	0.007	0.007	0.438	0.007	0.002	0.072
Mg														
Ca	1.137	1.162	1.116	1.088	1.088	0.791	1.131	0.770	1.107	1.117	0.852	1.103	1.045	1.082
Na	0.923	0.921	0.914	0.928	0.796	0.600	0.909	0.630	0.866	0.918	0.559	0.920	0.841	0.000
K														
Ba														
Pb	0.002	0.001	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.001	0.000	0.001	0.000	0.003
Th	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.004	0.000	0.001
U	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.003	0.004	0.001	0.003	0.005	0.004
Sb	0.032	0.038	0.042	0.041					0.037	0.037	0.037	0.049	0.053	0.681
Bi	0.001	0.002	0.001	0.000					0.001	0.000	0.000	0.000	0.000	0.001
Cs														
Sc	0.000	0.002	0.000	0.000					0.000	0.000	0.000	0.002	0.000	0.007
Y														
Si														
F	1.047	1.118	1.126	1.126	1.181	0.817	1.093	0.883	1.141	1.157	0.938	1.272	1.224	0.110
OH*	0.000	0.000	0.000	0.000	0.000	0.183	0.000	0.117	0.000	0.000	0.062	0.000	0.000	0.890
Total	5.146	5.254	5.205	5.201	5.100	4.704	5.150	4.713	5.164	5.246	4.932	5.363	5.173	4.895
Comments:	assoc. with coarse beryl & zinnwaldite microlite with blobby textured cassiterite inclusions													

Pyrochlore Group

	Microlite			Antimonian microlite		Sb microlite			Microlite						
	Marko's pegmatite			Marko's pegmatite		Marko's peg.			Marko's pegmatite						
	94-44J			94-44J		94-44J			94-44J						
	EC	EG	EH	EA	EB	ED	EE	EF	JA	JB	JE	JC	JD	JF	
Na2O	4.62	5.01	4.82	3.86	3.87	3.19	4.99	4.04	5.04	4.64	3.55	3.82	2.69	3.22	
CaO	12.49	13.33	12.78	12.72	12.75	12.81	13.04	13.25	12.06	12.06	10.39	10.98	10.73	11.19	
Al2O3				0.00	0.00	0.00	0.19	0.00							
FeO	0.08	0.05	0.14	0.06	0.06	0.07	0.07	0.12	0.05	0.03	0.37	0.37	0.22	0.69	
MnO	0.26	0.05	0.21	0.30	0.22	0.43	0.28	0.35	0.04	0.05	0.05	0.08	0.12	0.17	
MgO															
TiO2	4.13	3.13	3.97	5.26	5.28	6.49	5.38	5.31	2.05	2.80	2.40	1.92	2.32	2.58	
Nb2O5	5.12	5.06	4.66	5.50	5.60	5.63	6.19	5.04	3.81	4.86	4.37	3.91	5.28	5.64	
Ta2O5	61.73	65.55	62.33	57.51	57.82	55.61	58.13	59.73	71.04	66.83	69.82	70.33	68.41	65.73	
SnO2	1.51	1.33	1.54	1.73	2.02	1.90	1.75	1.72	1.30	1.51	1.13	1.10	1.17	1.34	
WO3	0.02	0.00	0.00	0.00	0.02	0.07	0.00	0.00	0.00	0.07	0.00	0.01	0.00	0.00	
PbO	0.03	0.00	0.00	0.07	0.07	0.07	0.05	0.03	0.03	0.12	0.10	0.26	0.28	0.34	
ThO2	0.06	0.01	0.01	0.05	0.05	0.04	0.03	0.01	0.03	0.04	0.02	0.05	0.02	0.08	
UO2	0.17	0.00	0.00	0.12	0.14	0.17	0.15	0.00	0.37	0.40	0.34	1.13	1.43	1.35	
Sb2O3	5.66	3.82	4.96	7.84	7.76	9.90	7.88	7.60	2.08	3.60	2.43	2.07	2.41	2.70	
Bi2O3	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.02	
Sc2O3	0.05	0.00	0.16	0.03	0.03	0.08	0.05	0.05	0.00	0.00	0.02	0.00	0.02	0.00	
Cs2O															
BaO															
K2O															
Y2O3															
SiO2															
F	4.01	4.43	4.01	3.54	3.68	2.86	3.45	3.82	4.26	3.78	3.38	3.27	2.76	2.78	
H2O*	0.00	0.00	0.00	0.06	0.00	0.89	0.30	0.00	0.00	0.00	0.29	0.34	0.91	0.86	
Subtotal	99.98	101.77	99.59	98.65	99.40	100.21	101.93	101.07	102.16	100.79	98.68	99.68	98.77	98.69	
O=F	1.69	1.87	1.69	1.49	1.55	1.20	1.45	1.61	1.79	1.59	1.42	1.38	1.16	1.17	
Total	98.29	99.90	97.90	97.16	97.85	99.00	100.48	99.46	100.37	99.20	97.26	98.30	97.61	97.52	
Structural formulae based on 6 oxygens															
Ti	0.272	0.205	0.264	0.347	0.345	0.418	0.343	0.344	0.133	0.182	0.155	0.127	0.150	0.169	
Nb	0.203	0.199	0.186	0.218	0.220	0.218	0.237	0.196	0.149	0.190	0.170	0.155	0.206	0.223	
Ta	1.472	1.550	1.496	1.374	1.365	1.297	1.341	1.400	1.673	1.574	1.636	1.679	1.604	1.561	
W	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	
Sn	0.053	0.046	0.054	0.061	0.070	0.065	0.059	0.059	0.045	0.052	0.039	0.039	0.040	0.047	
Al				0.000	0.000	0.000	0.019	0.000							
Fe	0.006	0.003	0.010	0.004	0.004	0.005	0.005	0.008	0.004	0.002	0.027	0.027	0.016	0.050	
Mn	0.019	0.004	0.016	0.022	0.016	0.031	0.020	0.026	0.003	0.004	0.004	0.006	0.009	0.013	
Mg															
Ca	1.173	1.242	1.209	1.197	1.186	1.177	1.185	1.224	1.119	1.119	0.959	1.033	0.991	1.047	
Na	0.785	0.845	0.825	0.657	0.651	0.530	0.821	0.676	0.846	0.779	0.593	0.650	0.450	0.545	
K															
Ba															
Pb	0.001	0.000	0.000	0.002	0.002	0.002	0.001	0.001	0.001	0.003	0.002	0.006	0.006	0.008	
Th	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.002	
U	0.003	0.000	0.000	0.002	0.003	0.003	0.003	0.000	0.007	0.008	0.007	0.022	0.027	0.026	
Sb	0.205	0.137	0.181	0.284	0.278	0.350	0.276	0.270	0.074	0.129	0.086	0.075	0.086	0.097	
Bi	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	
Cs															
Sc	0.004	0.000	0.012	0.002	0.002	0.006	0.004	0.003	0.000	0.000	0.002	0.000	0.002	0.000	
Y															
Si															
F	1.112	1.218	1.119	0.983	1.010	0.776	0.926	1.041	1.166	1.035	0.921	0.908	0.752	0.768	
OH*	0.000	0.000	0.000	0.017	0.000	0.224	0.074	0.000	0.000	0.000	0.079	0.092	0.248	0.232	
Total	5.310	5.449	5.373	5.172	5.154	5.105	5.315	5.250	5.220	5.079	4.680	4.821	4.587	4.789	
Comments:									A, B & E same grain attached to edge of cassiterite	C, D & F same grain BSE shows appreciable internal alteration					

Pyrochlore Group

	Stibiomicrocline					Microcline						Microcline		Microcline			
	Marko's pegmatite					Marko's pegmatite						Marko's peg.		Marko's pegmatite			
	94-44K					94-44R						94-44T		94-44V			
	CK	CM	CP	CQ	ZG	DL	YE	YF	YK	YL	YM	EC	ED	EF	EH	EI	EJ
Na2O	2.54	3.61	4.00	4.05	4.23	3.91	4.90	4.96	5.00	3.89	3.51	3.02	4.40	2.36	5.20	5.41	5.11
CaO	12.56	12.65	12.50	12.57	11.87	9.02	11.99	12.20	12.30	9.59	9.94	8.99	11.20	6.21	12.22	11.94	11.55
Al2O3																	
FeO	0.18	0.15	0.18	0.14	0.09	0.26	0.08	0.01	0.05	0.08	0.02	0.22	0.07	1.22	0.11	0.02	0.17
MnO	0.56	0.50	0.65	0.67	0.21	0.13	0.34	0.21	0.17	0.41	0.23	0.22	0.12	7.96	0.14	0.25	0.72
MgO																	
TiO2	8.55	8.44	8.97	9.10	5.09	0.94	1.02	0.90	1.04	0.87	0.75	0.67	0.61	1.10	1.14	0.81	0.95
Nb2O5	9.44	9.40	10.00	11.54	9.64	3.12	3.24	2.72	3.73	2.28	2.56	4.01	4.13	13.53	3.55	3.06	3.82
Ta2O5	47.24	48.62	46.65	43.89	58.10	74.97	73.06	75.61	73.88	74.18	76.53	76.79	76.44	66.25	75.50	76.25	76.28
SnO2	1.58	1.67	1.60	1.20	1.33	1.64	1.77	1.24	1.45	1.32	1.20	1.17	1.30	0.81	1.04	0.92	1.15
WO3	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.14	0.05	0.00	0.00	0.00	0.00	0.15	0.03	0.01	0.00
PbO	0.05	0.08	0.07	0.05	0.08	0.40	0.10	0.05	0.07	0.75	0.59	0.14	0.02	0.14	0.03	0.09	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.04	0.02	0.03	0.03	0.00	0.03	0.04	0.00
UO2	0.00	0.00	0.00	0.00	0.00	1.20	0.23	0.20	0.17	2.49	1.53	0.40	0.09	0.00	0.00	0.08	0.00
Sb2O3	14.31	13.69	14.22	14.76	6.23	1.03	1.33	0.95	1.24	0.68	0.62	1.30	1.12				
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.04						
Sc2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Cs2O																	
BaO																	
K2O																	
Y2O3																	
SiO2																	
F	2.28	2.37	1.92	2.43	3.67	2.87	4.17	4.18	4.02	3.16	3.08	2.44	3.35	2.03	3.86	3.85	3.58
H2O*	1.66	1.62	2.14	1.58	0.21	0.78	0.00	0.00	0.00	0.38	0.56	1.26	0.39	1.96	0.00	0.00	0.16
Subtotal	100.95	102.80	102.90	101.98	100.75	100.27	102.45	103.37	103.17	100.12	101.18	100.66	103.27	103.72	102.85	102.73	103.49
O=F	0.96	1.00	0.81	1.02	1.55	1.21	1.76	1.76	1.69	1.33	1.30	1.03	1.41	0.85	1.63	1.62	1.51
Total	99.99	101.81	102.09	100.95	99.21	99.06	100.69	101.61	101.48	98.79	99.88	99.64	101.86	102.86	101.22	101.11	101.98
Structural formulae based on 6 oxygens																	
Ti	0.532	0.518	0.549	0.559	0.312	0.061	0.067	0.059	0.068	0.058	0.049	0.043	0.039	0.065	0.073	0.053	0.060
Nb	0.353	0.347	0.368	0.426	0.356	0.122	0.128	0.107	0.146	0.092	0.101	0.153	0.158	0.483	0.137	0.120	0.146
Ta	1.063	1.080	1.032	0.975	1.289	1.761	1.739	1.788	1.736	1.802	1.809	1.765	1.759	1.423	1.754	1.795	1.755
W	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.001	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000
Sn	0.052	0.054	0.052	0.039	0.043	0.056	0.062	0.043	0.050	0.047	0.042	0.039	0.044	0.026	0.035	0.032	0.039
Al																	
Fe	0.012	0.010	0.012	0.010	0.006	0.019	0.006	0.001	0.004	0.006	0.001	0.016	0.005	0.081	0.008	0.001	0.012
Mn	0.039	0.035	0.045	0.046	0.015	0.010	0.025	0.015	0.012	0.031	0.017	0.016	0.009	0.533	0.010	0.018	0.052
Mg																	
Ca	1.113	1.107	1.089	1.101	1.038	0.835	1.125	1.137	1.139	0.918	0.926	0.814	1.016	0.526	1.118	1.108	1.047
Na	0.407	0.572	0.631	0.642	0.669	0.655	0.832	0.836	0.838	0.674	0.591	0.495	0.722	0.361	0.861	0.908	0.838
K																	
Ba																	
Pb	0.001	0.002	0.002	0.001	0.002	0.009	0.002	0.001	0.002	0.018	0.014	0.003	0.000	0.003	0.001	0.002	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.001	0.000
U	0.000	0.000	0.000	0.000	0.000	0.023	0.004	0.004	0.003	0.049	0.030	0.008	0.002	0.000	0.000	0.002	0.000
Sb	0.488	0.461	0.477	0.497	0.210	0.037	0.048	0.034	0.044	0.025	0.022	0.045	0.039	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Cs																	
Sc	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Y																	
Si																	
F	0.597	0.612	0.494	0.628	0.947	0.784	1.155	1.150	1.098	0.893	0.847	0.652	0.897	0.507	1.043	1.054	0.958
OH*	0.403	0.388	0.506	0.372	0.053	0.216	0.000	0.000	0.000	0.107	0.153	0.348	0.103	0.493	0.000	0.000	0.042
Total	5.062	5.186	5.255	5.297	4.939	4.587	5.198	5.178	5.139	4.722	4.602	4.397	4.793	4.503	5.041	5.094	4.948
Comments: K & M same grain P, Q & G same grain antimonian microlite replaces wodginite odd ? microlite replaces wodginite																	

Pyrochlore Group

	Microlite-like (after ferrotapiolite)							Microlite				Microlite		Microlite			
	Marko's pegmatite							Marko's pegmatite				Marko's peg.		Marko's pegmatite			
	94-44Z							94-44ii				94-44iii(3)		94-44iii(3)			
	FA	FC	FD	FE	FG	FI	FJ	EF	EG	EI	EJ	AA	AC	AD	AE	AH	AA
Na2O	1.97	2.20	0.65	1.30	2.09	1.04	1.79	5.08	3.12	3.83	5.18	5.06	4.42	5.28	5.43	5.57	5.26
CaO	7.08	8.86	2.48	5.03	9.22	3.58	10.85	12.55	12.70	11.98	12.74	9.89	8.93	10.61	10.23	10.78	9.21
Al2O3																	
FeO	6.26	3.22	12.04	9.00	2.65	11.72	1.90	0.02	0.68	0.05	0.01	0.02	0.07	0.02	0.06	0.07	0.03
MnO	0.00	0.09	0.00	0.00	0.06	0.00	0.02	0.14	0.27	0.17	0.18	0.06	0.05	0.05	0.05	0.07	0.05
MgO																	
TiO2	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.75	0.77	0.78	0.74	0.62	0.59	0.63	0.64	0.66	0.64
Nb2O5	0.89	1.09	1.26	1.09	0.81	1.57	1.92	3.00	2.89	2.90	2.75	3.14	2.87	2.99	2.80	2.52	3.10
Ta2O5	75.38	76.00	73.89	75.54	75.03	73.35	76.22	73.09	74.15	74.95	73.50	75.79	78.11	74.90	75.13	74.65	76.94
SnO2	1.27	1.12	1.14	1.11	1.32	1.31	1.24	1.51	1.04	1.11	1.30	1.32	1.19	1.47	1.04	0.92	1.57
WO3	0.37	0.38	0.44	0.63	0.29	0.22	0.73	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
PbO	0.00	0.00	0.77	0.00	0.00	0.21	0.00	0.36	0.23	0.09	0.23	0.12	0.09	0.17	0.05	0.05	0.07
ThO2	0.19	0.38	0.00	0.56	0.00	0.00	0.45	0.06	0.05	0.04	0.03	0.07	0.02	0.04	0.07	0.04	0.01
UO2	1.71	1.08	1.43	1.01	1.78	1.51	0.72	0.63	0.99	0.70	0.73	0.54	0.44	0.51	0.47	0.37	0.47
Sb2O3	0.55	0.29	0.27	0.55	0.89	0.77	0.30	0.80	0.89	0.69	0.69	0.78	0.60	0.78	0.67	0.72	0.68
Bi2O3	0.00	0.00	0.13	0.58	0.16	0.00	0.21	0.00	0.00	0.02	0.02	0.02	0.02	0.00	0.04	0.02	0.02
Sc2O3	0.28	0.00	0.69	1.47	2.20	0.14	0.00	0.02	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.02
Cs2O	0.68	0.69	1.62	0.00	0.55	0.77	0.77										
BaO																	
K2O																	
Y2O3																	
SiO2																	
F	1.12	1.45	0.24	0.54	1.49	0.26	1.23	3.95	3.17	3.24	4.06	4.22	4.28	4.12	4.50	4.44	4.10
H2O*	2.35	2.01	3.18	3.01	2.00	3.18	2.33	0.00	0.40	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	100.09	98.99	100.23	101.40	100.53	99.61	100.66	101.96	101.36	100.95	102.16	101.63	101.68	101.57	101.18	100.89	102.17
O=F	0.47	0.61	0.10	0.23	0.63	0.11	0.52	1.66	1.33	1.36	1.71	1.77	1.80	1.73	1.89	1.87	1.73
Total	99.62	98.38	100.13	101.17	99.91	99.51	100.14	100.30	100.02	99.59	100.45	99.86	99.88	99.84	99.29	99.02	100.44
Structural formulae based on 6 oxygens																	
Ti	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.050	0.052	0.052	0.050	0.040	0.038	0.042	0.043	0.045	0.041
Nb	0.037	0.045	0.054	0.045	0.034	0.067	0.078	0.121	0.116	0.115	0.111	0.123	0.111	0.119	0.112	0.102	0.120
Ta	1.907	1.896	1.893	1.899	1.909	1.879	1.858	1.775	1.795	1.794	1.792	1.791	1.811	1.788	1.809	1.820	1.786
W	0.009	0.009	0.011	0.015	0.007	0.005	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sn	0.047	0.041	0.043	0.041	0.049	0.049	0.044	0.054	0.037	0.039	0.046	0.046	0.040	0.051	0.037	0.033	0.053
Al																	
Fe	0.487	0.247	0.948	0.696	0.207	0.923	0.142	0.001	0.051	0.004	0.001	0.001	0.005	0.001	0.004	0.005	0.002
Mn	0.000	0.007	0.000	0.000	0.005	0.000	0.002	0.011	0.020	0.013	0.014	0.004	0.004	0.004	0.004	0.005	0.004
Mg																	
Ca	0.706	0.871	0.250	0.498	0.924	0.361	1.042	1.201	1.211	1.130	1.224	0.920	0.816	0.998	0.970	1.036	0.842
Na	0.356	0.392	0.118	0.232	0.378	0.189	0.310	0.879	0.538	0.654	0.901	0.852	0.731	0.899	0.932	0.968	0.870
K																	
Ba																	
Pb	0.000	0.000	0.019	0.000	0.000	0.005	0.000	0.009	0.006	0.002	0.006	0.003	0.002	0.004	0.001	0.001	0.002
Th	0.004	0.008	0.000	0.012	0.000	0.000	0.009	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000
U	0.035	0.022	0.030	0.021	0.037	0.032	0.014	0.013	0.020	0.014	0.015	0.010	0.008	0.010	0.009	0.007	0.009
Sb	0.021	0.011	0.011	0.021	0.034	0.030	0.011	0.029	0.033	0.025	0.026	0.028	0.021	0.028	0.024	0.027	0.024
Bi	0.000	0.000	0.003	0.014	0.004	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Cs	0.027	0.027	0.065	0.000	0.022	0.031	0.029										
Sc	0.022	0.000	0.056	0.118	0.179	0.012	0.000	0.002	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.001
Y																	
Si																	
F	0.329	0.422	0.071	0.156	0.442	0.077	0.348	1.115	0.892	0.902	1.151	1.158	1.154	1.144	1.260	1.259	1.107
OH*	0.671	0.578	0.929	0.844	0.558	0.923	0.652	0.000	0.108	0.098	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.659	4.584	4.501	4.612	4.791	4.582	4.565	5.261	4.880	4.844	5.337	4.980	4.741	5.089	5.207	5.310	4.862
Comments:	core	core	rim		rim			all same grain				uniform mineral	separate	- all same grain			
	remnants of possible ferrotapiolite							microlite replaces wodginitite									

Pyrochlore Group

	Uranmicrolite		Uranmicrolite		Microlite			Microlite					Microlite			
	Pegmatite 5		Pegmatite 5		Pegmatite 5			Treelined Lake Complex					Pegmatite 7			
	94-80D		94-80F		94-80I			94-84E					94-Peg 7B			
	GJ	GK	ZD	ZE	QP	QQ	QR	EA	EB	EC	ED	EE	QB	WZ	XB	
Na2O	0.44	0.44	1.52	1.96	3.89	3.73	3.93	1.97	2.72	3.14	2.16	1.81	1.17	0.62	0.65	
CaO	3.44	4.44	6.30	6.27	12.18	12.48	12.57	6.23	9.07	6.73	6.07	6.26	15.97	10.60	14.87	
Al2O3														0.05	0.10	
FeO	0.60	0.65	1.79	1.24	0.10	0.13	0.10	0.09	0.61	0.09	1.36	0.57	0.10	1.86	0.34	
MnO	0.33	0.40	0.36	0.45	0.07	0.10	0.11	0.32	0.28	0.23	0.14	0.23	0.25	1.93	0.39	
MgO														0.02	0.00	
TiO2	0.39	0.44	0.49	0.34	1.90	1.81	1.62	0.14	0.16	0.18	0.13	0.15	0.82	1.09	2.16	
Nb2O5	1.76	1.90	1.65	1.46	5.35	5.78	5.58	4.66	4.57	4.70	4.21	4.76	7.64	36.98	13.61	
Ta2O5	67.61	66.00	63.93	65.29	68.37	68.01	69.30	74.14	70.33	72.68	68.80	71.33	66.64	40.52	60.68	
SnO2	0.16	0.32	0.90	1.03	2.37	2.60	2.53	0.71	0.49	0.74	0.51	0.58	3.60	1.81	3.34	
WO3	0.08	0.19	0.00	0.00	0.36	0.47	0.37	0.53	0.59	0.53	0.41	0.54	0.13	0.55	0.12	
PbO	2.64	2.67	3.11	3.05	1.15	0.83	0.69	0.59	0.85	0.89	4.05	0.82	0.12	0.63	0.28	
ThO2	0.01	0.00	0.00	0.00	0.01	0.03	0.03	0.00	0.00	0.00	0.04	0.01	0.01	0.00	0.03	
UO2	16.61	16.36	13.65	13.24	0.20	0.10	0.04	1.76	1.74	1.72	1.59	1.72	0.41	0.72	0.55	
Sb2O3			0.78	0.67	2.48	2.53	1.90	1.46	2.19	1.75	1.68	1.63		0.19	0.58	
Bi2O3			0.00	0.08	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.05		0.00	0.04	
Sc2O3			0.03	0.02	0.11	0.00	0.00	0.98	0.30	1.37	2.91	4.64		0.17	0.00	
Cs2O					0.00	0.09	0.04									
BaO																
K2O																
Y2O3																
SiO2																
F	0.36	1.65	1.07	1.06	3.00	2.84	3.10	1.14	1.60	1.77	1.38	1.47	2.18	0.92	1.94	
H2O*	2.73	1.43	2.06	2.09	0.74	0.93	0.67	2.35	1.86	1.76	2.01	2.08	1.60	3.57	2.11	
Subtotal	97.15	96.89	97.64	98.25	102.27	102.44	102.57	97.10	97.36	98.30	97.44	98.64	100.64	102.23	101.79	
O=F	0.15	0.69	0.45	0.45	1.26	1.19	1.30	0.48	0.67	0.75	0.58	0.62	0.92	0.39	0.82	
Total	97.00	96.20	97.19	97.81	101.01	101.25	101.27	96.62	96.69	97.55	96.86	98.02	99.73	101.84	100.98	
Structural formulae based on 6 oxygens																
Ti	0.030	0.034	0.039	0.027	0.122	0.115	0.103	0.009	0.011	0.012	0.009	0.010	0.052	0.056	0.126	
Nb	0.081	0.089	0.079	0.069	0.206	0.221	0.213	0.185	0.191	0.189	0.181	0.195	0.292	1.134	0.478	
Ta	1.880	1.858	1.844	1.861	1.584	1.566	1.591	1.769	1.766	1.760	1.780	1.761	1.532	0.748	1.281	
W	0.002	0.005	0.000	0.000	0.008	0.010	0.008	0.012	0.014	0.012	0.010	0.013	0.003	0.010	0.002	
Sn	0.007	0.013	0.038	0.043	0.080	0.088	0.085	0.025	0.018	0.026	0.019	0.021	0.121	0.049	0.103	
Al								0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.009	
Fe	0.051	0.056	0.159	0.109	0.007	0.009	0.007	0.007	0.047	0.007	0.108	0.043	0.007	0.106	0.022	
Mn	0.029	0.035	0.032	0.040	0.005	0.007	0.008	0.024	0.022	0.017	0.011	0.018	0.018	0.111	0.026	
Mg													0.000	0.002	0.000	
Ca	0.377	0.493	0.716	0.704	1.111	1.131	1.137	0.586	0.897	0.642	0.619	0.609	1.446	0.771	1.237	
Na	0.087	0.088	0.313	0.398	0.643	0.611	0.644	0.335	0.487	0.542	0.398	0.318	0.192	0.082	0.098	
K																
Ba																
Pb	0.073	0.074	0.089	0.086	0.026	0.019	0.016	0.014	0.021	0.021	0.104	0.020	0.003	0.012	0.006	
Th	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	
U	0.378	0.377	0.322	0.309	0.004	0.002	0.001	0.034	0.036	0.034	0.034	0.035	0.008	0.011	0.010	
Sb	0.000	0.000	0.034	0.029	0.087	0.088	0.066	0.053	0.083	0.064	0.066	0.061		0.005	0.019	
Bi	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001		0.000	0.001	
Cs					0.000	0.003	0.002									
Sc	0.000	0.000	0.003	0.002	0.008	0.000	0.000	0.075	0.024	0.106	0.241	0.367		0.010	0.000	
Y																
Si																
F	0.116	0.540	0.359	0.351	0.808	0.759	0.827	0.317	0.467	0.500	0.417	0.423	0.583	0.197	0.476	
OH*	0.884	0.460	0.641	0.649	0.192	0.241	0.173	0.683	0.533	0.500	0.583	0.577	0.417	0.803	0.524	
Total	3.995	4.123	4.667	4.679	4.891	4.872	4.881	4.127	4.617	4.434	4.582	4.471	4.674	4.108	4.418	
Comments:					inclusions/replacement in/of ferrotantalite			analysed twice and checked for additional elements					inclusion in cassiterite			

Pyrochlore Group

	Microlite Pegmatite 7 94-Peg 7X		Microlite SW Beryl 96-9		Microlite SW Beryl pegmatite 96-9			Microlite SW Beryl pegmatite 96-25A					Yttrpyrochlore Big Whopper 96-29G		
	NM	NR	FF	FG	FH	FK	FL	WG	WH	WI	WJ	WK	FA	FB	FG
	Na2O	0.96	2.04	1.30	1.29	1.20	1.97	1.98	0.79	0.80	0.81	1.01	0.87	0.00	0.00
CaO	13.73	11.03	15.48	15.65	15.48	15.37	15.24	16.14	16.39	16.77	16.68	17.32	0.59	0.58	0.62
Al2O3	0.30	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
FeO	0.28	1.13	0.10	0.14	0.14	0.08	0.08	0.05	0.06	0.05	0.02	0.07	0.00	0.00	0.00
MnO	0.22	0.51	0.03	0.03	0.01	0.01	0.01	0.13	0.11	0.13	0.12	0.10	0.00	0.00	0.00
MgO	0.00	0.00													
TiO2	1.13	1.80	0.97	0.99	0.94	1.39	1.40	0.61	0.62	0.75	0.71	0.85	0.06	0.09	0.08
Nb2O5	6.45	6.69	4.57	4.57	4.75	5.80	6.06	8.41	9.09	12.28	12.80	13.79	37.40	36.44	35.67
Ta2O5	63.75	65.20	74.30	74.26	75.23	71.15	71.08	67.17	66.72	63.17	62.43	60.19	10.64	12.79	12.89
SnO2	5.07	4.59	0.66	0.66	0.63	1.20	1.26	2.44	2.52	2.67	3.20	3.40	0.00	0.00	0.00
WO3	0.21	0.20	0.28	0.38	0.29	0.40	0.38	0.47	0.35	0.34	0.34	0.39	1.68	1.44	1.17
PbO	0.34	0.31	0.00	0.03	0.00	0.07	0.00	0.17	0.06	0.09	0.02	0.08	0.65	0.97	0.90
ThO2	0.05	0.02	0.04	0.00	0.03	0.00	0.02	0.06	0.01	0.00	0.01	0.06	0.57	0.39	0.65
UO2	0.66	1.16	0.05	0.02	0.06	0.02	0.01	0.40	0.32	0.21	0.00	0.06	2.05	2.18	2.14
Sb2O3	3.82	0.54	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00
Bi2O3	0.00	0.00	0.06	0.00	0.00	0.10	0.00	0.01	0.00	0.03	0.00	0.01	0.00	0.00	0.00
Sc2O3	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.13	0.12	0.00	0.00	0.08	0.00
Cs2O			0.07	0.05	0.02	0.09	0.09	0.10	0.01	0.06	0.08	0.05	0.00	0.05	0.00
BaO													0.00	0.00	0.00
K2O													0.15	0.03	0.19
Y2O3													19.49	20.92	18.60
SiO2															
F	2.02	2.23	2.35	2.34	2.38	2.52	2.54	1.47	1.61	1.67	2.02	1.83	0.13	0.26	0.38
H2O*	1.73	1.53	1.37	1.40	1.39	1.24	1.24	2.33	2.22	2.26	1.93	2.13	23.84	24.21	23.11
Subtotal	100.72	98.98	101.63	101.80	102.63	101.45	101.43	100.74	100.89	101.41	101.49	101.19	97.10	100.39	96.22
O=F	0.85	0.94	0.99	0.98	1.00	1.06	1.07	0.62	0.68	0.70	0.85	0.77	0.05	0.11	0.16
Total	99.87	98.05	100.64	100.82	101.62	100.38	100.36	100.13	100.21	100.71	100.64	100.41	97.04	100.29	96.06
Structural formulae based on 6 oxygens															
Ti	0.072	0.113	0.063	0.064	0.060	0.088	0.089	0.039	0.039	0.046	0.043	0.052	0.004	0.006	0.006
Nb	0.248	0.252	0.177	0.177	0.182	0.222	0.231	0.322	0.345	0.454	0.469	0.505	1.668	1.616	1.613
Ta	1.473	1.478	1.732	1.728	1.731	1.640	1.630	1.547	1.524	1.406	1.377	1.326	0.285	0.341	0.351
W	0.005	0.004	0.006	0.008	0.006	0.009	0.008	0.010	0.008	0.007	0.007	0.008	0.043	0.037	0.030
Sn	0.172	0.153	0.022	0.023	0.021	0.041	0.042	0.082	0.084	0.087	0.103	0.110	0.000	0.000	0.000
Al	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.020	0.079	0.007	0.010	0.010	0.006	0.006	0.004	0.004	0.003	0.002	0.004	0.000	0.000	0.000
Mn	0.016	0.036	0.002	0.002	0.001	0.001	0.001	0.009	0.008	0.009	0.008	0.007	0.000	0.000	0.000
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	1.250	0.985	1.422	1.435	1.404	1.396	1.377	1.464	1.474	1.470	1.449	1.503	0.062	0.060	0.066
Na	0.158	0.330	0.217	0.215	0.196	0.324	0.324	0.130	0.130	0.129	0.159	0.137	0.000	0.000	0.000
K													0.019	0.003	0.025
Ba													0.000	0.000	0.000
Pb	0.008	0.007	0.000	0.001	0.000	0.002	0.000	0.004	0.001	0.002	0.000	0.002	0.017	0.026	0.024
Th	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.013	0.009	0.015
U	0.012	0.022	0.001	0.000	0.001	0.000	0.000	0.007	0.006	0.004	0.000	0.001	0.045	0.048	0.048
Sb	0.134	0.019	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Bi	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Cs			0.003	0.002	0.001	0.003	0.003	0.004	0.000	0.002	0.003	0.002	0.000	0.002	0.000
Sc	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.010	0.008	0.000	0.000	0.006	0.000
Y													1.023	1.092	0.990
Si															
F	0.543	0.588	0.638	0.633	0.638	0.676	0.677	0.393	0.427	0.431	0.518	0.470	0.039	0.079	0.121
OH*	0.457	0.412	0.362	0.367	0.362	0.324	0.323	0.607	0.573	0.569	0.482	0.530	6.961	6.921	6.879
Total	4.599	4.477	4.653	4.664	4.621	4.735	4.712	4.623	4.625	4.629	4.630	4.657	10.180	10.247	10.168
														calculated (F+OH) = 7	
Comments:	primary														
Original															

Pyrochlore Group

	Yttrian pyrochlore					Microlite												
	Big Whopper pegmatite					Marko's pegmatite												
	96-29G					96-AT1												
	FC	FD	FF	FE	FH	SA	SB	SE	SF	SL	TR15	TR20	TR21	TR23	TR33	TR40	TR41	TR42
Na2O	0.12	0.08	0.20	0.18	0.09	0.77	0.75	0.76	0.75	0.77	0.82	0.76	0.78	0.69	0.65	0.59	0.65	0.54
CaO	6.90	7.16	6.30	5.90	5.96	15.87	15.77	15.95	15.88	15.86	15.72	15.92	15.91	15.18	13.65	16.20	15.71	16.39
Al2O3	0.77	1.02	0.72	0.69	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.05	0.00
FeO	0.81	0.77	1.00	1.07	0.74	0.04	0.06	0.08	0.10	0.09	0.23	0.11	0.09	0.14	0.29	0.16	0.17	0.07
MnO	1.10	1.33	1.06	1.02	1.05	0.16	0.15	0.16	0.15	0.16	0.18	0.20	0.17	0.20	0.21	0.22	0.22	0.21
MgO																		
TiO2	0.00	0.00	0.07	0.07	0.12	1.33	1.31	1.40	1.45	1.38	2.11	1.71	1.63	1.54	2.50	2.26	2.93	1.82
Nb2O5	44.33	41.08	43.99	43.19	42.39	7.18	7.36	6.81	7.27	7.68	13.05	10.78	9.37	8.30	13.00	13.80	11.44	11.61
Ta2O5	12.95	15.03	12.56	12.96	14.65	69.09	68.62	69.00	67.56	67.21	56.16	60.24	61.82	63.34	56.81	55.08	55.44	59.43
SnO2	0.07	0.12	0.06	0.10	0.07	1.89	1.89	1.83	1.97	1.92	3.19	2.92	2.93	2.98	3.35	3.33	3.64	2.82
WO3	1.81	1.70	1.91	1.81	1.61	0.37	0.35	0.33	0.33	0.42	0.49	0.42	0.36	0.38	0.45	0.46	0.48	0.43
PbO	0.37	0.40	0.37	0.49	0.38	0.16	0.08	0.14	0.10	0.10	0.09	0.12	0.14	0.17	0.16	0.21	0.26	0.04
ThO2	0.62	1.03	0.77	0.72	0.57	0.02	0.05	0.07	0.06	0.06	0.03	0.03	0.01	0.02	0.15	0.06	0.13	0.04
UO2	2.00	1.91	2.85	2.51	2.61	0.52	0.46	0.39	0.48	0.45	0.38	0.41	0.38	0.39	0.35	0.47	0.46	0.43
Sb2O3	0.01	0.02	0.00	0.00	0.01	1.17	1.20	1.23	1.44	1.35	2.88	1.98	1.63	1.70	3.70	3.23	4.75	2.18
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.00	0.02	0.00	0.00
Sc2O3	0.27	0.10	0.00	0.00	0.11	0.00	0.19	0.00	0.02	0.00	0.00	0.00	0.00	0.09	0.04	0.00	0.06	0.05
Cs2O	0.02	0.06	0.00	0.02	0.00	0.07	0.06	0.05	0.09	0.11	0.05	0.00	0.10	0.00	0.01	0.02	0.03	0.00
BaO	0.06	0.00	0.01	0.00	0.00						0.00	0.03	0.05	0.04	0.00	0.04	0.00	0.03
K2O	0.22	0.00	0.14	0.07	0.00						0.00	0.06	0.00	0.00	0.07	0.00	0.05	0.00
Y2O3	5.15	4.28	4.79	5.69	5.58						0.01	0.00	0.00	0.00	0.12	0.11	0.05	0.00
SiO2	4.67	6.17	4.03	3.50	4.46													
F	0.24	0.26	0.18	0.15	0.14	1.80	1.79	1.85	1.66	1.74	1.44	1.62	1.56	1.32	1.45	1.29	1.26	1.23
H2O*	16.95	17.05	16.51	16.20	16.59	2.04	2.04	1.96	2.15	2.07	2.46	2.22	2.23	2.45	2.47	2.67	2.66	2.66
Subtotal	99.44	99.54	97.51	96.34	97.91	102.51	102.13	102.02	101.45	101.37	99.31	99.54	99.15	98.93	99.43	100.17	100.44	99.99
O=F	0.10	0.11	0.07	0.06	0.06	0.76	0.75	0.78	0.70	0.73	0.61	0.68	0.66	0.56	0.61	0.54	0.53	0.52
Total	99.34	99.44	97.44	96.28	97.85	101.75	101.37	101.24	100.75	100.64	98.71	98.86	98.49	98.38	98.82	99.63	99.91	99.47

Structural formulae based on 6 oxygens

Ti	0.000	0.000	0.004	0.004	0.007	0.084	0.083	0.089	0.092	0.088	0.132	0.108	0.104	0.099	0.152	0.139	0.183	0.114
Nb	1.606	1.526	1.609	1.598	1.557	0.272	0.279	0.260	0.278	0.293	0.488	0.409	0.360	0.320	0.476	0.512	0.430	0.437
Ta	0.282	0.336	0.276	0.289	0.324	1.573	1.567	1.583	1.556	1.545	1.264	1.376	1.429	1.471	1.252	1.230	1.252	1.346
W	0.038	0.036	0.040	0.038	0.034	0.008	0.008	0.007	0.007	0.009	0.010	0.009	0.008	0.008	0.010	0.010	0.010	0.009
Sn	0.002	0.004	0.002	0.003	0.002	0.063	0.063	0.062	0.066	0.065	0.105	0.098	0.099	0.102	0.108	0.109	0.120	0.094
Al	0.073	0.098	0.068	0.067	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.005	0.000
Fe	0.054	0.053	0.068	0.073	0.050	0.003	0.004	0.006	0.007	0.007	0.016	0.008	0.006	0.010	0.019	0.011	0.012	0.005
Mn	0.075	0.093	0.073	0.071	0.072	0.011	0.011	0.011	0.011	0.011	0.013	0.014	0.012	0.014	0.014	0.015	0.015	0.015
Mg																		
Ca	0.592	0.631	0.546	0.517	0.519	1.424	1.419	1.441	1.441	1.437	1.395	1.432	1.449	1.389	1.185	1.425	1.397	1.463
Na	0.019	0.013	0.032	0.028	0.014	0.125	0.122	0.124	0.124	0.126	0.132	0.123	0.128	0.115	0.101	0.094	0.105	0.088
K	0.022	0.000	0.014	0.007	0.000						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ba	0.002	0.000	0.000	0.000	0.000						0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.008	0.009	0.008	0.011	0.008	0.004	0.002	0.003	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.001
Th	0.011	0.019	0.014	0.013	0.011	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.003	0.001	0.002	0.001
U	0.036	0.035	0.051	0.046	0.047	0.010	0.009	0.007	0.009	0.008	0.007	0.008	0.007	0.007	0.006	0.009	0.008	0.008
Sb	0.000	0.001	0.000	0.000	0.000	0.040	0.042	0.043	0.050	0.047	0.098	0.068	0.057	0.060	0.124	0.109	0.163	0.075
Bi	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Cs	0.001	0.002	0.000	0.001	0.000	0.002	0.002	0.002	0.003	0.004	0.002	0.000	0.003	0.000	0.000	0.001	0.001	0.000
Sc	0.019	0.007	0.000	0.000	0.008	0.000	0.014	0.000	0.001	0.000	0.000	0.000	0.000	0.007	0.003	0.000	0.004	0.004
Y	0.220	0.187	0.206	0.248	0.241						0.000	0.000	0.000	0.000	0.005	0.005	0.002	0.000
Si	0.374	0.507	0.326	0.287	0.362													
F	0.060	0.066	0.045	0.040	0.037	0.477	0.476	0.493	0.443	0.465	0.376	0.431	0.419	0.356	0.371	0.334	0.330	0.324
OH*	3.940	3.934	3.955	3.960	3.963	0.523	0.524	0.507	0.557	0.535	0.624	0.569	0.581	0.644	0.629	0.666	0.670	0.676
Total	7.433	7.556	7.339	7.302	7.333	4.621	4.624	4.639	4.649	4.643	4.665	4.657	4.666	4.607	4.465	4.674	4.716	4.658

calculated (F+OH) = 4

Comments:

All from same grain - microlite replaces ? columbite

Replacement

Pyrochlore Group

	Stibiomicrosite Marko's pegmatite 96-AT1									Stibiobetafite Marko's pegmatite 96-AT1					
	SH	SK	SN	TR16	TR17	TR18	TR31	TR32	TR34	TR1	TR2	TR4	TR5	TE	TF
	Na2O	0.41	0.35	0.44	0.49	0.50	0.42	0.26	0.33	0.40	0.58	0.43	0.35	0.05	0.59
CaO	14.25	14.27	14.37	13.92	13.93	13.02	4.89	11.98	13.75	9.85	7.87	10.41	10.83	9.42	9.32
Al2O3	0.31	0.33	0.30	0.29	0.31	0.32	0.18	0.26	0.26	0.21	0.16	0.22	0.64	0.22	0.22
FeO	0.61	0.51	0.44	0.52	0.52	0.50	1.01	0.52	0.52	1.16	0.84	0.79	0.45	1.51	1.47
MnO	0.31	0.27	0.24	0.27	0.26	0.25	0.27	0.25	0.25	0.32	0.42	0.44	0.64	0.32	0.29
MgO															
TiO2	5.71	6.05	5.77	5.94	5.66	5.74	5.11	5.81	6.38	24.46	23.62	24.63	19.52	26.19	26.22
Nb2O5	10.17	10.01	9.65	11.06	11.33	10.90	10.93	6.64	11.02	11.05	11.50	12.67	10.20	12.08	12.20
Ta2O5	49.56	48.33	50.60	46.48	46.84	47.46	54.71	47.05	46.41	20.06	20.20	17.35	20.25	19.95	19.90
SnO2	3.50	3.67	3.40	5.11	5.23	5.15	4.80	3.70	5.17	3.77	3.71	4.05	4.37	3.17	3.15
WO3	0.40	0.44	0.41	0.33	0.40	0.39	0.43	0.30	0.36	1.69	1.65	1.53	1.18	1.80	1.91
PbO	0.11	0.21	0.18	0.17	0.11	0.21	0.13	0.14	0.17	0.19	0.12	0.13	0.15	0.12	0.14
ThO2	0.12	0.07	0.11	0.10	0.00	0.17	0.17	0.12	0.13	0.14	0.12	0.14	0.00	0.21	0.21
UO2	0.37	0.32	0.41	0.37	0.36	0.44	0.35	0.36	0.40	0.13	0.04	0.06	0.05	0.15	0.10
Sb2O3	11.65	12.08	11.25	11.46	11.04	11.17	9.54	8.63	11.91	19.96	22.46	20.89	25.34	16.75	16.73
Bi2O3	0.00	0.00	0.04	0.00	0.02	0.00	0.04	0.00	0.01	0.05	0.05	0.06	0.02	0.07	0.04
Sc2O3	0.00	0.01	0.04	0.13	0.07	0.06	2.11	0.17	0.10	0.81	1.59	0.68	0.33	1.37	1.49
Cs2O	0.01	0.00	0.05	0.05	0.00	0.02	0.00	0.00	0.05	0.00	0.03	0.00	0.00	0.00	0.03
BaO				0.04	0.04	0.10	0.81	0.13	0.05	0.32	0.67	0.33	0.15	0.60	0.61
K2O				0.00	0.00	0.00	0.05	0.11	0.07	0.00	0.12	0.19	0.15	0.27	0.04
Y2O3				0.43	0.43	0.44	0.37	0.30	0.52	1.00	1.17	1.10	1.16	0.89	0.96
SiO2															
F	0.80	0.73	0.93	0.94	0.99	0.97	0.20	0.60	0.78	0.61	0.35	0.40	0.11	0.76	0.75
H2O*	3.21	3.28	3.08	3.10	3.05	3.04	3.70	2.97	3.31	4.14	4.36	4.39	4.38	4.12	4.13
Subtotal	101.50	100.92	101.69	101.21	101.09	100.73	100.04	90.35	102.02	100.48	101.49	100.80	99.96	100.55	100.48
O=F	0.34	0.31	0.39	0.39	0.42	0.41	0.08	0.25	0.33	0.25	0.15	0.17	0.05	0.32	0.32
Total	101.16	100.61	101.30	100.81	100.67	100.32	99.95	90.10	101.69	100.23	101.34	100.63	99.91	100.23	100.16
Structural formulae based on 6 oxygens															
Ti	0.354	0.376	0.357	0.363	0.345	0.350	0.297	0.397	0.386	1.185	1.163	1.186	1.064	1.209	1.208
Nb	0.379	0.374	0.359	0.407	0.415	0.399	0.382	0.273	0.401	0.322	0.340	0.367	0.334	0.335	0.338
Ta	1.112	1.087	1.134	1.029	1.033	1.046	1.149	1.162	1.015	0.352	0.360	0.302	0.399	0.333	0.331
W	0.008	0.009	0.009	0.007	0.008	0.008	0.009	0.007	0.007	0.028	0.028	0.025	0.022	0.029	0.030
Sn	0.115	0.121	0.112	0.166	0.169	0.166	0.148	0.134	0.166	0.097	0.097	0.103	0.126	0.078	0.077
Al	0.030	0.032	0.029	0.028	0.029	0.030	0.017	0.027	0.025	0.016	0.012	0.016	0.054	0.016	0.016
Fe	0.042	0.035	0.031	0.036	0.035	0.034	0.065	0.039	0.035	0.063	0.046	0.042	0.027	0.078	0.075
Mn	0.021	0.019	0.017	0.019	0.018	0.017	0.017	0.019	0.017	0.018	0.023	0.024	0.039	0.016	0.015
Mg															
Ca	1.260	1.265	1.268	1.214	1.210	1.130	0.404	1.166	1.185	0.680	0.552	0.714	0.841	0.619	0.611
Na	0.065	0.056	0.070	0.077	0.078	0.066	0.039	0.058	0.063	0.072	0.055	0.044	0.007	0.070	0.069
K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ba	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.002	0.005	0.004	0.004	0.002	0.005	0.003	0.004	0.004	0.003	0.002	0.002	0.003	0.002	0.002
Th	0.002	0.001	0.002	0.002	0.000	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.000	0.003	0.003
U	0.007	0.006	0.007	0.007	0.006	0.008	0.006	0.007	0.007	0.002	0.001	0.001	0.001	0.002	0.001
Sb	0.396	0.412	0.382	0.385	0.369	0.373	0.304	0.323	0.395	0.530	0.606	0.551	0.757	0.424	0.422
Bi	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.001
Cs	0.000	0.000	0.002	0.002	0.000	0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.001
Sc	0.000	0.001	0.003	0.009	0.005	0.004	0.142	0.013	0.007	0.046	0.091	0.038	0.021	0.073	0.079
Y	0.000	0.000	0.000	0.019	0.019	0.019	0.015	0.014	0.022	0.034	0.041	0.038	0.045	0.029	0.031
Si															
F	0.209	0.191	0.242	0.241	0.254	0.249	0.049	0.173	0.197	0.123	0.073	0.082	0.026	0.147	0.146
OH*	0.791	0.809	0.758	0.759	0.746	0.751	0.951	0.827	0.803	0.877	0.927	0.918	0.974	0.853	0.854
Total	4.797	4.801	4.786	4.772	4.744	4.659	4.000	4.646	4.739	4.451	4.420	4.457	4.742	4.318	4.311

Comments: replaces microlite

Pyrochlore Group

	Microlite			Microlite		Microlite		Sb/U		Microlite	
	Marko's pegmatite			Marko's peg.		Marko's peg.		Marko's peg.		Marko's peg.	
	96-AT3			96-AT4		96-AT5		96-AT6		96-AT7	
	AH	AI	AJ	NG	NH	NA	NB	CD	CJ	DF	DL
Na2O	0.96	1.28	0.95	2.08	1.82	3.71	2.68	0.77	2.04	0.97	1.18
CaO	15.01	14.59	13.77	13.45	11.16	13.86	12.60	12.29	10.39	16.26	14.61
Al2O3	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.15	0.00	0.00
FeO	0.27	0.61	0.37	0.41	1.68	0.01	0.17	0.82	1.97	0.33	0.25
MnO	0.36	0.82	0.50	0.21	1.52	0.00	0.06	0.40	0.14	0.27	0.28
MgO											
TiO2	2.62	3.51	2.50	3.52	3.17	2.96	2.18	8.53	10.89	5.30	5.42
Nb2O5	6.33	7.56	7.12	9.17	9.98	8.10	5.43	13.52	12.97	19.17	19.30
Ta2O5	67.58	66.25	63.50	64.00	64.52	67.18	70.37	44.67	38.47	47.21	47.86
SnO2	1.15	2.22	5.80	1.47	2.24	0.90	2.04	2.16	2.02	1.77	1.76
WO3	0.25	0.18	0.23	0.35	0.26	0.30	0.29	0.75	0.70	0.84	0.83
PbO	0.00	0.00	0.00	0.06	0.15	0.00	0.00	1.37	1.16	0.61	0.54
ThO2	0.06	0.00	0.00	0.01	0.00	0.04	0.00	0.16	0.32	0.11	0.07
UO2	0.11	0.04	0.03	0.51	0.24	0.08	0.20	7.11	5.70	1.28	1.20
Sb2O3	2.37	1.83	1.58	1.72	0.20	1.14	0.79	4.91	10.50	4.37	4.64
Bi2O3	0.07	0.01	0.00	0.00	0.02	0.00	0.02	0.02	0.05	0.03	0.00
Sc2O3	0.00	0.09	0.15	0.00	0.19	0.31	0.14	0.40	1.94	0.25	0.12
Cs2O	0.03	0.18	0.12	0.14	0.04	0.04	0.06	0.00	0.00	0.05	0.00
BaO											
K2O											
Y2O3											
SiO2											
F	1.63	1.97	1.79	2.25	1.69	2.85	2.50	1.11	1.75	1.58	1.75
H2O*	2.19	2.01	2.10	1.69	2.29	1.07	1.31	3.02	2.46	2.69	2.50
Subtotal	101.04	103.14	100.50	101.03	101.15	102.55	100.83	102.01	103.62	103.09	102.32
O=F	0.69	0.83	0.75	0.95	0.71	1.20	1.05	0.47	0.74	0.66	0.74
Total	100.35	102.31	99.75	100.09	100.44	101.35	99.78	101.54	102.88	102.42	101.58

Structural formulae based on 6 oxygens

Ti	0.166	0.211	0.152	0.213	0.188	0.181	0.136	0.498	0.638	0.302	0.305
Nb	0.241	0.273	0.260	0.333	0.355	0.298	0.203	0.475	0.457	0.656	0.653
Ta	1.546	1.441	1.396	1.399	1.381	1.486	1.587	0.943	0.815	0.972	0.974
W	0.005	0.004	0.005	0.007	0.005	0.006	0.006	0.015	0.014	0.016	0.016
Sn	0.039	0.071	0.187	0.047	0.070	0.029	0.068	0.067	0.063	0.054	0.053
Al	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.014	0.000	0.000
Fe	0.019	0.041	0.025	0.028	0.110	0.001	0.012	0.053	0.128	0.021	0.016
Mn	0.026	0.055	0.034	0.014	0.101	0.000	0.004	0.027	0.009	0.018	0.018
Mg											
Ca	1.353	1.251	1.192	1.159	0.942	1.208	1.119	1.022	0.867	1.319	1.171
Na	0.157	0.198	0.149	0.325	0.278	0.585	0.431	0.115	0.308	0.142	0.171
K											
Ba											
Pb	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.029	0.024	0.012	0.011
Th	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.006	0.002	0.001
U	0.002	0.001	0.000	0.009	0.004	0.001	0.004	0.123	0.099	0.022	0.020
Sb	0.082	0.060	0.053	0.057	0.007	0.038	0.027	0.157	0.337	0.136	0.143
Bi	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000
Cs	0.001	0.006	0.004	0.005	0.001	0.001	0.002	0.000	0.000	0.002	0.000
Sc	0.000	0.006	0.011	0.000	0.013	0.022	0.010	0.027	0.132	0.016	0.008
Y											
Si											
F	0.435	0.499	0.458	0.572	0.420	0.733	0.656	0.271	0.432	0.378	0.414
OH*	0.565	0.501	0.542	0.428	0.580	0.267	0.344	0.729	0.568	0.622	0.586
Total	4.643	4.618	4.469	4.598	4.459	4.857	4.610	4.556	4.911	4.691	4.559

Comments:

Pyrochlore Group

	Microlite Marko's pegmatite 96-AT8						Antimonian Microlite Marko's peg. 96-AT8		Microlite Marko's peg. 96-AT11A		Microlite Marko's peg. 96-AT12		Antimonian Microlite Marko's peg. 96-AT13		Microlite Marko's peg. 96-AT15		
	EH	EK	EL	EM	EN	EZ	EI	EJ	QC	QD	GG	GH	LH	LI	GA	GB	GC
	Na2O	3.41	3.62	4.07	3.81	4.08	4.27	2.60	2.95	0.94	1.24	4.79	4.65	2.91	3.49	2.93	2.45
CaO	13.06	12.79	13.29	12.99	12.89	12.73	12.95	12.78	6.40	5.87	12.24	12.37	10.58	11.83	10.46	10.59	9.69
Al2O3	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
FeO	0.00	0.01	0.00	0.00	0.01	0.00	0.02	0.00	6.89	5.41	0.00	0.00	0.72	0.01	1.38	0.07	1.61
MnO	0.03	0.02	0.02	0.06	0.07	0.15	0.10	0.06	0.03	0.03	0.09	0.01	0.87	0.17	0.15	0.00	0.12
MgO																	
TiO2	3.15	2.71	2.14	3.49	3.50	4.04	5.69	4.60	2.92	3.07	1.05	1.10	6.49	4.97	0.19	0.29	0.57
Nb2O5	8.47	8.90	14.43	11.06	12.02	9.40	9.60	9.33	3.39	3.91	8.10	7.21	7.71	4.33	2.21	2.11	2.22
Ta2O5	63.58	64.34	60.29	60.95	59.59	59.62	56.79	59.43	67.66	68.13	70.14	71.35	59.41	64.32	74.28	75.21	73.45
SnO2	0.97	1.59	0.62	0.82	0.72	0.88	1.47	1.50	0.44	0.48	0.92	1.13	1.78	1.60	1.20	1.24	1.02
WO3	0.36	0.38	0.37	0.44	0.37	0.77	0.43	0.42	0.36	0.28	0.40	0.53	0.23	0.13	0.27	0.04	0.37
PbO	0.01	0.06	0.04	0.09	0.05	0.23	0.00	0.03	0.29	0.15	0.00	0.00	0.10	0.00	0.11	0.23	0.11
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.08	0.03	0.00	0.23	0.00	0.02	0.20	0.00	0.38
UO2	0.09	0.05	0.01	0.14	0.10	0.26	0.01	0.05	2.41	2.91	0.27	0.07	0.00	0.00	0.95	0.88	0.99
Sb2O3	3.65	3.11	2.05	3.69	3.88	4.10	8.02	6.44	2.45	2.67	0.62	0.46	7.68	7.38	0.94	1.02	1.36
Bi2O3	0.00	0.00	0.07	0.03	0.03	0.39	0.00	0.00	0.37	0.06	0.40	0.00	0.00	0.00	0.00	0.00	0.27
Sc2O3	0.00	0.00	0.00	0.01	0.07	0.54	0.25	0.05	2.69	2.91	0.00	0.00	0.00	0.00	0.29	0.00	0.41
Cs2O	0.05	0.07	0.07	0.09	0.07	0.05	0.04	0.07	0.36	0.63	0.67	0.55	0.01	0.03	0.10	0.09	0.19
BaO																	
K2O																	
Y2O3																	
SiO2																	
F	2.80	2.98	3.40	2.78	2.81	3.18	2.29	2.52	0.68	0.64	3.39	2.96	1.81	2.20	2.07	2.22	2.11
H2O*	1.02	0.88	0.55	1.15	1.12	0.65	1.69	1.40	3.02	3.08	0.42	0.87	2.21	1.63	1.43	1.28	1.39
Subtotal	100.65	101.52	101.41	101.60	101.39	101.28	101.99	101.64	101.36	101.51	103.50	103.47	102.50	102.14	99.16	97.73	99.05
O=F	1.18	1.26	1.43	1.17	1.18	1.34	0.96	1.06	0.29	0.27	1.43	1.25	0.76	0.93	0.87	0.93	0.89
Total	99.47	100.26	99.98	100.43	100.20	99.93	101.03	100.57	101.08	101.24	102.07	102.22	101.73	101.21	98.28	96.80	98.17

Structural formulae based on 6 oxygens

Ti	0.198	0.168	0.130	0.213	0.214	0.253	0.345	0.282	0.196	0.202	0.066	0.069	0.386	0.313	0.013	0.020	0.039
Nb	0.320	0.331	0.525	0.406	0.441	0.353	0.351	0.344	0.137	0.155	0.305	0.271	0.276	0.164	0.091	0.086	0.092
Ta	1.443	1.441	1.318	1.345	1.315	1.348	1.248	1.317	1.643	1.621	1.590	1.612	1.277	1.466	1.846	1.848	1.823
W	0.008	0.008	0.008	0.009	0.008	0.017	0.009	0.009	0.008	0.006	0.009	0.011	0.005	0.003	0.006	0.001	0.009
Sn	0.032	0.052	0.020	0.026	0.023	0.029	0.047	0.049	0.016	0.017	0.030	0.037	0.056	0.054	0.044	0.045	0.037
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.515	0.396	0.000	0.000	0.048	0.000	0.105	0.006	0.123
Mn	0.002	0.001	0.001	0.004	0.005	0.011	0.007	0.004	0.002	0.003	0.006	0.001	0.058	0.012	0.011	0.000	0.009
Mg																	
Ca	1.168	1.128	1.145	1.130	1.121	1.134	1.121	1.115	0.612	0.550	1.094	1.101	0.896	1.063	1.024	1.025	0.948
Na	0.552	0.579	0.635	0.600	0.642	0.689	0.408	0.466	0.163	0.211	0.774	0.750	0.446	0.567	0.519	0.430	0.495
K																	
Ba																	
Pb	0.000	0.001	0.001	0.002	0.001	0.005	0.000	0.001	0.007	0.003	0.000	0.000	0.002	0.000	0.003	0.006	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.001	0.000	0.004	0.000	0.000	0.004	0.000	0.008
U	0.002	0.001	0.000	0.003	0.002	0.005	0.000	0.001	0.048	0.057	0.005	0.001	0.000	0.000	0.019	0.018	0.020
Sb	0.125	0.105	0.068	0.123	0.130	0.141	0.267	0.216	0.090	0.096	0.021	0.016	0.250	0.255	0.035	0.038	0.051
Bi	0.000	0.000	0.001	0.001	0.001	0.008	0.000	0.000	0.008	0.001	0.009	0.000	0.000	0.000	0.000	0.000	0.006
Cs	0.002	0.003	0.002	0.003	0.002	0.002	0.001	0.003	0.014	0.023	0.024	0.019	0.000	0.001	0.004	0.004	0.007
Sc	0.000	0.000	0.000	0.001	0.005	0.039	0.018	0.004	0.209	0.222	0.000	0.000	0.000	0.000	0.023	0.000	0.033
Y																	
Si																	
F	0.739	0.776	0.863	0.714	0.722	0.837	0.585	0.650	0.191	0.178	0.893	0.777	0.453	0.583	0.598	0.633	0.608
OH*	0.261	0.224	0.137	0.286	0.278	0.163	0.415	0.350	0.809	0.822	0.107	0.223	0.547	0.417	0.402	0.367	0.392
Total	4.851	4.820	4.854	4.866	4.909	5.033	4.824	4.810	4.670	4.563	4.933	4.892	4.701	4.899	4.748	4.526	4.703

Comments: EH - EL traverse across inc EM & EN same grain

Pyrochlore Group

	Microlite Marko's pegmatite 96-AT17							Microlite Marko's peg. 96-AT19B			Microlite East Beryl peg. 97-1A	Microlite School of Fish pegmatite 97-71					
	RG	RI	RJ	RK	RL	RH	RY	DC	DV	DY	NA	FI	FJ	FK	FL	FM	
Na2O	3.94	4.15	4.12	3.95	3.92	4.51	4.57	4.36	4.32	4.06	3.23	1.20	1.18	2.43	2.86	1.22	
CaO	11.94	11.94	12.02	11.91	12.30	12.49	11.76	12.18	12.15	12.38	12.82	15.48	15.50	8.06	10.48	16.28	
Al2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
FeO	0.01	0.01	0.02	0.06	0.02	0.01	0.01	0.00	0.01	0.17	0.80	0.14	0.14	0.24	0.36	0.10	
MnO	0.06	0.05	0.03	0.07	0.06	0.02	0.02	0.06	0.05	0.26	0.05	0.18	0.18	0.18	0.15	0.14	
MgO																	
TiO2	3.71	3.19	3.08	3.89	3.49	1.56	2.02	0.93	0.80	0.76	0.02	1.96	2.02	2.03	1.96	1.70	
Nb2O5	5.84	6.53	6.66	6.77	6.12	6.12	5.45	3.34	3.44	4.19	4.86	4.46	4.42	4.83	4.43	5.88	
Ta2O5	65.38	66.19	66.34	65.10	65.94	70.87	69.31	73.60	72.64	71.65	68.50	68.94	68.57	72.53	69.85	70.79	
SnO2	1.40	1.28	1.30	1.33	1.20	0.90	2.82	1.58	2.27	2.64	5.03	2.75	2.85	2.59	2.69	1.80	
WO3	0.25	0.20	0.19	0.21	0.26	0.18	0.25	0.30	0.44	0.13	0.25	0.50	0.57	0.39	0.47	0.27	
PbO	0.09	0.09	0.04	0.04	0.04	0.00	0.03	0.16	0.28	0.00	0.00	0.45	0.49	0.56	0.53	0.00	
ThO2	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.06	0.21	0.20	0.17	0.12	0.00	
UO2	0.00	0.00	0.00	0.03	0.02	0.00	0.01	0.69	0.23	0.30	0.08	1.74	1.91	1.77	1.83	0.00	
Sb2O3	4.97	4.03	3.75	4.81	4.39	1.20	2.14	1.15	1.25	0.76	0.10	0.03	0.07	0.11	0.11	0.15	
Bi2O3	0.00	0.00	0.00	0.02	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	
Sc2O3	0.00	0.02	0.00	0.09	0.00	0.01	0.00	0.63	0.19	0.00	0.15	0.12	0.03	0.17	0.41	0.00	
Cs2O	0.07	0.07	0.08	0.03	0.11	0.07	0.08	0.25	0.07	0.30	0.13	0.00	0.03	0.05	0.04	0.05	
BaO																	
K2O																	
Y2O3																	
SiO2											1.83						
F	2.83	2.96	2.94	2.95	2.93	3.25	3.17	3.46	3.67	3.41	4.06	2.61	2.58	1.76	3.29	3.40	
H2O*	0.97	0.84	0.87	0.91	0.88	0.50	0.64	0.17	0.00	0.24	0.00	2.22	2.18	1.06	1.01	1.21	
Subtotal	101.46	101.54	101.47	102.14	101.71	101.68	102.31	102.87	101.87	101.51	101.98	101.92	101.94	99.93	100.00	102.21	
O=F	1.19	1.25	1.24	1.24	1.23	1.37	1.33	1.46	1.55	1.44	1.71	0.65	0.67	1.16	1.15	1.10	
Total	100.27	100.29	100.23	100.90	100.48	100.31	100.97	101.41	100.32	100.08	100.27	101.26	101.26	98.77	98.86	101.11	
Structural formulae based on 6 oxygens																	
Ti	0.234	0.201	0.194	0.241	0.220	0.099	0.127	0.061	0.052	0.050	0.002	0.125	0.129	0.124	0.125	0.106	
Nb	0.221	0.247	0.252	0.252	0.232	0.234	0.205	0.132	0.135	0.164	0.192	0.172	0.170	0.178	0.169	0.222	
Ta	1.492	1.506	1.507	1.459	1.502	1.632	1.569	1.745	1.717	1.692	1.626	1.598	1.591	1.605	1.605	1.606	
W	0.006	0.004	0.004	0.004	0.006	0.004	0.005	0.007	0.010	0.003	0.006	0.011	0.013	0.008	0.010	0.006	
Sn	0.047	0.043	0.043	0.044	0.040	0.030	0.094	0.055	0.079	0.091	0.175	0.093	0.097	0.084	0.090	0.060	
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Fe	0.001	0.001	0.002	0.004	0.001	0.001	0.001	0.000	0.000	0.012	0.058	0.010	0.010	0.016	0.026	0.007	
Mn	0.004	0.003	0.002	0.005	0.004	0.001	0.001	0.005	0.004	0.019	0.004	0.013	0.013	0.013	0.010	0.010	
Mg																	
Ca	1.073	1.070	1.076	1.051	1.104	1.133	1.049	1.138	1.131	1.151	1.199	1.414	1.416	0.703	0.949	1.456	
Na	0.642	0.674	0.667	0.630	0.636	0.740	0.738	0.736	0.727	0.683	0.547	0.199	0.194	0.383	0.468	0.198	
K																	
Ba																	
Pb	0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.004	0.007	0.000	0.000	0.010	0.011	0.012	0.012	0.000	
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.004	0.004	0.003	0.002	0.000	
U	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.013	0.004	0.006	0.002	0.033	0.036	0.032	0.034	0.000	
Sb	0.172	0.139	0.129	0.163	0.152	0.042	0.073	0.041	0.045	0.027	0.004	0.001	0.002	0.004	0.004	0.005	
Bi	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Cs	0.002	0.003	0.003	0.001	0.004	0.002	0.003	0.009	0.002	0.011	0.005	0.000	0.001	0.002	0.001	0.002	
Sc	0.000	0.002	0.000	0.007	0.000	0.001	0.000	0.048	0.014	0.000	0.011	0.009	0.002	0.012	0.030	0.000	
Y																	
Si											0.159						
F	0.751	0.783	0.776	0.768	0.775	0.870	0.834	0.954	1.010	0.937	1.121	0.419	0.430	0.710	0.727	0.688	
OH*	0.249	0.217	0.224	0.232	0.225	0.130	0.166	0.046	0.000	0.063	0.000	0.581	0.570	0.290	0.273	0.312	
Total	4.897	4.893	4.881	4.863	4.904	4.920	4.867	4.995	4.945	4.915	5.111	4.692	4.691	4.180	4.537	4.677	
Comments:	All from same inclusion in cassiterite					RH & RY rim		replaces wodginite			incl. in columbite		FI - FL big fractured grain			FM & FN same grain	

Pyrochlore Group

Microlite																	
School of Fish pegmatite																	
97-71																	
	FN	FO	FV	FW	FX	HA	HD	HG	HH	HI	HQ	HR	HS	HT	HU	HV	HZ
Na2O	1.10	1.17	1.25	1.21	1.30	1.29	1.17	1.41	1.39	1.44	1.24	1.26	1.24	1.28	0.95	1.00	1.09
CaO	13.75	16.02	16.14	16.00	16.18	16.55	14.45	16.51	16.30	16.38	16.34	16.30	16.18	16.26	16.39	16.60	14.86
Al2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FeO	1.78	0.09	0.08	0.09	0.13	0.35	4.83	0.17	0.34	0.14	0.05	0.05	0.09	0.03	0.13	0.10	2.46
MnO	0.48	0.17	0.18	0.18	0.17	0.08	0.69	0.04	0.04	0.04	0.05	0.05	0.07	0.05	0.07	0.06	0.69
MgO																	
TiO2	2.47	1.37	1.75	1.65	2.05	2.31	8.44	2.20	2.27	2.21	1.71	1.66	1.57	1.61	1.45	1.56	5.55
Nb2O5	9.26	5.58	6.20	5.73	6.68	5.82	4.83	6.22	6.30	5.90	6.41	6.25	6.30	6.16	5.97	5.84	6.59
Ta2O5	65.92	70.49	70.11	70.68	68.33	68.06	59.97	69.33	68.77	69.84	70.03	70.43	70.02	70.09	70.44	70.71	64.68
SnO2	2.89	2.43	1.94	1.88	2.03	2.83	2.49	2.03	2.03	1.82	1.93	2.00	2.19	2.18	2.37	2.19	1.98
WO3	0.29	0.34	0.34	0.28	0.27	0.77	0.65	0.45	0.42	0.42	0.33	0.32	0.32	0.31	0.25	0.26	0.24
PbO	0.00	0.09	0.10	0.03	0.02	0.00	0.07	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.04	0.09	0.10
ThO2	0.06	0.14	0.04	0.01	0.00	0.05	0.09	0.00	0.01	0.00	0.02	0.08	0.08	0.09	0.33	0.20	0.00
UO2	0.00	0.37	0.02	0.04	0.01	0.07	0.00	0.00	0.05	0.00	0.09	0.01	0.09	0.03	0.28	0.23	0.00
Sb2O3	0.09	0.02	0.21	0.20	0.34	0.00	0.00	0.20	0.21	0.22	0.18	0.21	0.14	0.17	0.00	0.00	0.10
Bi2O3	0.00	0.00	0.00	0.00	0.37	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Sc2O3	0.23	0.01	0.00	0.09	0.13	0.01	0.16	0.00	0.11	0.02	0.00	0.11	0.04	0.08	0.04	0.00	0.10
Cs2O	0.04	0.05	0.08	0.05	0.03	0.07	0.05	0.06	0.03	0.09	0.02	0.04	0.00	0.06	0.09	0.06	0.03
BaO																	
K2O																	
Y2O3																	
SiO2																	
F	2.86	2.91	3.24	3.23	3.34	3.53	2.86	3.47	3.28	3.54	3.24	3.20	3.16	3.29	2.85	2.92	3.19
H2O*	1.40	2.05	0.52	0.39	0.96	0.31	1.28	0.37	0.56	0.28	0.58	0.63	0.66	0.52	0.96	0.90	0.86
Subtotal	102.33	102.15	102.25	101.89	101.85	102.10	102.25	102.47	102.10	102.33	102.20	102.60	102.13	102.22	102.60	102.74	102.51
O=F	1.09	0.74	1.39	1.43	1.21	1.49	1.21	1.46	1.38	1.49	1.36	1.35	1.33	1.38	1.20	1.23	1.34
Total	101.25	101.41	100.87	100.46	100.65	100.61	101.04	101.00	100.72	100.84	100.84	101.26	100.80	100.83	101.40	101.51	101.17
Structural formulae based on 6 oxygens																	
Ti	0.147	0.087	0.109	0.104	0.129	0.144	0.485	0.137	0.141	0.137	0.107	0.103	0.098	0.101	0.091	0.098	0.326
Nb	0.332	0.212	0.233	0.217	0.251	0.217	0.167	0.232	0.236	0.221	0.241	0.234	0.237	0.232	0.225	0.220	0.233
Ta	1.423	1.612	1.586	1.611	1.547	1.529	1.246	1.555	1.547	1.573	1.581	1.589	1.585	1.588	1.599	1.604	1.375
W	0.006	0.007	0.007	0.006	0.006	0.016	0.013	0.010	0.009	0.009	0.007	0.007	0.007	0.007	0.005	0.006	0.005
Sn	0.092	0.082	0.064	0.063	0.067	0.093	0.076	0.067	0.067	0.060	0.064	0.066	0.073	0.072	0.079	0.073	0.062
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.118	0.006	0.005	0.006	0.009	0.024	0.309	0.012	0.024	0.010	0.003	0.003	0.006	0.002	0.009	0.007	0.161
Mn	0.032	0.012	0.013	0.013	0.012	0.005	0.045	0.003	0.003	0.003	0.004	0.003	0.005	0.004	0.005	0.004	0.046
Mg																	
Ca	1.169	1.443	1.438	1.437	1.443	1.465	1.183	1.459	1.445	1.453	1.453	1.449	1.444	1.451	1.466	1.483	1.244
Na	0.169	0.190	0.202	0.197	0.210	0.207	0.174	0.225	0.223	0.231	0.200	0.203	0.199	0.207	0.154	0.161	0.165
K																	
Ba																	
Pb	0.000	0.002	0.002	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.002	0.002
Th	0.001	0.003	0.001	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001	0.002	0.002	0.006	0.004	0.000
U	0.000	0.007	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.002	0.000	0.002	0.001	0.005	0.004	0.000
Sb	0.003	0.001	0.007	0.007	0.012	0.000	0.000	0.007	0.007	0.008	0.006	0.007	0.005	0.006	0.000	0.000	0.003
Bi	0.000	0.000	0.000	0.000	0.008	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Cs	0.001	0.002	0.003	0.002	0.001	0.003	0.002	0.002	0.001	0.003	0.001	0.001	0.000	0.002	0.003	0.002	0.001
Sc	0.016	0.001	0.000	0.007	0.010	0.001	0.011	0.000	0.008	0.001	0.000	0.008	0.003	0.006	0.003	0.000	0.007
Y																	
Si																	
F	0.647	0.469	0.866	0.900	0.754	0.922	0.692	0.905	0.857	0.928	0.850	0.840	0.831	0.867	0.753	0.769	0.788
OH*	0.353	0.531	0.134	0.100	0.246	0.078	0.308	0.095	0.143	0.072	0.150	0.160	0.169	0.133	0.247	0.231	0.212
Total	4.509	4.667	4.672	4.670	4.705	4.707	4.727	4.708	4.712	4.709	4.668	4.677	4.665	4.680	4.652	4.669	4.629
Comments:	FV - FX		HA & HD				HG - HJ		HQ - HT			HU & HP					
	same grain		same grain				same grain		same grain			same grain					

Pyrochlore Group

	Microlite School of Fish pegmatite 97-264					Microlite Whopper 97-BW7A	Microlite Big Whopper 97-BW7B		Microlite Whopper 98-SS27	Microlite Big Whopper pegmatite 98-SS29					
	HC	HD	HE	HF	HG	GN	JA	JB	HG	DD	DF	DG	DH	DI	DK
Na2O	0.48	0.47	0.46	0.64	0.62	0.42	2.55	3.49	3.20	2.61	2.84	2.94	2.76	2.70	2.88
CaO	16.02	16.15	16.05	17.81	17.70	11.32	10.48	9.73	6.08	12.62	13.86	13.90	13.20	13.44	13.91
Al2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.09	0.10	0.11	0.11	0.13	2.66	1.02	0.49	2.10	0.22	0.08	0.09	0.18	0.15	0.09
MnO	0.08	0.08	0.07	0.07	0.07	1.17	0.46	0.21	0.09	0.11	0.10	0.09	0.11	0.10	0.11
MgO									0.26						
TiO2	1.63	1.52	1.57	1.49	1.34	0.22	0.63	0.67	0.11	0.33	0.59	0.55	0.54	0.61	0.91
Nb2O5	3.82	4.14	4.07	21.79	18.51	5.04	7.16	7.49	3.16	1.68	7.52	5.62	5.42	2.72	6.70
Ta2O5	70.88	70.85	70.79	51.36	55.81	70.20	67.58	67.69	67.54	75.40	69.26	71.42	71.45	74.74	69.63
SnO2	1.84	1.72	1.75	2.22	2.19	5.36	2.61	2.83	0.63	2.32	2.48	2.60	2.69	1.86	2.10
WO3	0.30	0.30	0.34	0.49	0.40	0.23	0.53	0.32	0.20	0.20	0.22	0.20	0.23	0.48	0.35
PbO	0.31	0.27	0.24	0.09	0.09	0.21	0.43	0.33	0.42	0.07	0.09	0.04	0.04	0.05	0.23
ThO2	0.18	0.18	0.17	0.20	0.14	0.08	0.08	0.06	0.02	0.00	0.01	0.01	0.06	0.04	0.00
UO2	1.21	1.05	1.14	0.06	0.05	0.08	1.15	0.47	5.18	0.28	0.33	0.25	0.22	0.46	0.58
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	0.00	0.00	0.03	0.00	0.01	0.02	0.02	0.04	0.42	0.02	0.05	0.00	0.00	0.11	0.00
Sc2O3	0.12	0.03	0.18	0.22	0.04	0.06	0.28	0.58	0.01						
Cs2O	0.04	0.04	0.05	0.02	0.04	0.00	0.04	0.04		0.06	0.06	0.03	0.05	0.08	0.00
BaO										0.01	0.00	0.00	0.00	0.00	0.00
K2O									0.12	0.04	0.00	0.02	0.01	0.02	0.01
Y2O3															
SiO2						1.46	1.23	1.25	4.80						
F	1.56	1.66	1.41	1.68	1.72	1.50	2.03	3.05	1.75	2.70	2.76	2.82	2.85	2.78	2.83
H2O*	2.16	2.05	2.31	2.48	2.38	2.32	1.70	0.68	1.86	0.86	1.00	0.91	0.86	0.86	0.92
Subtotal	100.70	100.61	100.73	100.72	101.24	102.32	100.10	99.50	99.27	99.98	101.25	101.47	100.65	101.18	101.26
O=F	0.66	0.70	0.59	0.71	0.72	0.63	0.86	1.28	0.75	1.14	1.16	1.19	1.20	1.17	1.19
Total	100.05	99.91	100.14	100.01	100.52	101.69	99.24	98.21	98.52	98.84	100.09	100.29	99.45	100.01	100.07

Structural formulae based on 6 oxygens

Ti	0.106	0.099	0.103	0.086	0.079	0.014	0.041	0.043	0.008	0.022	0.038	0.035	0.035	0.040	0.058
Nb	0.150	0.162	0.160	0.759	0.656	0.192	0.278	0.288	0.131	0.068	0.287	0.217	0.209	0.107	0.257
Ta	1.674	1.672	1.669	1.077	1.189	1.609	1.580	1.566	1.688	1.824	1.588	1.655	1.660	1.777	1.606
W	0.007	0.007	0.008	0.010	0.008	0.005	0.012	0.007	0.005	0.004	0.005	0.005	0.005	0.011	0.008
Sn	0.064	0.059	0.061	0.068	0.068	0.180	0.090	0.096	0.023	0.082	0.083	0.088	0.092	0.065	0.071
Al	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.145	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.007	0.007	0.008	0.007	0.008	0.188	0.073	0.035	0.161	0.016	0.005	0.006	0.013	0.011	0.007
Mn	0.006	0.006	0.005	0.005	0.005	0.083	0.033	0.015	0.007	0.008	0.007	0.006	0.008	0.007	0.008
Mg									0.035						
Ca	1.491	1.502	1.491	1.471	1.486	1.022	0.965	0.887	0.599	1.202	1.252	1.270	1.208	1.259	1.264
Na	0.081	0.080	0.077	0.095	0.094	0.069	0.426	0.575	0.570	0.450	0.464	0.486	0.456	0.457	0.474
K									0.013	0.004	0.000	0.002	0.001	0.002	0.001
Ba										0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.007	0.006	0.006	0.002	0.002	0.005	0.010	0.007	0.010	0.002	0.002	0.001	0.001	0.001	0.005
Th	0.004	0.003	0.003	0.003	0.003	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000
U	0.023	0.020	0.022	0.001	0.001	0.001	0.022	0.009	0.106	0.006	0.006	0.005	0.004	0.009	0.011
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.010	0.001	0.001	0.000	0.000	0.002	0.000
Cs	0.002	0.001	0.002	0.001	0.001	0.000	0.001	0.002		0.002	0.002	0.001	0.002	0.003	0.000
Sc	0.009	0.002	0.013	0.015	0.003	0.004	0.021	0.043	0.001						
Y															
Si						0.123	0.105	0.106	0.441						
F	0.427	0.456	0.388	0.410	0.425	0.398	0.553	0.821	0.510	0.760	0.737	0.759	0.769	0.768	0.759
OH*	0.573	0.544	0.612	0.590	0.575	0.602	0.447	0.179	0.490	0.240	0.263	0.241	0.231	0.232	0.241
Total	4.629	4.629	4.628	4.599	4.604	4.497	4.663	4.684	4.593	4.691	4.740	4.777	4.694	4.753	4.769

Comments: HC - HE same grain HF & HG same grain tiny veinlet lepidolite mass - borehole 98-38

Pyrochlore Group

	Uran-					
	Microlite Wolf peg.		microlite Whopper	Microlite SW Beryl		Microlite Zone 11
	99-WZ4	DC97-7-55	EFR-6056B	99-ATZ11		
	DO	DP	AE	KI	KJ	ZA
Na2O	1.49	2.63	1.24	3.74	2.54	0.18
CaO	9.31	6.89	8.21	9.04	8.86	16.40
Al2O3	0.00	0.00	0.00	0.00	0.00	0.00
FeO	0.01	0.17	0.02	0.10	1.15	0.11
MnO	0.18	0.50	0.84	0.12	0.20	0.26
MgO						
TiO2	0.71	0.67	0.00	0.32	0.37	0.33
Nb2O5	6.14	6.09	1.41	5.67	6.56	8.19
Ta2O5	69.94	67.90	68.23	71.68	70.02	67.97
SnO2	2.52	2.43	0.88	2.12	2.11	2.14
WO3	0.61	2.05	0.18	0.12	0.09	0.24
PbO	0.67	0.61	5.34	0.82	0.67	0.04
ThO2	0.00	0.00	0.00	0.00	0.00	0.11
UO2	1.79	1.78	8.56	0.93	1.02	0.08
Sb2O3	0.27	0.29	0.00	0.52	0.75	0.00
Bi2O3	0.09	0.05	0.00	0.00	0.05	0.00
Sc2O3	0.22	1.77	0.08	0.64	0.69	0.05
Cs2O			0.00	0.05	0.09	0.00
BaO	0.01	0.77				
K2O	0.10	0.07				
Y2O3						
SiO2	1.42	1.58		1.28	1.79	1.30
F	1.83	1.94	1.26	3.36	2.43	0.96
H2O*	1.87	1.76	1.93	0.32	1.27	2.91
Subtotal	99.17	99.96	98.18	100.81	100.68	101.26
O=F	0.77	0.82	0.53	1.41	1.02	0.40
Total	98.40	99.14	97.65	99.40	99.65	100.85

Structural formulae based on 6 oxygens

Ti	0.046	0.044	0.000	0.021	0.024	0.021
Nb	0.236	0.237	0.065	0.221	0.256	0.317
Ta	1.619	1.590	1.895	1.683	1.645	1.583
W	0.013	0.046	0.005	0.003	0.002	0.005
Sn	0.086	0.083	0.036	0.073	0.073	0.073
Al	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.000	0.012	0.002	0.007	0.083	0.008
Mn	0.013	0.037	0.072	0.009	0.015	0.019
Mg						
Ca	0.849	0.635	0.899	0.836	0.820	1.505
Na	0.246	0.438	0.244	0.625	0.425	0.031
K	0.011	0.008				
Ba	0.000	0.026				
Pb	0.015	0.014	0.147	0.019	0.016	0.001
Th	0.000	0.000	0.000	0.000	0.000	0.002
U	0.034	0.034	0.194	0.018	0.020	0.002
Sb	0.009	0.010	0.000	0.019	0.027	0.000
Bi	0.002	0.001	0.000	0.000	0.001	0.000
Cs			0.000	0.002	0.003	0.000
Sc	0.016	0.133	0.007	0.048	0.052	0.004
Y						
Si	0.121	0.136		0.110	0.154	0.111
F	0.493	0.529	0.406	0.916	0.665	0.260
OH*	0.507	0.471	0.594	0.084	0.335	0.740
Total	4.316	4.485	4.566	4.693	4.616	4.682

Comments: DO & DP rim around inclusions B23K1
 same grain W-rich in columbite
 wodginite Emerald Fields sample

Ixiolite

	Lou's pegmatite					Marko's pegmatite		Pegmatite 9			Peg. 11
	93-272B					94-44Y		94-318			95-117B
	RF	RN	RG	RO	RP	UA	UD	BC17	BC18	BC19	RL
FeO	4.27	4.16	4.69	4.80	3.94	9.23	8.53	15.57	15.23	14.15	12.42
MnO	11.81	11.62	12.63	12.17	11.93	9.09	8.98	1.85	1.74	1.49	5.13
TiO2	4.91	5.17	4.83	4.31	4.83	4.10	3.89	2.14	2.58	3.18	3.03
Nb2O5	37.06	35.73	34.38	34.46	35.74	37.68	39.47	31.51	25.69	19.39	46.33
Ta2O5	37.76	39.77	40.44	40.45	40.23	36.87	36.31	39.77	40.51	41.26	27.09
SnO2	1.07	1.02	1.22	1.15	1.07	1.84	1.38	2.17	4.81	8.48	0.63
WO3	0.03	0.14	0.10	0.11	0.21	0.33	0.37	6.60	8.37	9.46	3.62
PbO	0.23	0.24	0.28	0.24	0.30	0.33	0.53	0.21	0.12	0.12	0.17
ThO2	0.00	0.01	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.00
UO2	0.08	0.06	0.08	0.03	0.10	0.40	0.60	0.00	0.01	0.10	0.00
Sb2O3	0.08	0.06	0.06	0.06	0.08	0.05	0.05	0.00	0.00	0.00	0.00
Bi2O3						0.00	0.00	0.00	0.00	0.00	0.00
Sc2O3	1.35	1.28	1.16	1.57	1.30	0.03	0.07	0.03	0.20	0.29	0.28
CaO	0.07	0.07	0.05	0.07	0.05	0.06	0.04	0.02	0.11	0.15	
Total	98.72	99.33	99.92	99.43	99.78	100.01	100.26	99.86	99.37	98.07	98.68
Structural formulae based on 6 oxygens											
Fe	0.234	0.229	0.259	0.266	0.216	0.507	0.466	0.894	0.894	0.860	0.665
Mn	0.657	0.647	0.705	0.683	0.664	0.506	0.497	0.107	0.103	0.092	0.278
Ti	0.242	0.255	0.239	0.215	0.239	0.202	0.191	0.111	0.136	0.174	0.146
Nb	1.100	1.061	1.025	1.033	1.061	1.119	1.165	0.978	0.816	0.637	1.340
Ta	0.674	0.711	0.725	0.729	0.719	0.658	0.645	0.742	0.774	0.815	0.471
Sn	0.028	0.027	0.032	0.030	0.028	0.048	0.036	0.059	0.135	0.246	0.016
W	0.001	0.002	0.002	0.002	0.004	0.006	0.006	0.117	0.152	0.178	0.060
Pb	0.004	0.004	0.005	0.004	0.005	0.006	0.009	0.004	0.002	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
U	0.001	0.001	0.001	0.000	0.001	0.006	0.009	0.000	0.000	0.002	0.000
Sb	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.000	0.000	0.000	0.000
Bi						0.000	0.000	0.000	0.000	0.000	0.000
Sc	0.077	0.073	0.067	0.091	0.074	0.002	0.004	0.002	0.012	0.018	0.015
Ca	0.005	0.005	0.004	0.005	0.004	0.004	0.003	0.001	0.008	0.011	
Total	3.026	3.017	3.065	3.061	3.017	3.065	3.033	3.015	3.034	3.035	2.994
Mn/(Mn+Fe)	0.737	0.739	0.732	0.720	0.754	0.499	0.516	0.107	0.103	0.096	0.295
Ta/(Ta+Nb)	0.380	0.401	0.414	0.414	0.404	0.371	0.356	0.432	0.487	0.561	0.260
Comments:	F & N same grain incl. in cass. high Sc & assoc. with stibiomicroilite	G, O & P same grain incl. in cass.	isolated grains close to selvedge	end of BC traverse Sn-W rich rim of normal ferrocolumbite							

NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).

Ixiolite

	Pegmatite 11			Treelined Lake		Marko's peg.		Big Whopper peg.			Pegmatite 7		
	95-117C			96-2		96-AT17		97-BW4			97-P7-1		
	XC	XD	XJ	FG	FN	RM	RZ	RG	RH	RI	SM	SO	SP
FeO	11.57	11.44	11.12	3.60	3.91	12.16	11.32	7.24	7.44	7.29	10.17	10.50	10.11
MnO	5.50	5.64	5.39	13.73	14.47	5.37	5.06	6.32	6.41	6.47	5.03	4.72	4.94
TiO2	4.60	4.88	3.92	12.57	7.89	3.20	8.78	7.41	6.80	7.17	3.88	4.12	3.21
Nb2O5	43.90	45.16	35.76	63.14	64.29	44.88	40.49	15.74	13.66	15.29	25.73	23.72	24.26
Ta2O5	29.66	27.67	38.19	2.30	2.19	33.17	32.63	51.06	49.85	48.86	48.30	48.35	47.18
SnO2	1.38	1.53	0.90	0.15	0.16	0.70	0.88	8.55	8.53	8.27	4.69	5.72	4.81
WO3	2.32	2.26	3.13	3.14	4.35	0.31	0.22	2.71	6.07	5.13	1.73	2.25	3.51
PbO	0.27	0.23	0.16	0.28	0.32	0.22	0.19	0.02	0.00	0.16	0.07	0.12	0.14
ThO2	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
UO2	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Bi2O3	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
Sc2O3	0.27	0.54	0.37	1.54	1.33	0.27	0.30	0.26	0.32	0.07	0.29	0.23	0.32
CaO				0.05	0.05	0.01	0.01	0.03	0.00	0.04	0.03	0.04	0.03
Total	99.53	99.43	98.94	100.45	98.91	100.28	99.91	99.34	99.07	98.76	99.91	99.75	98.50

Structural formulae based on 6 oxygens

Fe	0.615	0.602	0.621	0.162	0.183	0.649	0.590	0.430	0.449	0.437	0.593	0.617	0.604
Mn	0.296	0.301	0.305	0.627	0.687	0.290	0.267	0.381	0.392	0.393	0.297	0.281	0.299
Ti	0.220	0.231	0.197	0.510	0.333	0.153	0.412	0.397	0.369	0.387	0.204	0.218	0.172
Nb	1.262	1.285	1.080	1.540	1.630	1.295	1.141	0.506	0.446	0.496	0.811	0.754	0.783
Ta	0.513	0.474	0.694	0.034	0.033	0.576	0.553	0.988	0.978	0.953	0.916	0.925	0.916
Sn	0.035	0.038	0.024	0.003	0.003	0.018	0.022	0.242	0.245	0.237	0.130	0.160	0.137
W	0.038	0.037	0.054	0.044	0.063	0.005	0.003	0.050	0.114	0.095	0.031	0.041	0.065
Pb	0.005	0.004	0.003	0.004	0.005	0.004	0.003	0.000	0.000	0.003	0.001	0.002	0.003
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000			
Sc	0.015	0.030	0.022	0.072	0.065	0.015	0.016	0.016	0.020	0.005	0.018	0.014	0.020
Ca				0.003	0.003	0.001	0.000	0.003	0.000	0.003	0.002	0.003	0.002
Total	2.999	3.003	2.999	2.999	3.006	3.005	3.009	3.012	3.012	3.009	3.004	3.015	3.001
Mn/(Mn+Fe)	0.325	0.333	0.329	0.794	0.790	0.309	0.312	0.469	0.466	0.473	0.334	0.313	0.331
Ta/(Ta+Nb)	0.289	0.269	0.391	0.021	0.020	0.308	0.326	0.661	0.687	0.658	0.530	0.551	0.539

Comments:	XC & XD same grain attached to strüverite	small inclusions in Nb rutile	incl. in cass. assoc. Sb microlite	edge of col RA - RF Ti, W wadginites or ixiolite	occurs marginal to wadginites
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Strüverite

	Marko's	Marko's pegmatite					Peg. 11	Pegmatite 11			
	94-44I	94-44J					95-117A	95-117C			
	XB	ZU	ZV	KA	KB	KC	VC	XE	XF	XG	XI
FeO	7.85	7.07	5.25	2.81	1.92	2.38	10.29	10.86	10.62	10.68	10.82
MnO	0.07	1.21	5.23	0.05	0.02	0.04	0.05	0.08	0.07	0.08	0.11
TiO2	58.28	55.51	34.39	86.68	90.53	87.92	40.88	38.17	39.17	39.15	37.69
Nb2O5	7.77	4.53	8.80	6.81	4.56	5.13	12.87	12.69	13.07	12.87	12.29
Ta2O5	23.85	30.55	42.49	3.06	2.10	3.43	32.26	35.09	33.59	34.45	34.81
SnO2	1.40	1.47	3.63	1.37	1.00	1.03	2.92	2.32	2.36	2.15	3.28
WO3	0.02	0.01	0.00	0.11	0.00	0.04	0.55	0.82	0.84	0.84	0.95
PbO	0.03	0.02	0.02	0.01	0.04	0.03	0.03	0.05	0.00	0.07	0.03
ThO2	0.02	0.01	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00	0.00
UO2	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Sb2O3				0.00	0.00	0.00					
Bi2O3				0.00	0.00	0.00					
Sc2O3	0.04			0.00	0.00	0.00	0.73	0.79	0.55	0.74	0.47
CaO											
Cr2O3											
Total	99.42	100.40	99.81	100.88	100.16	100.00	100.59	100.88	100.27	101.03	100.46

Structural formulae based on 4 oxygens

Fe	0.218	0.201	0.172	0.065	0.044	0.055	0.312	0.335	0.327	0.327	0.337
Mn	0.002	0.035	0.173	0.001	0.000	0.001	0.001	0.002	0.002	0.003	0.003
Ti	1.455	1.421	1.011	1.814	1.876	1.846	1.114	1.060	1.084	1.078	1.056
Nb	0.117	0.070	0.156	0.086	0.057	0.065	0.211	0.212	0.217	0.213	0.207
Ta	0.215	0.283	0.452	0.023	0.016	0.026	0.318	0.352	0.336	0.343	0.353
Sn	0.019	0.020	0.057	0.015	0.011	0.011	0.042	0.034	0.035	0.031	0.049
W	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.008	0.008	0.008	0.009
Pb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb											
Bi											
Sc	0.001						0.023	0.026	0.018	0.024	0.015
Ca											
Cr											
Total	2.027	2.030	2.021	2.006	2.004	2.006	2.028	2.031	2.027	2.028	2.030

Comments:

KA - KC
same grain

XE - XG
same grain

NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).

Strüverite

	Treelined Lake Complex 96-2						SW Beryl pegmatite 96-9				Marko's 96-AT17
	FB	FM	FC	FK	FE	FF	FM	FN	FO	FP	RN
FeO	3.16	2.81	3.06	2.75	2.80	2.75	12.25	12.25	12.40	12.31	7.29
MnO	0.08	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.02	0.03	1.06
TiO2	83.54	85.05	83.19	84.89	84.59	83.90	23.74	22.94	22.50	24.90	54.23
Nb2O5	10.00	8.28	9.35	8.27	8.67	8.45	7.83	7.56	7.14	7.48	10.90
Ta2O5	1.32	1.23	1.22	1.06	1.11	1.12	52.40	52.15	54.04	51.54	24.30
SnO2	0.09	0.68	0.06	0.04	0.03	0.04	2.55	2.52	2.51	2.94	0.82
WO3	0.42	0.06	0.41	0.26	0.24	0.26	0.39	0.36	0.40	0.44	0.17
PbO	0.01	0.01	0.00	0.02	0.04	0.03	0.03	0.03	0.00	0.00	0.00
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
UO2	0.01	0.03	0.00	0.00	0.01	0.00	0.02	0.03	0.00	0.00	0.00
Sb2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Bi2O3	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.06	0.04	0.02	0.00
Sc2O3	1.62	1.75	1.73	1.75	1.92	1.94	0.67	0.79	0.66	0.75	1.21
CaO	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.03	0.00	0.01	0.01
Cr2O3											
Total	100.26	99.94	99.08	99.11	99.48	98.54	99.92	98.72	99.71	100.42	100.01

Structural formulae based on 4 oxygens

Fe	0.073	0.065	0.072	0.064	0.065	0.064	0.437	0.445	0.450	0.434	0.203
Mn	0.002	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.030
Ti	1.744	1.775	1.752	1.778	1.767	1.770	0.762	0.749	0.734	0.789	1.362
Nb	0.126	0.104	0.118	0.104	0.109	0.107	0.151	0.148	0.140	0.142	0.165
Ta	0.010	0.009	0.009	0.008	0.008	0.009	0.608	0.616	0.637	0.591	0.221
Sn	0.001	0.007	0.001	0.000	0.000	0.000	0.043	0.044	0.043	0.049	0.011
W	0.003	0.000	0.003	0.002	0.002	0.002	0.004	0.004	0.004	0.005	0.001
Pb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sc	0.039	0.042	0.042	0.042	0.046	0.047	0.025	0.030	0.025	0.028	0.035
Ca	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Cr											
Total	2.017	2.019	2.019	2.019	2.020	2.020	2.034	2.038	2.035	2.039	2.029

Comments: FB & FM FC & FK
 same grain same grain

Strüverite

	Big Mack pegmatite 98-83Ciii					Big Mack pegmatite 98-83Cii									
	FM	FO	FQ	FR	FS	UA	UC	UF	UP	UT	UW	VP	VT	VW	VX
FeO	8.50	8.58	8.38	8.32	8.58	11.54	11.48	11.32	11.94	12.01	11.95	11.05	12.05	11.89	10.03
MnO	0.14	0.12	0.13	0.11	0.14	0.05	0.05	0.19	0.11	0.13	0.27	0.70	0.12	0.10	2.96
TiO2	33.10	33.04	32.52	33.26	31.72	24.76	25.11	25.92	25.03	22.73	22.87	22.69	22.36	24.62	6.53
Nb2O5	15.88	19.49	18.59	18.90	16.71	6.03	6.24	7.31	5.98	6.52	6.18	6.34	6.37	6.17	9.05
Ta2O5	32.24	27.97	29.38	28.47	31.91	52.72	52.40	50.55	52.79	53.73	54.09	53.84	54.71	53.31	60.78
SnO2	4.12	4.10	3.90	3.92	4.09	4.03	3.75	3.15	3.14	3.62	3.36	2.97	3.55	3.49	8.69
WO3	0.28	0.27	0.39	0.37	0.39	0.50	0.60	0.54	0.97	0.67	0.59	0.94	0.65	0.61	1.35
PbO	0.00	0.13	0.01	0.07	0.00	0.07	0.02	0.00	0.07	0.00	0.08	0.32	0.00	0.00	0.06
ThO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06	0.00	0.04	0.00
UO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.03	0.01	0.00	0.00	0.00
Sb2O3	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
Bi2O3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.28	0.00	0.02	0.06
Sc2O3	0.91	0.83	0.91	0.96	0.87	0.67	0.62	0.76	0.61	0.60	0.63	0.60	0.57	0.55	0.32
CaO	0.01	0.00	0.00	0.03	0.27	0.01	0.00	0.04	0.00	0.01	0.03	0.17	0.02	0.01	0.02
Cr2O3	3.65	4.63	4.54	4.57	4.38										
Total	98.83	99.17	98.74	98.99	99.07	100.37	100.27	99.78	100.67	100.03	100.09	99.80	100.39	100.82	99.83
Structural formulae based on 4 oxygens															
Fe	0.275	0.273	0.270	0.266	0.279	0.410	0.407	0.398	0.423	0.422	0.435	0.420	0.402	0.437	0.422
Mn	0.005	0.004	0.004	0.004	0.005	0.002	0.002	0.007	0.004	0.004	0.005	0.004	0.026	0.004	0.004
Ti	0.963	0.947	0.942	0.955	0.928	0.792	0.801	0.819	0.797	0.763	0.739	0.778	0.742	0.729	0.785
Nb	0.278	0.336	0.324	0.326	0.294	0.116	0.120	0.139	0.115	0.113	0.127	0.126	0.125	0.125	0.118
Ta	0.339	0.290	0.308	0.296	0.338	0.609	0.604	0.578	0.608	0.631	0.632	0.612	0.636	0.645	0.615
Sn	0.064	0.062	0.060	0.060	0.064	0.068	0.063	0.053	0.053	0.068	0.063	0.064	0.052	0.061	0.059
W	0.003	0.003	0.004	0.004	0.004	0.006	0.007	0.006	0.011	0.007	0.007	0.007	0.011	0.007	0.007
Pb	0.000	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.004	0.000	0.000
Th	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
U	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000
Sc	0.031	0.028	0.030	0.032	0.029	0.025	0.023	0.028	0.023	0.022	0.023	0.019	0.023	0.021	0.020
Ca	0.000	0.000	0.000	0.001	0.011	0.000	0.000	0.002	0.000	0.000	0.001	0.000	0.008	0.001	0.001
Cr	0.047	0.059	0.058	0.058	0.057										
Total	2.004	2.003	2.000	2.001	2.009	2.029	2.026	2.028	2.034	2.029	2.032	2.029	2.030	2.030	2.031
Comments:	FM - FS		FQ & FR		UA & UC										
	all around		same grain		intergrown										
	cordierite cluster				grain										

Cassiterite

	Separation Rapids pluton 93-260					Separation Rapids pluton 93-260C								
	NC	ND	NE	NF	NG	XA1	XA2	XA3	XA4	XA5	XA6	XA7	XA8	XA9
SnO2	97.63	97.10	98.35	96.60	98.43	94.11	93.97	94.32	93.89	94.14	94.15	94.01	93.44	93.91
FeO	0.48	0.52	0.32	0.60	0.33	0.90	0.95	0.95	0.88	0.91	0.94	0.94	0.96	0.90
MnO	0.05	0.05	0.01	0.07	0.04	0.04	0.05	0.03	0.06	0.05	0.06	0.06	0.07	0.04
Nb2O5	0.65	0.75	0.40	0.72	0.41	0.78	0.77	0.80	0.86	0.78	0.92	0.91	0.85	0.79
Ta2O5	0.92	0.98	0.88	1.59	0.55	3.92	3.88	3.91	3.79	3.96	4.04	4.16	4.16	3.96
Total	99.73	99.40	99.96	99.58	99.76	99.75	99.62	100.00	99.47	99.85	100.11	100.07	99.47	99.61
Structural formulae based on 4 oxygens														
Sn	1.955	1.950	1.967	1.938	1.971	1.891	1.890	1.890	1.891	1.890	1.884	1.882	1.883	1.890
Fe	0.020	0.022	0.013	0.025	0.014	0.038	0.040	0.040	0.037	0.038	0.039	0.039	0.040	0.038
Mn	0.002	0.002	0.000	0.003	0.002	0.002	0.002	0.001	0.003	0.002	0.003	0.002	0.003	0.002
Nb	0.015	0.017	0.009	0.016	0.009	0.018	0.018	0.018	0.020	0.018	0.021	0.021	0.019	0.018
Ta	0.013	0.013	0.012	0.022	0.008	0.054	0.053	0.053	0.052	0.054	0.055	0.057	0.057	0.054
Total	2.004	2.004	2.002	2.005	2.004	2.002	2.003	2.003	2.002	2.002	2.002	2.001	2.003	2.002
Sn end	97.525	97.279	98.256	96.689	98.384	94.448	94.363	94.383	94.444	94.388	94.103	94.049	94.008	94.398
FeMn end	1.112	1.199	0.692	1.408	0.777	1.980	2.103	2.041	1.981	2.014	2.098	2.083	2.165	1.981
NbTa end	1.363	1.522	1.053	1.902	0.840	3.573	3.534	3.576	3.575	3.598	3.799	3.868	3.828	3.622
Nb+Ta	0.027	0.030	0.021	0.038	0.017	0.072	0.071	0.072	0.072	0.072	0.076	0.077	0.077	0.072
Fe+Mn	0.022	0.024	0.014	0.028	0.016	0.040	0.042	0.041	0.040	0.040	0.042	0.042	0.043	0.040
Comments:	NC - NG same grain					core traverse across anhedral crystal furthest away from inclusions 1400 µm traverse - 100 µm intervals								

NOTE: All pertinent data are supplied in this table, however, additional information (calculations, ratios, etc.) is available on the Miscellaneous Release-Data (i.e., the electronic version).

Cassiterite

	Separation Rapids Pluton 93-260C					E Beryl peg. 93-265A		East Beryl pegmatite 93-265F				
	XA10	XA11	XA12	XA13	XA14	LE	LF	UA	UC	UD	UE	UG
SnO2	94.35	94.36	94.34	95.46	94.89	98.23	97.54	94.71	95.17	96.47	95.32	95.71
FeO	0.83	0.88	0.89	0.74	0.81	0.11	0.18	0.73	0.62	0.58	0.64	0.66
MnO	0.04	0.04	0.03	0.04	0.04	0.10	0.20	0.09	0.05	0.08	0.04	0.09
Nb2O5	0.79	0.85	0.82	0.70	0.76	0.06	0.07	0.73	0.59	0.52	0.61	0.64
Ta2O5	3.53	3.79	3.70	3.13	3.34	1.18	1.90	2.90	2.41	2.60	2.79	2.57
Total	99.54	99.92	99.78	100.07	99.83	99.68	99.89	99.16	98.84	100.25	99.40	99.67
Structural formulae based on 4 oxygens												
Sn	1.899	1.892	1.894	1.910	1.904	1.974	1.957	1.912	1.927	1.927	1.920	1.922
Fe	0.035	0.037	0.038	0.031	0.034	0.005	0.008	0.031	0.026	0.024	0.027	0.028
Mn	0.002	0.002	0.001	0.002	0.001	0.004	0.009	0.004	0.002	0.003	0.002	0.004
Nb	0.018	0.019	0.019	0.016	0.017	0.001	0.002	0.017	0.014	0.012	0.014	0.015
Ta	0.048	0.052	0.051	0.043	0.046	0.016	0.026	0.040	0.033	0.035	0.038	0.035
Total	2.002	2.002	2.002	2.002	2.002	2.000	2.001	2.003	2.003	2.002	2.001	2.003
Sn end	94.846	94.502	94.599	95.437	95.085	98.678	97.816	95.438	96.239	96.259	95.952	95.937
FeMn end	1.833	1.946	1.940	1.632	1.768	0.445	0.805	1.735	1.422	1.383	1.437	1.579
NbTa end	3.321	3.552	3.461	2.930	3.147	0.877	1.379	2.827	2.339	2.358	2.612	2.484
Nb+Ta	0.066	0.071	0.069	0.059	0.063	0.018	0.028	0.057	0.047	0.047	0.052	0.050
Fe+Mn	0.037	0.039	0.039	0.033	0.035	0.009	0.016	0.035	0.028	0.028	0.029	0.032
Comments:									UA - UE same grain			core

Cassiterite

	East Beryl pegmatite 93-265K					E Beryl peg. 93-265N(ii)		East Beryl pegmatite 93-265P			Audreys 93-271	Audreys 93-271		
	YA	YB	YC	YD	YE	BG	BH	WH	WI	WJ	YA	YH		
SnO2	97.77	96.20	95.64	95.87	95.08	96.60	97.94	98.55	98.16	99.10	97.97	97.89		
FeO	0.32	0.60	0.77	0.53	0.71	0.52	0.34	0.13	0.20	0.21	0.57	0.46		
MnO	0.03	0.04	0.05	0.11	0.04	0.07	0.05	0.05	0.04	0.03	0.07	0.10		
Nb2O5	0.41	0.62	1.20	0.50	0.96	0.50	0.35	0.18	0.04	0.09	0.21	0.18		
Ta2O5	1.07	2.39	2.20	2.11	2.85	1.98	1.16	0.42	0.94	0.76	1.48	1.14		
Total	99.60	99.85	99.86	99.12	99.64	99.67	99.84	99.33	99.38	100.19	100.30	99.77		
Structural formulae based on 4 oxygens														
Sn	1.963	1.928	1.911	1.936	1.908	1.939	1.962	1.984	1.978	1.979	1.955	1.964		
Fe	0.013	0.025	0.032	0.022	0.030	0.022	0.014	0.005	0.008	0.009	0.024	0.019		
Mn	0.001	0.002	0.002	0.005	0.002	0.003	0.002	0.002	0.002	0.001	0.003	0.004		
Nb	0.009	0.014	0.027	0.011	0.022	0.011	0.008	0.004	0.001	0.002	0.005	0.004		
Ta	0.015	0.033	0.030	0.029	0.039	0.027	0.016	0.006	0.013	0.010	0.020	0.016		
Total	2.001	2.002	2.003	2.003	2.001	2.003	2.002	2.001	2.002	2.002	2.007	2.007		
Sn end	98.065	96.319	95.428	96.623	95.379	96.836	97.992	99.126	98.801	98.878	97.423	97.842		
FeMn end	0.737	1.345	1.717	1.356	1.579	1.242	0.820	0.381	0.508	0.503	1.337	1.177		
NbTa end	1.198	2.336	2.855	2.022	3.042	1.922	1.189	0.493	0.691	0.619	1.240	0.981		
Nb+Ta	0.024	0.047	0.057	0.041	0.061	0.038	0.024	0.010	0.014	0.012	0.025	0.020		
Fe+Mn	0.015	0.027	0.034	0.027	0.032	0.025	0.016	0.008	0.010	0.010	0.027	0.024		
Comments:	YA - YE same grain					core		BG & BH same grain		WH - WJ same grain pale dark dark contains many inclusions			YA & YH same grain	

Cassiterite

	Lou's pegmatite 93-272B						Lou's pegmatite 93-272E							
	XA	XE	XI	XK	XL	XP	WA	WB	WC	WD	WE	WF	JF	JG
SnO2	98.64	96.65	93.55	95.32	99.28	97.72	98.66	95.54	92.17	94.42	95.67	97.44	97.45	95.83
FeO	0.23	0.34	0.88	0.63	0.20	0.40	0.17	0.80	1.03	0.73	0.65	0.22	0.53	0.63
MnO	0.03	0.05	0.03	0.07	0.04	0.05	0.05	0.05	0.15	0.08	0.07	0.07	0.03	0.08
Nb2O5	0.09	0.07	0.77	0.55	0.06	0.25	0.04	0.70	0.92	0.74	0.55	0.13	0.19	0.50
Ta2O5	1.00	1.51	3.46	2.46	1.00	1.48	0.73	2.85	4.40	2.74	2.67	2.21	2.06	2.69
Total	99.99	98.62	98.69	99.03	100.58	99.90	99.65	99.94	98.67	98.71	99.61	100.07	100.26	99.73
Structural formulae based on 4 oxygens														
Sn	1.975	1.964	1.899	1.927	1.976	1.958	1.982	1.914	1.872	1.914	1.923	1.952	1.948	1.925
Fe	0.009	0.014	0.037	0.027	0.008	0.017	0.007	0.034	0.044	0.031	0.027	0.009	0.022	0.027
Mn	0.001	0.002	0.001	0.003	0.002	0.002	0.002	0.002	0.006	0.003	0.003	0.003	0.001	0.003
Nb	0.002	0.002	0.018	0.013	0.001	0.006	0.001	0.016	0.021	0.017	0.013	0.003	0.004	0.011
Ta	0.014	0.021	0.048	0.034	0.014	0.020	0.010	0.039	0.061	0.038	0.037	0.030	0.028	0.037
Total	2.001	2.003	2.003	2.003	2.001	2.003	2.002	2.004	2.005	2.004	2.003	1.998	2.004	2.003
Sn end	98.680	98.044	94.790	96.194	98.752	97.761	98.991	95.481	93.391	95.539	96.029	97.729	97.211	96.096
FeMn end	0.536	0.831	1.935	1.483	0.502	0.946	0.464	1.783	2.512	1.721	1.518	0.612	1.172	1.495
NbTa end	0.784	1.125	3.276	2.322	0.746	1.293	0.545	2.736	4.097	2.740	2.454	1.660	1.616	2.408
Nb+Ta	0.016	0.023	0.066	0.047	0.015	0.026	0.011	0.055	0.082	0.055	0.049	0.033	0.032	0.048
Fe+Mn	0.011	0.017	0.039	0.030	0.010	0.019	0.009	0.036	0.050	0.034	0.030	0.012	0.023	0.030
Comments:	XE & XI same grain		XK & XL same grain		WA - WD & WF same grain contains microlite and ferrowodginite inclusions core									

Cassiterite

	Lou's pegmatite 93-272E				Marko's pegmatite 93-275C			Marko's 93-275D	James' peg. 93-276A	
	JH	JI	JL	JM	BC	BD	BF	CC	CK	CP
SnO2	97.29	96.31	96.41	98.19	97.28	98.87	97.55	97.06	97.38	96.52
FeO	0.63	0.64	0.64	0.45	0.14	0.12	0.14	0.16	0.31	0.51
MnO	0.03	0.04	0.01	0.05	0.33	0.14	0.22	0.28	0.07	0.08
Nb2O5	0.57	0.56	0.52	0.35	0.15	0.01	0.09	0.13	0.10	0.16
Ta2O5	2.35	2.67	2.45	1.58	2.02	0.55	1.27	1.74	1.80	2.33
Total	100.87	100.22	100.03	100.62	99.92	99.69	99.27	99.37	99.66	99.60
Structural formulae based on 4 oxygens										
Sn	1.930	1.924	1.930	1.953	1.951	1.985	1.968	1.957	1.958	1.943
Fe	0.026	0.027	0.027	0.019	0.006	0.005	0.006	0.007	0.013	0.022
Mn	0.001	0.002	0.000	0.002	0.014	0.006	0.009	0.012	0.003	0.003
Nb	0.013	0.013	0.012	0.008	0.003	0.000	0.002	0.003	0.002	0.004
Ta	0.032	0.036	0.033	0.021	0.028	0.008	0.017	0.024	0.025	0.032
Total	2.003	2.002	2.002	2.003	2.002	2.004	2.003	2.003	2.001	2.004
Sn end	96.399	96.124	96.377	97.494	97.453	99.063	98.258	97.720	97.850	96.976
FeMn end	1.372	1.424	1.363	1.043	0.996	0.550	0.766	0.937	0.803	1.245
NbTa end	2.228	2.451	2.260	1.464	1.550	0.387	0.975	1.343	1.347	1.779
Nb+Ta	0.045	0.049	0.045	0.029	0.031	0.008	0.020	0.027	0.027	0.036
Fe+Mn	0.027	0.029	0.027	0.021	0.020	0.011	0.015	0.019	0.016	0.025
Comments:					BC & BD same grain	perfectly euhedral basal section		rim	CK & CP same grain	

Cassiterite

James' pegmatite										
93-276B										
	PF	PG	PH	PI	PL	PN	PY	SD	SG	SH
SnO2	96.52	97.79	97.72	96.21	97.67	96.83	92.14	96.95	96.88	94.06
FeO	0.37	0.31	0.24	0.57	0.27	0.40	1.02	0.27	0.36	0.72
MnO	0.05	0.03	0.05	0.07	0.04	0.10	0.07	0.04	0.04	0.09
Nb2O5	0.12	0.13	0.07	0.13	0.10	0.24	0.70	0.13	0.15	0.66
Ta2O5	1.97	1.57	1.23	2.43	1.42	1.98	5.22	1.44	1.67	3.28
Total	99.03	99.83	99.31	99.41	99.50	99.55	99.15	98.83	99.10	98.81
Structural formulae based on 4 oxygens										
Sn	1.954	1.962	1.971	1.941	1.966	1.949	1.867	1.965	1.958	1.907
Fe	0.016	0.013	0.010	0.024	0.011	0.017	0.043	0.011	0.015	0.031
Mn	0.002	0.001	0.002	0.003	0.002	0.004	0.003	0.002	0.002	0.004
Nb	0.003	0.003	0.002	0.003	0.002	0.005	0.016	0.003	0.003	0.015
Ta	0.027	0.021	0.017	0.033	0.019	0.027	0.072	0.020	0.023	0.045
Total	2.001	2.001	2.002	2.004	2.001	2.002	2.001	2.001	2.002	2.002
Sn end	97.611	98.073	98.461	96.831	98.257	97.313	93.276	98.196	97.830	95.254
FeMn end	0.892	0.705	0.614	1.353	0.655	1.057	2.316	0.660	0.848	1.723
NbTa end	1.496	1.222	0.925	1.816	1.088	1.631	4.407	1.144	1.322	3.023
Nb+Ta	0.030	0.024	0.019	0.036	0.022	0.033	0.088	0.023	0.026	0.061
Fe+Mn	0.018	0.014	0.012	0.027	0.013	0.021	0.046	0.013	0.017	0.034

Comments: contains columbite and many ferrowodginite inclusions

Cassiterite

	James' pegmatite 93-276C			James' peg. 93-276C		James' pegmatite 93-276D				James' pegmatite 93-276E					
	KA	KB	KC	KD	KE	QA	QB	QC	QD	HA	HB	HC	HD	HE	
SnO2	96.05	95.90	96.80	96.81	98.27	96.51	96.38	97.46	97.61	98.30	99.11	99.45	98.50	98.85	
FeO	0.84	0.76	0.58	0.90	0.35	0.39	0.34	0.33	0.26	0.33	0.25	0.18	0.32	0.18	
MnO	0.04	0.09	0.08	0.04	0.12	0.05	0.04	0.04	0.04	0.07	0.03	0.01	0.04	0.04	
Nb2O5	0.52	0.64	0.52	0.25	0.32	0.30	0.32	0.32	0.22	0.07	0.10	0.09	0.18	0.13	
Ta2O5	2.32	2.52	2.35	2.47	1.46	1.39	1.34	1.09	0.96	1.55	1.18	0.98	1.31	0.61	
Total	99.77	99.91	100.33	100.47	100.52	98.64	98.42	99.24	99.09	100.32	100.67	100.71	100.35	99.81	
Structural formulae based on 4 oxygens															
Sn	1.927	1.921	1.931	1.931	1.956	1.958	1.959	1.964	1.971	1.963	1.971	1.977	1.965	1.981	
Fe	0.035	0.032	0.024	0.038	0.015	0.017	0.014	0.014	0.011	0.014	0.010	0.008	0.013	0.008	
Mn	0.002	0.004	0.003	0.002	0.005	0.002	0.002	0.002	0.002	0.003	0.001	0.000	0.002	0.002	
Nb	0.012	0.015	0.012	0.006	0.007	0.007	0.007	0.007	0.005	0.002	0.002	0.002	0.004	0.003	
Ta	0.032	0.034	0.032	0.034	0.020	0.019	0.019	0.015	0.013	0.021	0.016	0.013	0.018	0.008	
Total	2.008	2.006	2.003	2.010	2.003	2.003	2.002	2.002	2.002	2.003	2.001	2.000	2.002	2.002	
Sn end	95.984	95.776	96.435	96.089	97.667	97.759	97.893	98.104	98.452	98.028	98.503	98.838	98.153	98.973	
FeMn end	1.845	1.783	1.381	1.958	0.983	0.936	0.811	0.782	0.636	0.838	0.584	0.396	0.753	0.463	
NbTa end	2.170	2.441	2.184	1.953	1.350	1.305	1.297	1.114	0.912	1.133	0.913	0.766	1.094	0.564	
Nb+Ta	0.044	0.049	0.044	0.039	0.027	0.026	0.026	0.022	0.018	0.023	0.018	0.015	0.022	0.011	
Fe+Mn	0.037	0.036	0.028	0.039	0.020	0.019	0.016	0.016	0.013	0.017	0.012	0.008	0.015	0.009	
Comments:	KA - KE same grain					QA - QD same grain core					HA - HE same grain core				

Cassiterite

	James' pegmatite 93-276F					SW Beryl pegmatite 94-15A			SW Beryl pegmatite 94-15A				
	DA	DB	DC	DD	DE	FA	FB	FF	FH	FI	FJ	CF	
SnO2	97.69	99.05	99.28	97.92	99.42	99.20	99.51	98.61	99.16	99.80	100.01	94.26	
FeO	0.50	0.25	0.17	0.25	0.18	0.19	0.19	0.28	0.16	0.13	0.14	1.09	
MnO	0.05	0.05	0.01	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.01	0.18	
Nb2O5	0.32	0.25	0.15	0.21	0.03	0.03	0.10	0.10	0.09	0.09	0.09	2.28	
Ta2O5	1.99	0.84	0.72	1.13	0.88	0.57	0.76	1.56	0.60	0.70	0.52	2.71	
Total	100.55	100.44	100.33	99.54	100.54	100.03	100.60	100.58	100.04	100.75	100.77	100.52	
Structural formulae based on 4 oxygens													
Sn	1.946	1.972	1.980	1.969	1.980	1.985	1.979	1.964	1.983	1.982	1.986	1.864	
Fe	0.021	0.010	0.007	0.011	0.008	0.008	0.008	0.012	0.007	0.005	0.006	0.045	
Mn	0.002	0.002	0.000	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.000	0.008	
Nb	0.007	0.006	0.003	0.005	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.051	
Ta	0.027	0.011	0.010	0.015	0.012	0.008	0.010	0.021	0.008	0.009	0.007	0.037	
Total	2.003	2.002	2.000	2.001	2.001	2.003	2.002	2.001	2.001	2.000	2.001	2.004	
Sn end	97.141	98.521	98.964	98.395	98.930	99.095	98.892	98.180	99.090	99.091	99.234	92.994	
FeMn end	1.148	0.627	0.377	0.591	0.439	0.483	0.480	0.648	0.399	0.334	0.312	2.633	
NbTa end	1.710	0.852	0.659	1.014	0.631	0.422	0.628	1.172	0.511	0.575	0.453	4.374	
Nb+Ta	0.034	0.017	0.013	0.020	0.013	0.008	0.013	0.023	0.010	0.012	0.009	0.088	
Fe+Mn	0.023	0.013	0.008	0.012	0.009	0.010	0.010	0.013	0.008	0.007	0.006	0.053	
Comments:	DA - DE same grain					FA & FB same grain contains inclusions of wadginite			FH - FJ from mineral separate		from polished section separate & section cassiterites		

have different compositions

Cassiterite

	SW Beryl pegmatite 94-15B						SW Beryl pegmatite 94-15B						
	AB	AC	AD	AE	AJ	AK	AL	AM	CC	CD	CK	CI	CJ
SnO2	91.29	99.02	95.47	98.11	95.93	98.97	94.91	97.27	95.17	98.29	99.18	95.92	95.93
FeO	1.23	0.16	0.74	0.35	0.70	0.21	0.84	0.43	0.75	0.27	0.20	0.59	0.58
MnO	0.35	0.01	0.10	0.02	0.05	0.00	0.02	0.04	0.03	0.00	0.02	0.05	0.04
Nb2O5	2.29	0.14	1.92	1.12	1.28	0.10	0.72	1.05	0.98	0.13	0.18	1.00	0.99
Ta2O5	5.22	0.63	1.65	0.45	1.69	0.80	3.53	0.60	2.66	1.18	0.66	2.08	1.84
Total	100.38	99.96	99.88	100.06	99.64	100.08	100.02	99.39	99.59	99.88	100.24	99.64	99.39
Structural formulae based on 4 oxygens													
Sn	1.814	1.982	1.900	1.953	1.919	1.979	1.901	1.950	1.910	1.970	1.979	1.923	1.927
Fe	0.051	0.007	0.031	0.015	0.029	0.009	0.035	0.018	0.032	0.011	0.009	0.025	0.024
Mn	0.015	0.000	0.004	0.001	0.002	0.000	0.001	0.002	0.001	0.000	0.001	0.002	0.002
Nb	0.052	0.003	0.043	0.025	0.029	0.002	0.016	0.024	0.022	0.003	0.004	0.023	0.023
Ta	0.071	0.009	0.022	0.006	0.023	0.011	0.048	0.008	0.036	0.016	0.009	0.028	0.025
Total	2.002	2.000	2.001	2.000	2.003	2.001	2.002	2.002	2.002	2.001	2.001	2.001	2.001
Sn end	90.596	99.067	94.965	97.658	95.836	98.905	94.972	97.413	95.424	98.468	98.884	96.091	96.301
FeMn end	3.290	0.338	1.753	0.767	1.571	0.432	1.801	0.986	1.647	0.574	0.465	1.350	1.311
NbTa end	6.115	0.595	3.282	1.575	2.593	0.663	3.227	1.601	2.928	0.958	0.652	2.559	2.388
Nb+Ta	0.122	0.012	0.066	0.032	0.052	0.013	0.065	0.032	0.059	0.019	0.013	0.051	0.048
Fe+Mn	0.066	0.007	0.035	0.015	0.031	0.009	0.036	0.020	0.033	0.011	0.009	0.027	0.026
Comments:	AB & AC same grain						CI & CJ same grain						

Cassiterite

	Marko's pegmatite 94-44C					Marko's pegmatite 94-44C					Marko's 94-44D
	ZA	ZB	ZC	ZD	ZE	YE	YI	YJ	YK	TJ	BD
SnO2	99.24	96.67	94.24	96.05	96.16	94.36	99.00	97.43	97.89	97.65	99.30
FeO	0.04	0.31	0.60	0.51	0.50	0.73	0.19	0.37	0.25	0.25	0.07
MnO	0.03	0.12	0.20	0.09	0.14	0.23	0.07	0.14	0.07	0.08	0.02
Nb2O5	0.01	0.10	0.12	0.01	0.28	0.19	0.04	0.12	0.06	0.09	0.07
Ta2O5	0.25	2.35	4.39	2.72	2.78	5.02	1.12	2.55	1.40	1.64	0.63
Total	99.57	99.55	99.55	99.38	99.86	100.53	100.42	100.61	99.67	99.71	100.09
Structural formulae based on 4 oxygens											
Sn	1.994	1.948	1.904	1.940	1.931	1.889	1.974	1.943	1.968	1.962	1.985
Fe	0.002	0.013	0.025	0.022	0.021	0.031	0.008	0.015	0.011	0.011	0.003
Mn	0.001	0.005	0.009	0.004	0.006	0.010	0.003	0.006	0.003	0.003	0.001
Nb	0.000	0.002	0.003	0.000	0.006	0.004	0.001	0.003	0.001	0.002	0.00
Ta	0.003	0.032	0.060	0.037	0.038	0.069	0.015	0.035	0.019	0.022	0.009
Total	2.001	2.000	2.001	2.003	2.002	2.002	2.001	2.001	2.002	2.001	1.999
Sn end	99.669	97.360	95.141	96.847	96.431	94.342	98.648	97.063	98.297	98.077	99.288
FeMn end	0.148	0.912	1.699	1.271	1.350	2.019	0.545	1.069	0.676	0.697	0.200
NbTa end	0.183	1.728	3.160	1.882	2.220	3.638	0.806	1.868	1.027	1.226	0.512
Nb+Ta	0.004	0.035	0.063	0.038	0.044	0.073	0.016	0.037	0.021	0.025	0.010
Fe+Mn	0.003	0.018	0.034	0.025	0.027	0.040	0.011	0.021	0.014	0.014	0.004
Comments:	ZA - ZE same grain					contains core a single wodginite inclusion					

Cassiterite

	Marko's pegmatite 94-44E							Marko's peg. 94-44G		Marko's peg. 94-44I	
	HC	PE	PF	PJ	PK	PO	PQ	BF	BG	XF	XG
SnO2	97.49	98.65	98.76	99.45	97.39	94.12	98.30	99.91	97.99	98.80	99.20
FeO	0.31	0.13	0.13	0.05	0.27	0.57	0.12	0.11	0.17	0.23	0.12
MnO	0.08	0.08	0.03	0.07	0.07	0.16	0.07	0.07	0.08	0.05	0.05
Nb2O5	0.01	0.00	0.07	0.03	0.06	0.06	0.07	0.07	0.13	0.18	0.01
Ta2O5	1.65	0.93	0.85	0.48	1.55	3.58	0.73	0.43	0.60	0.81	0.22
Total	99.54	99.79	99.84	100.08	99.34	98.49	99.29	100.59	98.97	100.07	99.60
Structural formulae based on 4 oxygens											
Sn	1.963	1.980	1.980	1.988	1.964	1.920	1.981	1.987	1.981	1.975	1.992
Fe	0.013	0.005	0.005	0.002	0.011	0.024	0.005	0.005	0.007	0.010	0.005
Mn	0.003	0.003	0.001	0.003	0.003	0.007	0.003	0.003	0.003	0.002	0.002
Nb	0.000	0.000	0.002	0.001	0.001	0.001	0.002	0.002	0.003	0.004	0.000
Ta	0.023	0.013	0.012	0.007	0.021	0.050	0.010	0.006	0.008	0.011	0.003
Total	2.003	2.001	2.000	2.001	2.002	2.003	2.001	2.002	2.003	2.002	2.003
Sn end	98.032	98.920	99.002	99.385	98.146	95.879	99.015	99.253	98.907	98.657	99.479
FeMn end	0.825	0.444	0.337	0.253	0.721	1.564	0.403	0.377	0.531	0.588	0.359
NbTa end	1.143	0.636	0.661	0.361	1.134	2.557	0.581	0.370	0.562	0.755	0.162
Nb+Ta	0.023	0.013	0.013	0.007	0.023	0.051	0.012	0.007	0.011	0.015	0.003
Fe+Mn	0.017	0.009	0.007	0.005	0.014	0.031	0.008	0.008	0.011	0.012	0.007
Comments:	core rim some cassiterite occurs as inclusions in microlite							BF & BG same grain close association with Mn columbite		XF & XG same grain wodginite incls.	

& garnet

Cassiterite

Marko's pegmatite										
94-44J										
	SD	SF	SG	SH	SJ	YC	YD	YE	YF	YG
SnO2	98.71	99.54	98.78	99.65	99.67	98.49	97.73	98.98	98.88	99.24
FeO	0.17	0.11	0.15	0.12	0.06	0.20	0.14	0.14	0.15	0.09
MnO	0.05	0.05	0.04	0.07	0.04	0.04	0.05	0.03	0.03	0.03
Nb2O5	0.07	0.01	0.03	0.04	0.00	0.09	0.04	0.04	0.07	0.01
Ta2O5	0.75	0.52	0.73	0.61	0.37	0.88	0.78	0.45	0.85	0.36
Total	99.75	100.23	99.73	100.49	100.14	99.70	98.74	99.64	99.98	99.73
Structural formulae based on 4 oxygens										
Sn	1.981	1.988	1.983	1.985	1.992	1.977	1.981	1.988	1.980	1.991
Fe	0.007	0.005	0.006	0.005	0.003	0.008	0.006	0.006	0.006	0.004
Mn	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.001	0.001	0.001
Nb	0.002	0.000	0.001	0.001	0.000	0.002	0.001	0.001	0.002	0.000
Ta	0.010	0.007	0.010	0.008	0.005	0.012	0.011	0.006	0.012	0.005
Total	2.002	2.002	2.001	2.002	2.001	2.002	2.001	2.002	2.000	2.001
Sn end	98.944	99.299	99.066	99.143	99.537	98.790	99.010	99.288	98.962	99.489
FeMn end	0.464	0.336	0.401	0.398	0.211	0.506	0.405	0.358	0.379	0.253
NbTa end	0.592	0.365	0.533	0.459	0.252	0.704	0.585	0.353	0.660	0.258
Nb+Ta	0.012	0.007	0.011	0.009	0.005	0.014	0.012	0.007	0.013	0.005
Fe+Mn	0.009	0.007	0.008	0.008	0.004	0.010	0.008	0.007	0.008	0.005
Comments:	SD - SJ large grain containing titanowodginite and ferrotitanowodginite inclusions euhedral antimonian microlite attached									

Cassiterite

Marko's pegmatite											
94-44K											
	CE	CI	ZA	ZD	ZI	HA	HB	HC	HD	HE	
SnO2	95.60	98.10	92.92	99.18	97.53	95.77	98.13	95.82	97.96	94.46	
FeO	0.57	0.14	0.87	0.05	0.08	0.57	0.43	0.86	0.21	0.71	
MnO	0.07	0.01	0.10	0.01	0.04	0.11	0.12	0.09	0.11	0.15	
Nb2O5	0.58	0.03	0.80	0.03	0.12	0.87	0.38	0.74	0.40	0.74	
Ta2O5	2.71	0.66	3.70	0.12	0.49	2.61	1.15	2.73	1.37	3.60	
Total	99.53	98.94	98.39	99.39	98.26	99.93	100.21	100.24	100.05	99.66	
Structural formulae based on 4 oxygens											
Sn	1.923	1.985	1.892	1.996	1.985	1.917	1.958	1.913	1.959	1.899	
Fe	0.024	0.006	0.037	0.002	0.003	0.024	0.018	0.036	0.009	0.030	
Mn	0.003	0.000	0.004	0.000	0.002	0.005	0.005	0.004	0.005	0.006	
Nb	0.013	0.001	0.018	0.001	0.003	0.020	0.009	0.017	0.009	0.017	
Ta	0.037	0.009	0.051	0.002	0.007	0.036	0.016	0.037	0.019	0.049	
Total	2.001	2.001	2.003	2.001	2.000	2.000	2.005	2.006	2.000	2.002	
Sn end	96.129	99.192	94.443	99.757	99.264	95.803	97.640	95.328	97.938	94.876	
FeMn end	1.352	0.318	2.070	0.127	0.257	1.430	1.151	1.985	0.674	1.816	
NbTa end	2.520	0.490	3.487	0.117	0.479	2.767	1.209	2.687	1.388	3.309	
Nb+Ta	0.050	0.010	0.070	0.002	0.010	0.055	0.024	0.054	0.028	0.066	
Fe+Mn	0.027	0.006	0.041	0.003	0.005	0.029	0.023	0.040	0.013	0.036	
Comments:	All from one big grain		light colour				HA - HE same grain				
	dark colour = high Ta		edge of								
			big crystal								

Cassiterite

Marko's pegmatite 94-44M												
	IA	IB	IC	ID	IE	LB	LG	LH	LI	LM	LN	LO
SnO2	100.07	99.83	96.47	99.67	99.41	99.13	99.54	97.64	98.95	99.68	97.46	96.90
FeO	0.17	0.17	0.62	0.14	0.20	0.24	0.19	0.29	0.13	0.15	0.45	0.62
MnO	0.08	0.09	0.14	0.07	0.05	0.01	0.03	0.05	0.03	0.05	0.05	0.12
Nb2O5	0.00	0.06	0.34	0.01	0.06	0.06	0.06	0.47	0.03	0.04	0.44	0.50
Ta2O5	0.49	0.70	3.02	0.76	0.67	1.03	0.63	0.82	0.58	0.85	1.58	2.46
Total	100.81	100.85	100.59	100.65	100.39	100.47	100.45	99.27	99.72	100.77	99.98	100.60
Structural formulae based on 4 oxygens												
Sn	1.986	1.981	1.923	1.982	1.982	1.976	1.983	1.965	1.986	1.980	1.950	1.929
Fe	0.007	0.007	0.026	0.006	0.008	0.010	0.008	0.012	0.005	0.006	0.019	0.026
Mn	0.003	0.004	0.006	0.003	0.002	0.000	0.001	0.002	0.001	0.002	0.002	0.005
Nb	0.000	0.001	0.008	0.000	0.001	0.001	0.001	0.011	0.001	0.001	0.010	0.011
Ta	0.007	0.009	0.041	0.010	0.009	0.014	0.009	0.011	0.008	0.012	0.022	0.033
Total	2.004	2.003	2.004	2.002	2.003	2.001	2.002	2.002	2.001	2.001	2.003	2.004
Sn end	99.147	98.917	95.978	99.034	98.954	98.710	99.045	98.183	99.232	98.962	97.376	96.227
FeMn end	0.522	0.543	1.590	0.439	0.523	0.522	0.460	0.718	0.337	0.418	1.049	1.544
NbTa end	0.331	0.540	2.433	0.526	0.523	0.767	0.495	1.098	0.431	0.621	1.575	2.229
Nb+Ta	0.007	0.011	0.049	0.011	0.010	0.015	0.010	0.022	0.009	0.012	0.032	0.045
Fe+Mn	0.010	0.011	0.032	0.009	0.010	0.010	0.009	0.014	0.007	0.008	0.021	0.031
Comments:	IA - IE same grain many tiny inclusions					LB - LO same grain inclusions have extreme ferrotitanowodginite composition						

Cassiterite

	Marko's pegmatite 94-44N1								Marko's pegmatite 94-44N1					
	SF	SG	SH	SJ	SK	SL	SM	SO	SP	AI	AJ	AK	AN	AM
SnO2	98.30	96.85	99.22	98.26	99.19	98.99	99.61	99.83	98.05	93.19	99.75	97.25	97.16	96.33
FeO	0.39	0.49	0.24	0.38	0.34	0.34	0.22	0.20	0.37	0.73	0.18	0.39	0.48	0.39
MnO	0.08	0.11	0.08	0.09	0.03	0.08	0.04	0.05	0.12	0.19	0.07	0.07	0.14	0.04
Nb2O5	0.82	0.82	0.69	0.84	0.31	0.31	0.19	0.12	0.48	0.45	0.03	0.34	0.25	0.18
Ta2O5	1.07	1.71	0.72	1.35	0.91	0.88	0.90	0.57	1.76	4.30	0.78	2.09	2.66	1.98
Total	100.66	99.98	100.95	100.92	100.78	100.60	100.96	100.77	100.78	98.86	100.81	100.14	100.69	98.92
Structural formulae based on 4 oxygens														
Sn	1.949	1.935	1.962	1.944	1.968	1.968	1.974	1.982	1.946	1.893	1.981	1.945	1.935	1.951
Fe	0.016	0.021	0.010	0.016	0.014	0.014	0.009	0.008	0.015	0.031	0.007	0.016	0.020	0.017
Mn	0.003	0.005	0.003	0.004	0.001	0.003	0.002	0.002	0.005	0.008	0.003	0.003	0.006	0.002
Nb	0.018	0.019	0.015	0.019	0.007	0.007	0.004	0.003	0.011	0.010	0.001	0.008	0.006	0.004
Ta	0.014	0.023	0.010	0.018	0.012	0.012	0.012	0.008	0.024	0.060	0.011	0.029	0.036	0.027
Total	2.002	2.002	2.000	2.001	2.003	2.004	2.001	2.003	2.002	2.002	2.002	2.001	2.003	2.001
Sn end	97.378	96.650	98.076	97.170	98.267	98.180	98.638	98.959	97.247	94.544	98.917	97.223	96.617	97.512
FeMn end	0.979	1.259	0.666	0.977	0.770	0.876	0.541	0.521	1.022	1.963	0.522	0.966	1.297	0.914
NbTa end	1.644	2.092	1.259	1.852	0.963	0.944	0.821	0.520	1.730	3.493	0.561	1.810	2.086	1.574
Nb+Ta	0.033	0.042	0.025	0.037	0.019	0.019	0.016	0.010	0.035	0.070	0.011	0.036	0.042	0.031
Fe+Mn	0.020	0.025	0.013	0.020	0.015	0.018	0.011	0.010	0.020	0.039	0.010	0.019	0.026	0.018
Comments:	SF - SJ same grain				SK - SP same grain				core	light coloured	core rim			
well developed zonation														
cassiterite occurs with acicular manganocolumbite and nanpingite														

Cassiterite

	Marko's peg. 94-44P		Marko's pegmatite 94-44R						Marko's pegmatite 94-44S			
	CC	CK	DF	DK	DM	YJ	YN	YR	YS	DA	DB	DC
SnO2	99.66	98.70	96.41	96.12	96.68	96.66	98.35	96.69	97.79	99.46	100.00	99.29
FeO	0.13	0.25	0.46	0.38	0.47	0.45	0.21	0.53	0.33	0.06	0.06	0.07
MnO	0.04	0.09	0.19	0.14	0.16	0.18	0.09	0.12	0.14	0.05	0.05	0.07
Nb2O5	0.00	0.09	0.15	0.09	0.13	0.12	0.07	0.13	0.10	0.01	0.01	0.00
Ta2O5	0.89	1.71	3.14	3.04	3.36	2.88	1.58	3.35	2.10	0.49	0.43	0.57
Total	100.72	100.84	100.35	99.77	100.80	100.29	100.30	100.82	100.46	100.07	100.55	100.00
Structural formulae based on 4 oxygens												
Sn	1.981	1.961	1.929	1.934	1.926	1.934	1.965	1.926	1.952	1.989	1.990	1.987
Fe	0.005	0.010	0.019	0.016	0.020	0.019	0.009	0.022	0.014	0.003	0.003	0.003
Mn	0.002	0.004	0.008	0.006	0.007	0.008	0.004	0.005	0.006	0.002	0.002	0.003
Nb	0.000	0.002	0.003	0.002	0.003	0.003	0.002	0.003	0.002	0.000	0.000	0.000
Ta	0.012	0.023	0.043	0.042	0.046	0.039	0.022	0.046	0.029	0.007	0.006	0.008
Total	2.001	2.001	2.002	2.000	2.001	2.003	2.001	2.001	2.002	2.001	2.001	2.001
Sn end	99.041	98.030	96.323	96.710	96.252	96.577	98.214	96.220	97.473	99.423	99.466	99.316
FeMn end	0.355	0.711	1.367	1.101	1.320	1.325	0.631	1.360	0.986	0.232	0.231	0.296
NbTa end	0.603	1.260	2.309	2.189	2.428	2.098	1.155	2.420	1.541	0.345	0.303	0.389
Nb+Ta	0.012	0.025	0.046	0.044	0.049	0.042	0.023	0.048	0.031	0.007	0.006	0.008
Fe+Mn	0.007	0.014	0.027	0.022	0.026	0.027	0.013	0.027	0.020	0.005	0.005	0.006
Comments:	CC & CK same grain euhedral later than		colourless brown brown associated with manganotantalite & microlite						DA - DC same grain contains a few tiny inclusions associated with wodginitite			

wodginitite

Cassiterite

	Marko's pegmatite 94-44U								Marko's pegmatite 94-44W			
	AK	AN	XA	XB	XC	XD	XE	XF	FB	FC	FD	FH
SnO2	99.31	98.97	99.20	98.32	97.95	98.13	97.22	99.13	92.65	97.26	94.47	99.19
FeO	0.13	0.13	0.11	0.15	0.20	0.18	0.26	0.10	0.99	0.33	0.73	0.14
MnO	0.04	0.05	0.00	0.01	0.03	0.00	0.09	0.00	0.24	0.15	0.19	0.04
Nb2O5	0.07	0.03	0.05	0.13	0.08	0.39	0.22	0.05	0.91	0.27	0.70	0.03
Ta2O5	0.63	0.88	0.80	1.15	1.23	0.78	1.76	0.66	5.24	2.26	3.75	0.79
Total	100.18	100.06	100.16	99.75	99.48	99.49	99.55	99.93	100.03	100.27	99.84	100.19
Structural formulae based on 4 oxygens												
Sn	1.982	1.979	1.983	1.974	1.972	1.972	1.956	1.985	1.859	1.944	1.896	1.982
Fe	0.005	0.005	0.005	0.006	0.008	0.008	0.011	0.004	0.042	0.014	0.031	0.006
Mn	0.006	0.006	0.000	0.000	0.001	0.000	0.004	0.000	0.010	0.006	0.008	0.002
Nb	0.002	0.001	0.001	0.003	0.002	0.009	0.005	0.001	0.021	0.006	0.016	0.001
Ta	0.009	0.012	0.011	0.016	0.017	0.011	0.024	0.009	0.072	0.031	0.051	0.011
Total	2.003	2.002	1.999	1.999	2.000	1.999	2.000	2.000	2.003	2.001	2.003	2.001
Sn end	98.946	98.819	99.165	98.746	98.586	98.640	97.800	99.294	92.797	97.145	94.701	99.050
FeMn end	0.547	0.548	0.239	0.325	0.478	0.375	0.737	0.206	2.590	1.010	1.939	0.378
NbTa end	0.507	0.633	0.596	0.929	0.936	0.985	1.463	0.500	4.613	1.845	3.359	0.572
Nb+Ta	0.010	0.013	0.012	0.019	0.019	0.020	0.029	0.010	0.092	0.037	0.067	0.011
Fe+Mn	0.011	0.011	0.005	0.006	0.010	0.008	0.015	0.004	0.052	0.020	0.039	0.008
Comments:	AK & AN same grain contains many tiny inclusions		XA - XC same grain manganocolumbite-rich sample				XE & XF same grain		FB - FD same grain manganocolumbite-rich sample some occurring as inclusions in cassiterite			

Cassiterite

	Marko's pegmatite 94-44Y				Marko's 94-44ii	Pegmatite 5 94-80A	
	UE	UF	UH	UJ	EE	TF	TG
SnO ₂	95.49	94.12	91.20	99.23	98.48	96.74	95.30
FeO	0.83	0.77	1.32	0.21	0.38	0.40	0.68
MnO	0.12	0.08	0.08	0.07	0.08	0.03	0.05
Nb ₂ O ₅	0.44	0.39	0.70	0.07	0.21	0.37	0.46
Ta ₂ O ₅	3.42	4.08	6.30	0.76	1.77	1.28	3.16
Total	100.30	99.44	99.60	100.34	100.92	98.82	99.65
Structural formulae based on 4 oxygens							
Sn	1.909	1.901	1.842	1.979	1.955	1.958	1.917
Fe	0.035	0.033	0.056	0.009	0.016	0.017	0.029
Mn	0.005	0.003	0.003	0.003	0.003	0.001	0.002
Nb	0.010	0.009	0.016	0.002	0.005	0.008	0.010
Ta	0.047	0.056	0.087	0.010	0.024	0.018	0.043
Total	2.006	2.002	2.004	2.003	2.002	2.003	2.002
Sn end	95.188	94.946	91.909	98.818	97.609	97.781	95.770
FeMn end	1.989	1.801	2.961	0.587	0.958	0.912	1.540
NbTa end	2.822	3.253	5.130	0.595	1.432	1.306	2.690
Nb+Ta	0.057	0.065	0.103	0.012	0.029	0.026	0.054
Fe+Mn	0.040	0.036	0.059	0.012	0.019	0.018	0.031
Comments:	UE & UF same grain	perfectly euhedral crystal			complex cassiterite wodginite microlite	TF & TG same grain	

grain

Cassiterite

	Pegmatite 5 94-80B					Pegmatite 5 94-80C			
	LA	LB	LC	LD	LE	XF	XG	XH	XI
SnO2	96.20	97.61	97.29	95.51	97.29	96.25	96.42	98.25	98.56
FeO	0.53	0.27	0.41	0.58	0.35	0.50	0.40	0.20	0.31
MnO	0.03	0.05	0.05	0.04	0.01	0.05	0.01	0.01	0.05
Nb2O5	0.49	0.24	0.47	0.55	0.38	0.24	0.35	0.16	0.25
Ta2O5	2.10	1.16	1.49	2.03	1.52	2.29	1.57	0.76	1.16
Total	99.35	99.33	99.71	98.71	99.55	99.33	98.75	99.38	100.33
Structural formulae based on 4 oxygens									
Sn	1.938	1.966	1.951	1.936	1.956	1.942	1.954	1.978	1.966
Fe	0.022	0.011	0.017	0.025	0.015	0.021	0.017	0.008	0.013
Mn	0.001	0.002	0.002	0.002	0.000	0.002	0.000	0.000	0.002
Nb	0.011	0.005	0.011	0.013	0.009	0.005	0.008	0.004	0.006
Ta	0.029	0.016	0.020	0.028	0.021	0.032	0.022	0.010	0.016
Total	2.002	2.001	2.002	2.003	2.000	2.002	2.001	2.001	2.002
Sn end	96.817	98.253	97.480	96.651	97.766	96.988	97.643	98.853	98.176
FeMn end	1.183	0.677	0.968	1.317	0.759	1.164	0.871	0.443	0.753
NbTa end	2.001	1.070	1.552	2.032	1.475	1.848	1.486	0.704	1.070
Nb+Ta	0.040	0.021	0.031	0.041	0.029	0.037	0.030	0.014	0.021
Fe+Mn	0.024	0.014	0.019	0.026	0.015	0.023	0.017	0.009	0.015
Comments:	LA - LE same grain core					XF - XI same grain core			

Cassiterite

Pegmatite 5											
94-80E											
	ME	MI	MQ	YK	YL	ZA	ZB	ZC	ZD	ZE	QD
SnO2	98.98	99.14	99.25	99.08	88.04	87.28	85.97	88.58	87.04	87.42	85.01
FeO	0.38	0.26	0.27	0.28	1.88	1.88	1.98	1.66	1.80	1.84	1.88
MnO	0.04	0.04	0.04	0.00	0.08	0.10	0.08	0.06	0.08	0.10	0.05
Nb2O5	0.09	0.07	0.07	0.07	0.95	1.04	1.06	0.95	0.94	0.86	0.99
Ta2O5	1.49	1.01	0.97	1.44	9.99	10.20	11.04	9.31	9.91	9.82	10.92
Total	100.98	100.52	100.60	100.87	100.94	100.50	100.14	100.56	99.76	100.04	98.85
Structural formulae based on 4 oxygens											
Sn	1.964	1.975	1.975	1.968	1.761	1.754	1.736	1.777	1.762	1.765	1.739
Fe	0.016	0.011	0.011	0.011	0.079	0.079	0.084	0.070	0.076	0.078	0.081
Mn	0.002	0.002	0.002	0.000	0.004	0.004	0.003	0.002	0.003	0.004	0.002
Nb	0.002	0.002	0.002	0.002	0.021	0.024	0.024	0.022	0.021	0.020	0.023
Ta	0.020	0.014	0.013	0.019	0.136	0.140	0.152	0.127	0.137	0.135	0.152
Total	2.003	2.002	2.003	2.000	2.002	2.001	2.000	1.999	2.000	2.002	1.998
Sn end	98.019	98.609	98.617	98.372	87.993	87.661	86.813	88.921	88.102	88.151	87.073
FeMn end	0.873	0.627	0.647	0.573	4.123	4.169	4.365	3.623	3.982	4.110	4.143
NbTa end	1.107	0.764	0.736	1.055	7.884	8.170	8.822	7.457	7.915	7.739	8.784
Nb+Ta	0.022	0.015	0.015	0.021	0.158	0.163	0.176	0.149	0.158	0.155	0.175
Fe+Mn	0.017	0.013	0.013	0.011	0.083	0.083	0.087	0.072	0.080	0.082	0.083
Comments:	ME & MI same grain		associated with tungsteniferous wodginite			ZA - ZE & QD - QW same grain cassiterite has zones containing many small inclusions (W wodginite) and others containing none					

Cassiterite

	Pegmatite 5 94-80E										Pegmatite 5 94-80F	
	QT	QU	QV	QW	QI	QJ	QK	QL	PA	PB	ZA	ZB
SnO2	86.22	86.64	86.98	87.34	96.76	97.10	96.28	97.91	98.26	97.55	98.72	97.69
FeO	1.75	1.61	1.58	1.77	0.23	0.28	0.47	0.26	0.29	0.39	0.37	0.51
MnO	0.15	0.05	0.06	0.11	0.04	0.01	0.08	0.07	0.03	0.02	0.03	0.03
Nb2O5	1.18	0.74	1.10	1.18	0.22	0.00	0.15	0.29	0.09	0.11	0.15	0.15
Ta2O5	10.45	9.99	9.44	9.97	1.98	1.86	2.44	1.48	1.47	2.00	1.68	2.30
Total	99.74	99.03	99.16	100.38	99.22	99.24	99.41	100.01	100.14	100.08	100.95	100.68
Structural formulae based on 4 oxygens												
Sn	1.746	1.769	1.769	1.756	1.954	1.962	1.942	1.960	1.966	1.954	1.959	1.945
Fe	0.074	0.069	0.068	0.075	0.010	0.012	0.020	0.011	0.012	0.017	0.015	0.021
Mn	0.006	0.002	0.003	0.005	0.002	0.001	0.003	0.003	0.001	0.001	0.001	0.001
Nb	0.027	0.017	0.025	0.027	0.005	0.000	0.003	0.007	0.002	0.002	0.003	0.003
Ta	0.144	0.139	0.131	0.137	0.027	0.026	0.034	0.020	0.020	0.027	0.023	0.031
Total	1.998	1.996	1.996	1.999	1.998	2.000	2.002	2.000	2.001	2.001	2.002	2.003
Sn end	87.390	88.620	88.647	87.837	97.813	98.102	96.998	97.978	98.230	97.633	97.863	97.144
FeMn end	4.037	3.552	3.520	3.975	0.573	0.619	1.160	0.682	0.668	0.878	0.832	1.127
NbTa end	8.573	7.828	7.833	8.189	1.614	1.279	1.842	1.340	1.103	1.489	1.304	1.729
Nb+Ta	0.171	0.156	0.156	0.164	0.032	0.026	0.037	0.027	0.022	0.030	0.026	0.035
Fe+Mn	0.081	0.071	0.070	0.079	0.011	0.012	0.023	0.014	0.013	0.018	0.017	0.023
Comments:	QD - QW same grain contains many tungsteniferous wodginite inclusions note very high Ta contents of this grain				QI - QL, PA & PB same grain totally different to QE - QW cassiterite grain many inclusions of wodginite, but of lower W content						ZA & ZB same grain associated with ferrowodginite	

Cassiterite

	Pegmatite 5								Pegmatite 5		
	94-80i								94-80P		
	RA	RB	RC	RD	QF	QG	QI	QJ	MA	MB	MC
SnO2	97.33	98.80	97.62	98.45	97.21	97.26	98.79	97.43	96.96	98.33	98.90
FeO	0.28	0.23	0.21	0.25	0.34	0.26	0.12	0.27	0.35	0.31	0.12
MnO	0.00	0.00	0.03	0.02	0.01	0.02	0.01	0.00	0.01	0.05	0.07
Nb2O5	0.04	0.05	0.08	0.07	0.14	0.09	0.03	0.08	0.03	0.00	0.00
Ta2O5	1.60	1.16	1.50	1.72	1.96	1.63	0.67	1.57	2.02	1.80	1.79
Total	99.25	100.24	99.44	100.50	99.66	99.26	99.61	99.35	99.37	100.49	100.88
Structural formulae based on 4 oxygens											
Sn	1.965	1.974	1.967	1.963	1.955	1.963	1.985	1.965	1.957	1.962	1.966
Fe	0.012	0.010	0.009	0.011	0.014	0.011	0.005	0.011	0.015	0.013	0.005
Mn	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.002	0.003
Nb	0.001	0.001	0.002	0.002	0.003	0.002	0.001	0.002	0.001	0.000	0.000
Ta	0.022	0.016	0.021	0.023	0.027	0.022	0.009	0.022	0.028	0.025	0.024
Total	2.000	2.001	1.999	1.999	2.000	2.000	2.000	2.000	2.001	2.001	1.998
Sn end	98.255	98.666	98.373	98.190	97.764	98.188	99.248	98.253	97.809	98.027	98.382
FeMn end	0.592	0.487	0.503	0.564	0.730	0.583	0.261	0.578	0.775	0.748	0.407
NbTa end	1.153	0.847	1.123	1.246	1.506	1.230	0.490	1.169	1.416	1.225	1.212
Nb+Ta	0.023	0.017	0.022	0.025	0.030	0.025	0.010	0.023	0.028	0.025	0.024
Fe+Mn	0.012	0.010	0.010	0.011	0.015	0.012	0.005	0.012	0.015	0.015	0.008
Comments:	QF - QJ euhedral crystals earlier than ferrotantalite								MA - MC same grain half grain is wodginitite		

Cassiterite

Pegmatite 5 94-80P												
	MG	MK	ML	MN	MO	MS	MU	MV	MZ	NB	NK	NN
SnO2	92.12	89.00	89.15	89.70	94.86	91.36	89.42	94.40	91.41	91.83	97.44	93.81
FeO	1.22	1.68	1.54	1.55	0.77	1.19	1.50	0.68	1.31	1.25	0.24	0.85
MnO	0.00	0.05	0.07	0.15	0.10	0.10	0.19	0.05	0.00	0.07	0.07	0.12
Nb2O5	0.20	0.55	0.56	0.65	0.35	0.38	0.18	0.30	0.49	0.52	0.32	0.13
Ta2O5	6.99	9.50	9.36	8.73	4.77	7.02	8.79	3.82	6.98	6.94	1.40	4.30
Total	100.53	100.77	100.68	100.78	100.84	100.05	100.08	99.26	100.20	100.60	99.48	99.21
Structural formulae based on 4 oxygens												
Sn	1.849	1.786	1.790	1.797	1.891	1.841	1.807	1.910	1.839	1.839	1.960	1.901
Fe	0.051	0.071	0.065	0.065	0.032	0.050	0.064	0.029	0.055	0.052	0.010	0.036
Mn	0.000	0.002	0.003	0.006	0.004	0.004	0.008	0.002	0.000	0.003	0.003	0.005
Nb	0.005	0.012	0.013	0.015	0.008	0.009	0.004	0.007	0.011	0.012	0.007	0.003
Ta	0.096	0.130	0.128	0.119	0.065	0.096	0.121	0.053	0.096	0.095	0.019	0.059
Total	2.001	2.001	1.999	2.002	2.000	2.001	2.005	2.001	2.001	2.001	2.000	2.005
Sn end	92.422	89.243	89.546	89.732	94.554	92.015	90.166	95.454	91.889	91.914	98.007	94.830
FeMn end	2.565	3.639	3.406	3.571	1.811	2.728	3.583	1.563	2.765	2.762	0.665	2.060
NbTa end	5.013	7.118	7.047	6.697	3.635	5.257	6.250	2.983	5.346	5.324	1.328	3.110
Nb+Ta	0.100	0.142	0.141	0.134	0.073	0.105	0.125	0.060	0.107	0.107	0.027	0.062
Fe+Mn	0.051	0.073	0.068	0.071	0.036	0.055	0.072	0.031	0.055	0.055	0.013	0.041
Comments:	all grains carefully chosen away from wodginitite						MU & MV same grain					
	note high Ta contents											

Cassiterite

Pegmatite 5											
94-80P											
	NT	NU	CJ	CK	CL	DE	DF	DG	DH	DI	DJ
SnO2	96.15	91.37	97.67	98.11	97.30	97.05	96.56	95.35	89.56	96.98	96.81
FeO	0.57	1.33	0.25	0.26	0.32	0.42	0.43	0.70	1.30	0.38	0.39
MnO	0.00	0.08	0.02	0.03	0.00	0.01	0.02	0.01	0.05	0.02	0.02
Nb2O5	0.00	0.16	0.02	0.06	0.06	0.14	0.11	0.21	0.73	0.11	0.07
Ta2O5	3.19	7.31	1.77	1.88	2.14	2.38	2.41	3.91	7.38	2.33	2.19
Total	99.92	100.26	99.73	100.34	99.83	100.00	99.53	100.18	99.03	99.82	99.48
Structural formulae based on 4 oxygens											
Sn	1.933	1.840	1.958	1.960	1.955	1.946	1.946	1.912	1.822	1.948	1.952
Fe	0.024	0.056	0.011	0.011	0.014	0.018	0.018	0.029	0.056	0.016	0.017
Mn	0.000	0.004	0.001	0.001	0.000	0.001	0.001	0.000	0.002	0.001	0.001
Nb	0.000	0.004	0.000	0.001	0.001	0.003	0.002	0.005	0.017	0.002	0.002
Ta	0.044	0.100	0.024	0.026	0.029	0.033	0.033	0.054	0.102	0.032	0.030
Total	2.001	2.004	1.998	1.999	1.999	2.000	2.001	2.000	1.999	2.000	2.001
Sn end	96.602	91.821	98.185	98.050	97.776	97.297	97.274	95.597	91.139	97.429	97.546
FeMn end	1.211	2.980	0.582	0.598	0.692	0.916	0.948	1.489	2.894	0.850	0.867
NbTa end	2.186	5.199	1.233	1.353	1.532	1.787	1.778	2.914	5.967	1.722	1.587
Nb+Ta	0.044	0.104	0.025	0.027	0.031	0.036	0.036	0.058	0.119	0.034	0.032
Fe+Mn	0.024	0.060	0.012	0.012	0.014	0.018	0.019	0.030	0.058	0.017	0.017
Comments:	NT & NU same grain		CJ - CL same grain assoc. with W wodginite			DE - DJ same grain mantles W wodginite			close to W wodginite		

Cassiterite

	Treelined Lake Complex					T.L.C.	Pegmatite 6					
	94-84B					94-84E	94-90B					
	AA	AB	AC	AD	AE	ZA	HD	HI	HM	DH	DJ	DK
SnO2	97.83	98.57	98.20	98.31	97.97	97.56	88.07	88.44	87.93	94.39	87.24	87.54
FeO	0.32	0.23	0.25	0.24	0.22	0.42	1.73	1.78	1.69	0.81	1.80	1.72
MnO	0.03	0.00	0.02	0.03	0.02	0.02	0.07	0.08	0.09	0.04	0.04	0.06
Nb2O5	0.33	0.22	0.23	0.24	0.25	0.07	1.19	1.31	1.19	0.43	1.17	1.22
Ta2O5	1.48	1.15	1.18	1.24	1.20	2.38	8.68	8.63	8.63	4.40	9.09	8.80
Total	99.98	100.17	99.88	100.07	99.67	100.45	99.74	100.24	99.53	100.07	99.33	99.34
Structural formulae based on 4 oxygens												
Sn	1.958	1.969	1.968	1.966	1.967	1.948	1.778	1.776	1.779	1.895	1.770	1.775
Fe	0.013	0.010	0.011	0.010	0.009	0.018	0.073	0.075	0.072	0.034	0.077	0.073
Mn	0.001	0.000	0.001	0.001	0.001	0.001	0.003	0.003	0.004	0.002	0.002	0.003
Nb	0.007	0.005	0.005	0.006	0.006	0.002	0.027	0.030	0.027	0.010	0.027	0.028
Ta	0.020	0.016	0.016	0.017	0.016	0.032	0.120	0.118	0.119	0.060	0.126	0.122
Total	2.000	2.000	2.000	2.000	2.000	2.001	2.001	2.002	2.001	2.000	2.001	2.000
Sn end	97.887	98.486	98.362	98.304	98.378	97.379	88.855	88.694	88.908	94.708	88.464	88.727
FeMn end	0.731	0.488	0.570	0.573	0.510	0.922	3.811	3.914	3.777	1.788	3.910	3.787
NbTa end	1.382	1.026	1.068	1.123	1.112	1.699	7.334	7.392	7.315	3.504	7.626	7.485
Nb+Ta	0.028	0.021	0.021	0.022	0.022	0.034	0.147	0.148	0.146	0.070	0.153	0.150
Fe+Mn	0.015	0.010	0.011	0.011	0.010	0.018	0.076	0.078	0.076	0.036	0.078	0.076
Comments:	AA - AC same grain				few small inclusions		HD - DK same grain associated with W wadginites which is the dominant oxide note high Ta contents					

Cassiterite

	East Beryl pegmatite 94-304C					Pegmatite 9 94-318					
	KB	KF	KC	KD	KE	VC	VP	VR	MC	MF	
SnO2	96.28	98.85	100.06	97.25	98.53	96.75	97.73	99.07	99.30	100.03	
FeO	0.71	0.30	0.17	0.35	0.18	0.44	0.08	0.06	0.22	0.12	
MnO	0.04	0.07	0.00	0.07	0.00	0.05	0.14	0.04	0.04	0.04	
Nb2O5	0.18	0.15	0.12	0.00	0.14	0.15	0.50	0.00	0.07	0.04	
Ta2O5	2.60	1.08	0.30	2.38	1.20	1.67	0.72	0.25	1.06	0.37	
Total	99.81	100.44	100.65	100.05	100.05	99.06	99.17	99.42	100.69	100.60	
Structural formulae based on 4 oxygens											
Sn	1.935	1.970	1.988	1.950	1.972	1.957	1.969	1.994	1.975	1.989	
Fe	0.030	0.013	0.007	0.015	0.007	0.019	0.003	0.003	0.009	0.005	
Mn	0.001	0.003	0.000	0.003	0.000	0.002	0.006	0.002	0.002	0.002	
Nb	0.004	0.003	0.003	0.000	0.003	0.003	0.011	0.000	0.002	0.001	
Ta	0.036	0.015	0.004	0.033	0.016	0.023	0.010	0.003	0.014	0.005	
Total	2.006	2.003	2.002	2.001	1.999	2.004	1.999	2.001	2.001	2.002	
Sn end	96.452	98.332	99.309	97.478	98.648	97.640	98.465	99.617	98.660	99.370	
FeMn end	1.566	0.774	0.360	0.893	0.370	1.038	0.469	0.212	0.543	0.334	
NbTa end	1.982	0.894	0.331	1.629	0.982	1.321	1.066	0.171	0.797	0.296	
Nb+Ta	0.040	0.018	0.007	0.033	0.020	0.026	0.021	0.003	0.016	0.006	
Fe+Mn	0.031	0.016	0.007	0.018	0.007	0.021	0.009	0.004	0.011	0.007	
Comments:	ferrocolumbite inclusions in core region	later columbite-free part				dark brown	medium brown	colourless	adjacent to nigerite		

Cassiterite

	Pegmatite 7 94-Peg 7A					Pegmatite 7 94-Peg 7B									
	UH	UI	UK	UL	UM	QH	QI	QJ	QQ	QR	WR	WS	WT	WV	
SnO2	96.84	96.57	99.58	99.46	98.36	99.51	99.56	97.48	98.83	99.99	99.45	98.99	99.29	96.35	
FeO	0.58	0.63	0.15	0.18	0.31	0.21	0.15	0.47	0.31	0.13	0.22	0.13	0.25	0.53	
MnO	0.04	0.03	0.03	0.07	0.01	0.05	0.03	0.05	0.05	0.03	0.05	0.03	0.05	0.01	
Nb2O5	0.38	0.49	0.06	0.04	0.22	0.03	0.09	0.43	0.19	0.09	0.03	0.09	0.10	0.40	
Ta2O5	2.27	2.35	0.73	0.82	1.28	0.88	0.72	1.79	1.35	0.52	0.80	0.45	1.06	2.21	
Total	100.11	100.07	100.55	100.57	100.18	100.68	100.55	100.22	100.73	100.76	100.55	99.69	100.75	99.50	
Structural formulae based on 4 oxygens															
Sn	1.937	1.932	1.982	1.980	1.965	1.979	1.981	1.946	1.964	1.985	1.980	1.986	1.973	1.939	
Fe	0.024	0.026	0.006	0.008	0.013	0.009	0.006	0.020	0.013	0.005	0.009	0.005	0.010	0.022	
Mn	0.002	0.001	0.001	0.003	0.000	0.002	0.001	0.002	0.002	0.001	0.002	0.001	0.002	0.000	
Nb	0.009	0.011	0.001	0.001	0.005	0.001	0.002	0.010	0.004	0.002	0.001	0.002	0.002	0.009	
Ta	0.031	0.032	0.010	0.011	0.017	0.012	0.010	0.024	0.018	0.007	0.011	0.006	0.014	0.030	
Total	2.003	2.003	2.001	2.002	2.001	2.002	2.001	2.002	2.002	2.001	2.003	2.001	2.002	2.002	
Sn end	96.724	96.461	99.061	98.876	98.209	98.827	99.034	97.208	98.121	99.213	98.860	99.253	98.544	96.889	
FeMn end	1.300	1.383	0.376	0.523	0.670	0.543	0.376	1.089	0.751	0.334	0.564	0.337	0.626	1.139	
NbTa end	1.977	2.156	0.563	0.601	1.121	0.630	0.590	1.704	1.128	0.453	0.576	0.410	0.830	1.972	
Nb+Ta	0.040	0.043	0.011	0.012	0.022	0.013	0.012	0.034	0.023	0.009	0.012	0.008	0.017	0.039	
Fe+Mn	0.026	0.028	0.008	0.010	0.013	0.011	0.008	0.022	0.015	0.007	0.011	0.007	0.013	0.023	
Comments:	UI - UM same grain				core	abundant euhedral, zoned centimetre-sized crystals with U, Th, Pb inclusions					cassiterite crystallized later than wodginite				

Cassiterite

	Pegmatite 7 94-Peg 7C					Pegmatite 7 94-Peg 7D					Pegmatite 7 94-Peg 7X			
	MA	MB	MC	MD	ME	XA	XB	XC	XD	XE	XD	XJ	XK	XL
SnO2	97.52	97.78	97.21	95.76	95.78	96.35	96.76	95.89	95.67	96.57	98.62	98.42	98.93	99.07
FeO	0.25	0.27	0.44	0.55	0.64	0.56	0.53	0.60	0.59	0.53	0.31	0.28	0.24	0.14
MnO	0.04	0.04	0.01	0.05	0.04	0.08	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.03
Nb2O5	0.12	0.19	0.37	0.35	0.37	0.41	0.41	0.55	0.50	0.41	0.21	0.22	0.22	0.58
Ta2O5	1.31	0.95	1.66	2.30	2.29	2.13	1.96	2.25	2.07	2.11	1.18	1.19	0.97	0.49
Total	99.24	99.23	99.69	99.01	99.12	99.53	99.69	99.32	98.86	99.66	100.35	100.15	100.40	100.31
Structural formulae based on 4 oxygens														
Sn	1.968	1.972	1.952	1.938	1.936	1.938	1.943	1.932	1.937	1.940	1.967	1.967	1.971	1.972
Fe	0.011	0.011	0.019	0.023	0.027	0.024	0.022	0.025	0.025	0.022	0.013	0.012	0.010	0.006
Mn	0.002	0.002	0.000	0.002	0.002	0.003	0.001	0.001	0.001	0.002	0.001	0.002	0.002	0.001
Nb	0.003	0.004	0.008	0.008	0.008	0.009	0.009	0.013	0.011	0.009	0.005	0.005	0.005	0.013
Ta	0.018	0.013	0.023	0.032	0.032	0.029	0.027	0.031	0.029	0.029	0.016	0.016	0.013	0.007
Total	2.001	2.002	2.002	2.003	2.004	2.004	2.003	2.002	2.003	2.002	2.002	2.001	2.001	1.999
Sn end	98.347	98.475	97.497	96.742	96.564	96.725	97.015	96.498	96.685	96.889	98.250	98.269	98.507	98.657
FeMn end	0.614	0.656	0.947	1.273	1.439	1.350	1.178	1.330	1.315	1.200	0.711	0.671	0.586	0.356
NbTa end	1.038	0.869	1.556	1.986	1.998	1.925	1.806	2.172	2.000	1.910	1.039	1.059	0.907	0.988
Nb+Ta	0.021	0.017	0.031	0.040	0.040	0.039	0.036	0.043	0.040	0.038	0.021	0.021	0.018	0.020
Fe+Mn	0.012	0.013	0.019	0.025	0.029	0.027	0.024	0.027	0.026	0.024	0.014	0.013	0.012	0.007
Comments:	MA - ME same grain					XA - XE same grain					abundant euhedral, zoned centimetre-sized crystals with U, Th, Pb inclusions			

Cassiterite

	Peg. 11		Pegmatite 11			SW Be		Pegmatite 12					Pegmatite 12		
	95-117B		95-117D			96-11A		96-13B					96-13C		
	RN	TG	TH	TI	PJ	MH	MI	MJ	MK	ML	MM	NA	NB	NC	
SnO2	98.64	98.19	97.45	98.11	92.21	99.59	99.41	99.48	97.31	98.74	99.31	99.32	99.64	99.32	
FeO	0.16	0.16	0.36	0.30	1.15	0.01	0.03	0.01	0.05	0.02	0.02	0.06	0.04	0.04	
MnO	0.01	0.00	0.06	0.05	0.02	0.00	0.02	0.00	0.20	0.00	0.00	0.01	0.01	0.00	
Nb2O5	0.17	0.20	0.65	0.47	0.15	0.02	0.05	0.00	0.23	0.04	0.00	0.00	0.03	0.05	
Ta2O5	0.75	0.54	1.07	0.58	6.18	0.12	0.24	0.13	1.92	0.26	0.07	0.34	0.23	0.21	
Total	99.72	99.09	99.59	99.52	99.70	99.74	99.75	99.62	99.71	99.05	99.40	99.72	99.94	99.62	
Structural formulae based on 4 oxygens															
Sn	1.979	1.982	1.954	1.969	1.865	1.997	1.994	1.998	1.955	1.994	1.998	1.993	1.994	1.994	
Fe	0.007	0.007	0.015	0.013	0.049	0.000	0.001	0.001	0.002	0.001	0.001	0.003	0.001	0.002	
Mn	0.000	0.000	0.003	0.002	0.001	0.000	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.000	
Nb	0.004	0.005	0.015	0.011	0.003	0.000	0.001	0.000	0.005	0.001	0.000	0.000	0.001	0.001	
Ta	0.010	0.007	0.015	0.008	0.085	0.002	0.003	0.002	0.026	0.004	0.001	0.005	0.003	0.003	
Total	2.000	2.000	2.001	2.003	2.003	2.000	2.000	2.000	1.997	1.999	2.000	2.000	2.000	2.000	
Sn end	98.948	99.061	97.641	98.328	93.108	99.876	99.685	99.887	97.895	99.743	99.911	99.623	99.726	99.722	
FeMn end	0.345	0.334	0.884	0.739	2.468	0.023	0.093	0.025	0.520	0.032	0.038	0.148	0.084	0.076	
NbTa end	0.707	0.605	1.474	0.933	4.424	0.101	0.222	0.088	1.585	0.226	0.051	0.230	0.190	0.202	
Nb+Ta	0.014	0.012	0.030	0.019	0.089	0.002	0.004	0.002	0.032	0.005	0.001	0.005	0.004	0.004	
Fe+Mn	0.007	0.007	0.018	0.015	0.049	0.000	0.002	0.001	0.010	0.001	0.001	0.003	0.002	0.002	
Comments:	tiny grain	TG - TI same grain	assoc. with ferrotapiolite			MH & MI same grain		MJ & MK same grain		ML & MM same grain		NA & NB same grain			
	assoc. ferrocolumbite	contains many tiny inclusions				tiny grains - ML has manganocolumbite inclusion									

Cassiterite

	SW Beryl pegmatite 96-25A					SW Beryl pegmatite 96-25B					SW Beryl aplite 96-27				
	WA	WB	WC	WD	WE	XA	XB	XC	XD	XE	BA	BB	BE	BH	BI
SnO2	98.26	98.96	98.58	98.75	97.66	97.64	98.89	99.17	96.48	99.23	100.14	100.05	99.95	97.96	99.26
FeO	0.28	0.19	0.25	0.18	0.50	0.54	0.19	0.20	0.56	0.26	0.00	0.05	0.38	0.16	0.09
MnO	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.08	0.16	0.06
Nb2O5	0.77	0.25	0.11	0.14	0.76	1.15	0.35	0.10	0.94	0.34	0.00	0.00	0.03	1.19	0.42
Ta2O5	0.60	0.77	1.12	0.92	0.76	1.26	0.53	0.92	1.41	0.45	0.17	0.00	0.10	0.89	0.69
Total	99.92	100.17	100.05	100.00	99.69	100.60	99.97	100.39	99.40	100.28	100.31	100.11	100.53	100.36	100.51
Structural formulae based on 4 oxygens															
Sn	1.962	1.976	1.973	1.976	1.955	1.935	1.977	1.977	1.937	1.977	1.997	1.999	1.988	1.945	1.974
Fe	0.012	0.008	0.010	0.008	0.021	0.022	0.008	0.008	0.023	0.011	0.000	0.002	0.016	0.007	0.004
Mn	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.003	0.007	0.002
Nb	0.017	0.006	0.003	0.003	0.017	0.026	0.008	0.002	0.021	0.008	0.000	0.000	0.001	0.027	0.009
Ta	0.008	0.010	0.015	0.013	0.010	0.017	0.007	0.013	0.019	0.006	0.002	0.000	0.001	0.012	0.009
Total	2.000	2.000	2.001	2.000	2.004	2.001	2.000	2.000	2.002	2.002	2.000	2.000	2.009	1.997	1.998
Sn end	98.124	98.797	98.595	98.821	97.531	96.707	98.834	98.847	96.759	98.769	99.882	99.882	98.968	97.384	98.752
FeMn end	0.601	0.398	0.514	0.388	1.098	1.155	0.409	0.410	1.208	0.541	0.000	0.118	0.936	0.669	0.315
NbTa end	1.274	0.806	0.891	0.790	1.371	2.138	0.757	0.743	2.034	0.690	0.118	0.000	0.095	1.947	0.934
Nb+Ta	0.025	0.016	0.018	0.016	0.027	0.043	0.015	0.015	0.041	0.014	0.002	0.000	0.002	0.039	0.019
Fe+Mn	0.012	0.008	0.010	0.008	0.022	0.023	0.008	0.008	0.024	0.011	0.000	0.002	0.019	0.013	0.006
Comments:	WA - WC		WD & WE		XA - XC					BH & BI					
	same grain		same grain		same grain					same grain					
	contains microlite inclusions					contains a few tiny inclusions									

Cassiterite

	Big Whopper pegmatite 96-29A					Big Whopper peg. 96-29B			Big Whopper peg. 96-29B				
	JA	JB	JC	JD	CD	AF	AL	BK	BO	BP	BS	BT	BU
SnO2	97.73	98.15	98.11	99.25	97.10	99.38	98.81	99.75	93.13	98.96	96.32	100.28	100.33
FeO	0.21	0.06	0.01	0.06	0.36	0.10	0.16	0.04	0.19	0.00	0.14	0.01	0.21
MnO	0.02	0.14	0.06	0.00	0.06	0.01	0.00	0.04	0.67	0.12	0.33	0.01	0.00
Nb2O5	0.19	0.32	0.09	0.08	0.23	0.07	0.30	0.25	1.29	0.11	0.42	0.00	0.00
Ta2O5	1.50	1.57	1.07	0.32	1.89	0.69	0.44	0.24	5.19	0.91	3.28	0.33	0.04
Total	99.65	100.23	99.34	99.71	99.64	100.25	99.71	100.33	100.47	100.10	100.50	100.62	100.59
Structural formulae based on 4 oxygens													
Sn	1.964	1.960	1.977	1.991	1.952	1.984	1.981	1.987	1.857	1.979	1.922	1.994	1.995
Fe	0.009	0.003	0.001	0.002	0.015	0.004	0.007	0.002	0.008	0.000	0.006	0.001	0.009
Mn	0.001	0.006	0.003	0.000	0.002	0.001	0.000	0.002	0.028	0.005	0.014	0.000	0.000
Nb	0.004	0.007	0.002	0.002	0.005	0.002	0.007	0.006	0.029	0.003	0.009	0.000	0.000
Ta	0.021	0.021	0.015	0.004	0.026	0.009	0.006	0.003	0.071	0.012	0.045	0.004	0.001
Total	1.999	1.997	1.997	2.000	2.001	2.000	2.000	1.999	1.993	1.999	1.996	1.999	2.004
Sn end	98.263	98.138	99.002	99.567	97.574	99.218	99.025	99.376	93.173	99.007	96.293	99.735	99.525
FeMn end	0.492	0.434	0.158	0.122	0.866	0.229	0.331	0.173	1.818	0.244	0.994	0.044	0.445
NbTa end	1.245	1.428	0.840	0.311	1.560	0.554	0.644	0.452	5.009	0.748	2.713	0.221	0.030
Nb+Ta	0.025	0.029	0.017	0.006	0.031	0.011	0.013	0.009	0.100	0.015	0.054	0.004	0.001
Fe+Mn	0.010	0.009	0.003	0.002	0.017	0.005	0.007	0.003	0.036	0.005	0.020	0.001	0.009
Comments:	JA & JB same grain		JC & JD same grain			BO & BP same grain							

Cassiterite

Big Whopper pegmatite																
96-29C																
	UA	UB	UC	UD	UE	DD	DE	DF	DR1	DR2	DR3	DR4	DR5	DR6	DR7	
SnO2	93.59	97.75	98.02	96.79	95.08	99.59	100.57	99.42	93.70	93.82	93.99	93.49	94.64	95.88	94.46	
FeO	0.19	0.07	0.05	0.10	0.13	0.01	0.00	0.00	0.14	0.12	0.14	0.14	0.14	0.12	0.16	
MnO	0.63	0.16	0.11	0.24	0.34	0.03	0.00	0.00	0.55	0.56	0.53	0.58	0.40	0.33	0.44	
Nb2O5	1.05	0.81	0.68	0.74	0.81	0.35	0.00	0.00	0.91	0.88	0.86	0.84	0.96	0.86	0.84	
Ta2O5	4.77	1.19	0.85	2.10	2.97	0.21	0.12	0.17	4.42	4.24	4.16	4.57	3.44	2.87	3.78	
Total	100.22	99.98	99.70	99.96	99.33	100.26	100.70	99.60	99.72	99.62	99.75	99.61	99.57	100.05	99.69	
Structural formulae based on 4 oxygens																
Sn	1.872	1.952	1.963	1.936	1.916	1.986	1.998	1.997	1.884	1.888	1.890	1.882	1.902	1.917	1.899	
Fe	0.008	0.003	0.002	0.004	0.006	0.001	0.000	0.000	0.006	0.005	0.006	0.006	0.006	0.005	0.007	
Mn	0.027	0.007	0.005	0.010	0.014	0.001	0.000	0.000	0.023	0.024	0.023	0.025	0.017	0.014	0.019	
Nb	0.024	0.018	0.015	0.017	0.019	0.008	0.000	0.000	0.021	0.020	0.020	0.019	0.022	0.019	0.019	
Ta	0.065	0.016	0.012	0.029	0.041	0.003	0.002	0.002	0.061	0.058	0.057	0.063	0.047	0.039	0.052	
Total	1.995	1.996	1.997	1.996	1.995	1.998	2.000	2.000	1.994	1.995	1.995	1.995	1.994	1.995	1.995	
Sn end	93.817	97.784	98.321	97.014	96.023	99.366	99.908	99.869	94.454	94.629	94.734	94.357	95.404	96.111	95.165	
FeMn end	1.733	0.483	0.329	0.717	1.005	0.095	0.008	0.015	1.469	1.456	1.422	1.544	1.140	0.955	1.280	
NbTa end	4.450	1.734	1.350	2.269	2.972	0.539	0.084	0.116	4.077	3.915	3.843	4.099	3.457	2.934	3.555	
Nb+Ta	0.089	0.035	0.027	0.045	0.059	0.011	0.002	0.002	0.081	0.078	0.077	0.082	0.069	0.059	0.071	
Fe+Mn	0.035	0.010	0.007	0.014	0.020	0.002	0.000	0.000	0.029	0.029	0.028	0.031	0.023	0.019	0.026	
Comments:	UA - UE same grain				DD & DE same grain brown colourless				DR = 1200 µm traverse from rim to core of large euhedral crystal note different Ta content compared to DD - DG							

Cassiterite

Big Whopper pegmatite													
96-29D													
	LA	LB	LC	LF	LG	LH	LI	LJ	LK	RC	RD	RE	RF
SnO2	96.04	100.12	99.37	90.88	97.94	97.97	97.74	99.95	96.41	99.29	98.90	97.61	97.87
FeO	0.03	0.01	0.01	0.04	0.17	0.15	0.01	0.02	0.01	0.03	0.07	0.01	0.28
MnO	0.34	0.01	0.05	1.03	0.08	0.13	0.20	0.01	0.27	0.01	0.01	0.09	0.00
Nb2O5	0.83	0.01	0.19	0.99	0.08	0.24	0.99	0.00	1.17	0.05	0.06	0.93	0.35
Ta2O5	2.48	0.06	0.55	7.01	1.74	1.60	1.39	0.14	1.84	0.11	0.30	0.52	1.08
Total	99.72	100.21	100.15	99.94	100.01	100.08	100.34	100.12	99.70	99.48	99.34	99.16	99.57
Structural formulae based on 4 oxygens													
Sn	1.926	1.998	1.984	1.829	1.963	1.960	1.944	1.997	1.930	1.996	1.992	1.962	1.966
Fe	0.001	0.000	0.000	0.002	0.007	0.006	0.000	0.001	0.000	0.001	0.003	0.001	0.012
Mn	0.014	0.000	0.002	0.044	0.003	0.006	0.009	0.000	0.011	0.000	0.000	0.004	0.000
Nb	0.019	0.000	0.004	0.022	0.002	0.005	0.022	0.000	0.026	0.001	0.001	0.021	0.008
Ta	0.034	0.001	0.007	0.096	0.024	0.022	0.019	0.002	0.025	0.001	0.004	0.007	0.015
Total	1.995	2.000	1.998	1.993	1.999	1.999	1.994	2.000	1.993	2.000	2.000	1.995	2.000
Sn end	96.569	99.907	99.296	91.751	98.195	98.056	97.486	99.847	96.823	99.795	99.568	98.364	98.281
FeMn end	0.783	0.040	0.123	2.298	0.530	0.583	0.443	0.055	0.589	0.076	0.161	0.218	0.581
NbTa end	2.648	0.053	0.581	5.951	1.275	1.362	2.072	0.098	2.589	0.128	0.271	1.418	1.137
Nb+Ta	0.053	0.001	0.012	0.119	0.025	0.027	0.041	0.002	0.052	0.003	0.005	0.028	0.023
Fe+Mn	0.016	0.001	0.002	0.046	0.011	0.012	0.009	0.001	0.012	0.002	0.003	0.004	0.012
Comments:	LA & LB		LD & LE			LI - LK same grain							
	same grain		same grain			brown		mid-brown		core		inter	rim
	core	rim			rim			colourless					

Cassiterite

	Big Whopper pegmatite 96-29G							Big Whopper pegmatite 96-31							
	EP	EQ	ER	ES	CL	CM	CN	FA	FB	FC	FD	FE	FF	FG	FH
SnO2	100.43	98.23	99.02	98.05	99.65	99.89	99.09	99.62	96.71	98.59	99.90	100.06	99.68	99.81	99.51
FeO	0.03	0.20	0.25	0.29	0.10	0.11	0.22	0.00	0.17	0.11	0.00	0.05	0.05	0.07	0.05
MnO	0.00	0.10	0.01	0.02	0.03	0.00	0.00	0.05	0.29	0.02	0.00	0.00	0.00	0.04	0.00
Nb2O5	0.04	0.62	0.11	0.17	0.18	0.00	0.32	0.09	0.98	0.06	0.20	0.04	0.20	0.00	0.12
Ta2O5	0.17	1.28	1.00	1.42	0.70	0.44	0.66	0.18	2.09	0.83	0.16	0.48	0.39	0.07	0.28
Total	100.67	100.43	100.39	99.94	100.66	100.44	100.29	99.94	100.24	99.61	100.26	100.62	100.32	99.99	99.96
Structural formulae based on 4 oxygens															
Sn	1.995	1.954	1.974	1.965	1.980	1.990	1.975	1.993	1.927	1.981	1.992	1.990	1.987	1.997	1.991
Fe	0.001	0.008	0.011	0.012	0.004	0.005	0.009	0.000	0.007	0.004	0.000	0.002	0.002	0.003	0.002
Mn	0.000	0.004	0.000	0.001	0.001	0.000	0.000	0.002	0.012	0.001	0.000	0.000	0.000	0.002	0.000
Nb	0.001	0.014	0.002	0.004	0.004	0.000	0.007	0.002	0.022	0.001	0.005	0.001	0.005	0.000	0.003
Ta	0.002	0.017	0.014	0.019	0.010	0.006	0.009	0.002	0.028	0.011	0.002	0.006	0.005	0.001	0.004
Total	2.000	1.999	2.001	2.001	1.999	2.001	2.001	2.000	1.997	1.999	1.998	1.999	1.998	2.002	1.999
Sn end	99.782	97.796	98.654	98.196	99.053	99.475	98.723	99.675	96.497	99.091	99.660	99.537	99.413	99.721	99.564
FeMn end	0.052	0.635	0.544	0.645	0.270	0.228	0.466	0.102	0.971	0.266	0.006	0.100	0.094	0.234	0.109
NbTa end	0.166	1.569	0.802	1.159	0.677	0.297	0.811	0.223	2.533	0.643	0.334	0.363	0.493	0.045	0.327
Nb+Ta	0.003	0.031	0.016	0.023	0.014	0.006	0.016	0.004	0.051	0.013	0.007	0.007	0.010	0.001	0.007
Fe+Mn	0.001	0.013	0.011	0.013	0.005	0.005	0.009	0.002	0.019	0.005	0.000	0.002	0.002	0.005	0.002
Comments:	EP & EQ same grain		ER & ES same grain associated with nigerite		CL - CN same grain core inter rim			from a cluster of grains							

Cassiterite

Big Whopper pegmatite												
96-31												
	FI	FJ	FK	FO	FP	FQ	BA	BB	BC	BH	BF	BG
SnO2	99.83	99.82	98.70	99.45	99.03	94.46	99.92	99.03	97.47	99.73	97.06	99.95
FeO	0.00	0.10	0.12	0.06	0.12	0.41	0.01	0.10	0.31	0.01	0.14	0.00
MnO	0.05	0.09	0.12	0.14	0.02	0.41	0.01	0.00	0.00	0.00	0.16	0.01
Nb2O5	0.31	0.00	0.43	0.00	0.27	0.90	0.00	0.06	0.15	0.02	0.33	0.03
Ta2O5	0.43	0.41	1.04	0.15	0.32	4.00	0.01	0.66	1.60	0.12	2.20	0.09
Total	100.62	100.43	100.41	99.81	99.76	100.17	99.95	99.85	99.53	99.88	99.88	100.09
Structural formulae based on 4 oxygens												
Sn	1.983	1.989	1.965	1.993	1.984	1.889	2.000	1.985	1.962	1.997	1.947	1.997
Fe	0.000	0.004	0.005	0.003	0.005	0.017	0.000	0.004	0.013	0.000	0.006	0.000
Mn	0.002	0.004	0.005	0.006	0.001	0.017	0.000	0.000	0.000	0.000	0.007	0.001
Nb	0.007	0.000	0.010	0.000	0.006	0.020	0.000	0.001	0.003	0.000	0.008	0.001
Ta	0.006	0.006	0.014	0.002	0.004	0.055	0.000	0.009	0.022	0.002	0.030	0.001
Total	1.998	2.003	1.999	2.004	2.000	1.998	2.000	2.000	2.000	2.000	1.997	2.000
Sn end	99.257	99.313	98.307	99.460	99.188	94.525	99.963	99.266	98.069	99.876	97.494	99.879
FeMn end	0.099	0.407	0.509	0.436	0.282	1.722	0.034	0.212	0.665	0.021	0.624	0.028
NbTa end	0.644	0.280	1.184	0.104	0.530	3.753	0.003	0.522	1.266	0.103	1.883	0.094
Nb+Ta	0.013	0.006	0.024	0.002	0.011	0.075	0.000	0.010	0.025	0.002	0.038	0.002
Fe+Mn	0.002	0.008	0.010	0.009	0.006	0.034	0.001	0.004	0.013	0.000	0.012	0.001
Comments:	FI - FK same grain						BA & BB same grain core rim		BC & BH same grain		BF & BG same grain	

Cassiterite

	SW Beryl pegmatite 96-53A					SW Beryl pegmatite 96053A					
	TA	TB	TC	TD	TE	SB	SC	SD	SF	SG	SH
SnO2	97.72	98.85	98.31	97.37	98.02	99.15	99.49	99.65	99.13	98.39	97.16
FeO	0.42	0.15	0.30	0.33	0.32	0.08	0.10	0.09	0.33	0.28	0.46
MnO	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.02	0.02
Nb2O5	0.64	0.16	0.13	0.11	0.17	0.07	0.19	0.14	0.40	0.31	0.79
Ta2O5	1.37	0.61	1.39	1.76	1.36	0.27	0.24	0.25	0.59	1.00	1.41
Total	100.15	99.78	100.14	99.59	99.87	99.58	100.02	100.13	100.47	100.00	99.85
Structural formulae based on 4 oxygens											
Sn	1.950	1.982	1.966	1.959	1.965	1.991	1.988	1.990	1.972	1.968	1.943
Fe	0.017	0.006	0.013	0.014	0.013	0.003	0.004	0.004	0.014	0.012	0.019
Mn	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Nb	0.015	0.004	0.003	0.003	0.004	0.002	0.004	0.003	0.009	0.007	0.018
Ta	0.019	0.008	0.019	0.024	0.019	0.004	0.003	0.003	0.008	0.014	0.019
Total	2.000	2.000	2.001	2.000	2.001	2.001	2.000	2.000	2.003	2.001	2.001
Sn end	97.470	99.065	98.259	97.946	98.205	99.538	99.415	99.489	98.440	98.335	97.133
FeMn end	0.874	0.339	0.644	0.718	0.677	0.194	0.207	0.184	0.708	0.631	1.011
NbTa end	1.655	0.596	1.097	1.336	1.118	0.268	0.378	0.327	0.851	1.034	1.856
Nb+Ta	0.033	0.012	0.022	0.027	0.022	0.005	0.008	0.007	0.017	0.021	0.037
Fe+Mn	0.017	0.007	0.013	0.014	0.014	0.004	0.004	0.004	0.014	0.013	0.020
Comments:	TA - TE same grain few wadginite inclusions					SB & SC same grain		SD & SF same grain contains a ferrotapiolite/ferrotantalite inclusion			

Cassiterite

	SW Beryl pegmatite 96-53B								SW Beryl peg. 96-53B		
	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY
SnO2	97.37	99.67	97.13	99.61	99.15	99.38	99.09	98.61	93.78	98.36	94.80
FeO	0.36	0.13	0.49	0.17	0.24	0.00	0.17	0.21	0.92	0.35	0.75
MnO	0.03	0.00	0.00	0.04	0.00	0.01	0.07	0.00	0.04	0.00	0.12
Nb2O5	0.37	0.00	0.32	0.40	0.36	0.21	0.19	0.10	0.54	0.43	0.72
Ta2O5	1.51	0.55	2.11	0.31	0.62	0.51	0.52	1.45	4.35	1.14	3.53
Total	99.64	100.35	100.04	100.53	100.37	100.11	100.04	100.37	99.61	100.28	99.92
Structural formulae based on 4 oxygens											
Sn	1.955	1.988	1.945	1.979	1.974	1.985	1.981	1.968	1.890	1.961	1.901
Fe	0.015	0.005	0.021	0.007	0.010	0.000	0.007	0.009	0.039	0.015	0.032
Mn	0.001	0.000	0.000	0.002	0.000	0.000	0.003	0.000	0.002	0.000	0.005
Nb	0.008	0.000	0.007	0.009	0.008	0.005	0.004	0.002	0.012	0.010	0.016
Ta	0.021	0.008	0.029	0.004	0.008	0.007	0.007	0.020	0.060	0.016	0.048
Total	2.001	2.001	2.001	2.001	2.001	1.997	2.002	1.999	2.002	2.001	2.002
Sn end	97.721	99.350	97.170	98.900	98.669	99.399	98.922	98.463	94.396	98.006	94.933
FeMn end	0.822	0.274	1.030	0.440	0.501	0.021	0.506	0.431	2.011	0.736	1.841
NbTa end	1.458	0.376	1.800	0.660	0.830	0.580	0.572	1.106	3.593	1.259	3.226
Nb+Ta	0.029	0.008	0.036	0.013	0.017	0.012	0.011	0.022	0.072	0.025	0.065
Fe+Mn	0.016	0.005	0.021	0.009	0.010	0.000	0.010	0.009	0.040	0.015	0.037
Comments:	JO - JQ traverse			JR - JT			JU & JV			JW - JY	
	from core to rim			same grain			same grain			same grain	
	core			rim							

Cassiterite

	Pegmatite 14 96-57A					Pegmatite 14 96-57B					Pegmatite 14 96-57C					
	MA	MB	MC	MD	ME	LA	LB	LC	LD	LE	KA	KB	KC	KD	KE	KF
SnO2	99.56	99.87	97.87	97.38	99.86	98.49	99.25	99.24	99.57	99.20	97.58	98.22	99.33	100.00	99.31	99.20
FeO	0.04	0.00	0.23	0.20	0.08	0.15	0.11	0.00	0.16	0.04	0.08	0.00	0.00	0.00	0.10	0.15
MnO	0.00	0.10	0.14	0.15	0.00	0.01	0.02	0.05	0.00	0.00	0.23	0.10	0.00	0.00	0.00	0.00
Nb2O5	0.19	0.23	0.87	0.95	0.00	0.12	0.04	0.00	0.04	0.12	0.38	0.30	0.29	0.00	0.35	0.00
Ta2O5	0.30	0.21	0.92	0.91	0.00	1.50	0.47	0.29	0.26	0.56	1.67	1.36	0.78	0.40	0.24	0.97
Total	100.10	100.41	100.03	99.59	99.94	100.27	99.89	99.57	100.02	99.92	99.93	99.99	100.40	100.40	99.99	100.33
Structural formulae based on 4 oxygens																
Sn	1.989	1.988	1.952	1.950	1.998	1.968	1.988	1.994	1.991	1.986	1.954	1.966	1.979	1.993	1.984	1.980
Fe	0.002	0.000	0.010	0.008	0.003	0.006	0.004	0.000	0.007	0.002	0.003	0.000	0.000	0.000	0.004	0.006
Mn	0.000	0.004	0.006	0.007	0.000	0.001	0.001	0.002	0.000	0.000	0.010	0.004	0.000	0.000	0.000	0.000
Nb	0.004	0.005	0.020	0.022	0.000	0.003	0.001	0.000	0.001	0.003	0.009	0.007	0.007	0.000	0.008	0.000
Ta	0.004	0.003	0.013	0.012	0.000	0.020	0.006	0.004	0.004	0.008	0.023	0.019	0.011	0.005	0.003	0.013
Total	1.999	2.000	2.000	1.999	2.002	1.998	2.001	2.000	2.002	1.998	1.999	1.996	1.996	1.999	1.999	2.000
Sn end	99.488	99.377	97.616	97.554	99.839	98.497	99.364	99.702	99.452	99.397	97.783	98.509	99.142	99.729	99.231	99.019
FeMn end	0.088	0.222	0.769	0.748	0.161	0.340	0.267	0.100	0.329	0.080	0.645	0.215	0.000	0.000	0.212	0.322
NbTa end	0.424	0.402	1.615	1.698	0.000	1.163	0.368	0.197	0.219	0.523	1.572	1.275	0.858	0.271	0.558	0.659
Nb+Ta	0.008	0.008	0.032	0.034	0.000	0.023	0.007	0.004	0.004	0.010	0.031	0.025	0.017	0.005	0.011	0.013
Fe+Mn	0.002	0.004	0.015	0.015	0.003	0.007	0.005	0.002	0.007	0.002	0.013	0.004	0.000	0.000	0.004	0.006
Comments:	MA - MC same grain		MD & ME same grain		LA - LC traverse from core to rim core			LD & LE same grain rim		KA - KC euhedral crystal core			KD & KE same grain rim			

Cassiterite

Separation Rapids pluton											
96-72B											
	KA	KB	KC	KD	KE	KF	KG	KH	KI	KL	KM
SnO2	95.82	98.22	95.71	97.01	98.66	98.46	97.68	96.28	98.53	97.04	98.65
FeO	0.73	0.23	0.75	0.62	0.19	0.22	0.54	0.67	0.18	0.73	0.18
MnO	0.04	0.01	0.05	0.01	0.00	0.01	0.00	0.03	0.00	0.02	0.01
Nb2O5	1.29	0.21	1.33	0.81	0.09	0.47	0.66	1.19	0.16	0.82	0.09
Ta2O5	1.97	0.94	2.26	0.65	0.82	0.27	0.50	1.21	0.81	0.53	0.73
Total	99.84	99.60	100.10	99.09	99.76	99.44	99.38	99.38	99.67	99.15	99.67
Structural formulae based on 4 oxygens											
Sn	1.914	1.973	1.907	1.953	1.980	1.977	1.961	1.931	1.978	1.952	1.981
Fe	0.031	0.010	0.031	0.026	0.008	0.009	0.023	0.028	0.008	0.031	0.008
Mn	0.001	0.000	0.002	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000
Nb	0.029	0.005	0.030	0.018	0.002	0.011	0.015	0.027	0.004	0.019	0.002
Ta	0.027	0.013	0.031	0.009	0.011	0.004	0.007	0.016	0.011	0.007	0.010
Total	2.002	2.001	2.002	2.006	2.001	2.001	2.006	2.004	2.000	2.009	2.001
Sn end	95.596	98.619	95.292	97.315	98.947	98.791	97.777	96.351	98.891	97.131	99.002
FeMn end	1.608	0.501	1.672	1.324	0.389	0.486	1.134	1.476	0.379	1.575	0.392
NbTa end	2.796	0.880	3.036	1.362	0.664	0.722	1.089	2.173	0.730	1.294	0.606
Nb+Ta	0.056	0.018	0.061	0.027	0.013	0.014	0.022	0.044	0.015	0.026	0.012
Fe+Mn	0.032	0.010	0.033	0.027	0.008	0.010	0.023	0.030	0.008	0.032	0.008
Comments:	KA - KC		KD - KF same grain			KG & KH same grain			KL & KM		
	same grain		brown			mid-brown			same grain		
	contains tiny inclusions		colourless								

Cassiterite

	SW Beryl pegmatite								SW Beryl peg.		SW Beryl peg.		
	MB	MC	MD	96-76				96-76A		96-81			
			ME	MI	MJ	MJ	MQ	MR	TA	TK	FB	FC	
SnO2	95.11	99.67	98.48	99.71	98.45	97.16	99.08	99.65	97.89	87.55	99.32	100.41	99.47
FeO	0.18	0.03	0.09	0.02	0.08	0.09	0.06	0.09	0.04	1.31	0.08	0.08	0.00
MnO	0.29	0.00	0.11	0.00	0.09	0.22	0.01	0.01	0.12	0.66	0.00	0.00	0.00
Nb2O5	1.27	0.07	0.09	0.00	0.52	0.43	0.04	0.07	0.35	1.55	0.05	0.00	0.22
Ta2O5	2.61	0.25	1.43	0.28	0.60	2.02	0.70	0.30	1.23	9.37	0.51	0.30	0.36
Total	99.45	100.02	100.20	100.01	99.74	99.91	99.90	100.12	99.63	100.44	99.96	100.78	100.04
Structural formulae based on 4 oxygens													
Sn	1.909	1.993	1.969	1.995	1.971	1.947	1.985	1.991	1.966	1.754	1.988	1.993	1.988
Fe	0.007	0.001	0.004	0.001	0.003	0.004	0.003	0.004	0.002	0.055	0.003	0.003	0.000
Mn	0.012	0.000	0.005	0.000	0.004	0.009	0.001	0.000	0.005	0.028	0.000	0.000	0.000
Nb	0.029	0.001	0.002	0.000	0.012	0.010	0.001	0.002	0.008	0.035	0.001	0.000	0.005
Ta	0.036	0.003	0.020	0.004	0.008	0.028	0.010	0.004	0.017	0.128	0.007	0.004	0.005
Total	1.994	1.999	1.999	1.999	1.998	1.997	1.999	2.001	1.997	2.001	2.000	2.001	1.998
Sn end	95.772	99.694	98.515	99.768	98.651	97.483	99.321	99.509	98.420	87.682	99.423	99.640	99.511
FeMn end	0.986	0.063	0.406	0.042	0.345	0.648	0.156	0.205	0.341	4.152	0.172	0.156	0.000
NbTa end	3.243	0.243	1.080	0.190	1.005	1.869	0.523	0.286	1.240	8.167	0.405	0.204	0.489
Nb+Ta	0.065	0.005	0.022	0.004	0.020	0.037	0.010	0.006	0.025	0.163	0.008	0.004	0.010
Fe+Mn	0.020	0.001	0.008	0.001	0.007	0.013	0.003	0.004	0.007	0.083	0.003	0.003	0.000
Comments:	MC - ME same grain			in contact with				note high		core		rim	
	full of wodginitite incls.			and earlier than columbite				Ta content					

Cassiterite

SW Beryl pegmatite											
96-85											
	GA	GB	GE	GF	GG	GI	GJ	GL	GM	GN	GO
SnO2	99.65	99.23	98.56	96.81	96.89	99.83	98.03	99.12	99.46	97.31	99.38
FeO	0.04	0.12	0.30	0.63	0.65	0.25	0.42	0.20	0.21	0.92	0.19
MnO	0.02	0.10	0.10	0.03	0.00	0.03	0.07	0.07	0.00	0.07	0.00
Nb2O5	0.26	0.00	0.00	0.43	0.53	0.00	0.15	0.28	0.13	1.00	0.33
Ta2O5	0.27	0.62	0.60	1.35	1.73	0.62	1.86	0.51	0.62	0.78	0.34
Total	100.24	100.06	99.56	99.25	99.79	100.74	100.54	100.18	100.42	100.08	100.24
Structural formulae based on 4 oxygens											
Sn	1.987	1.985	1.981	1.951	1.942	1.984	1.954	1.978	1.981	1.938	1.981
Fe	0.002	0.005	0.013	0.027	0.027	0.010	0.018	0.008	0.009	0.038	0.008
Mn	0.001	0.004	0.004	0.001	0.000	0.001	0.003	0.003	0.000	0.003	0.000
Nb	0.006	0.000	0.000	0.010	0.012	0.000	0.003	0.006	0.003	0.023	0.007
Ta	0.004	0.008	0.008	0.018	0.024	0.008	0.025	0.007	0.008	0.011	0.005
Total	1.999	2.002	2.006	2.007	2.005	2.004	2.003	2.002	2.002	2.012	2.001
Sn end	99.392	99.120	98.744	97.196	96.875	98.997	97.530	98.777	98.989	96.290	98.999
FeMn end	0.128	0.459	0.843	1.393	1.353	0.581	1.037	0.558	0.447	2.056	0.397
NbTa end	0.479	0.420	0.413	1.411	1.773	0.422	1.433	0.665	0.564	1.654	0.604
Nb+Ta	0.010	0.008	0.008	0.028	0.036	0.008	0.029	0.013	0.011	0.033	0.012
Fe+Mn	0.003	0.009	0.017	0.028	0.027	0.012	0.021	0.011	0.009	0.041	0.008
Comments:	GE - GG same grain						incl.	incl.	core	rim	
	contains some inclusions						rich	poor			
	core inter rim						core	rim			
							many inclusions				

Cassiterite

	SW Beryl pegmatite 96-86									SW Beryl pegmatite 96-86B		
	FA	FB	FC	FD	FE	FF	FG	FJ	FK	JA	JB	JE
SnO2	93.65	96.04	93.65	99.46	98.93	98.61	97.68	96.36	98.83	98.91	99.80	100.02
FeO	0.59	0.32	0.75	0.02	0.10	0.19	0.25	0.26	0.13	0.11	0.00	0.02
MnO	0.18	0.07	0.08	0.01	0.00	0.04	0.01	0.11	0.00	0.14	0.10	0.04
Nb2O5	0.47	0.20	0.69	0.01	0.19	0.17	0.05	0.82	0.08	0.00	0.22	0.00
Ta2O5	4.57	2.16	4.28	0.45	0.61	1.09	1.46	1.77	0.77	0.68	0.00	0.46
Total	99.46	98.77	99.44	99.95	99.84	100.10	99.45	99.32	99.81	99.83	100.12	100.55
Structural formulae based on 4 oxygens												
Sn	1.892	1.949	1.889	1.991	1.982	1.972	1.968	1.938	1.982	1.983	1.992	1.991
Fe	0.025	0.013	0.032	0.001	0.004	0.008	0.011	0.011	0.006	0.005	0.000	0.001
Mn	0.008	0.003	0.003	0.000	0.000	0.002	0.000	0.005	0.000	0.006	0.004	0.002
Nb	0.011	0.005	0.016	0.000	0.004	0.004	0.001	0.019	0.002	0.000	0.005	0.000
Ta	0.063	0.030	0.059	0.006	0.008	0.015	0.020	0.024	0.010	0.009	0.000	0.006
Total	1.998	2.000	1.999	1.999	1.999	2.000	2.000	1.997	2.000	2.003	2.001	2.000
Sn end	94.672	97.463	94.524	99.618	99.140	98.581	98.385	97.065	99.102	99.020	99.541	99.550
FeMn end	1.639	0.819	1.742	0.061	0.225	0.483	0.556	0.782	0.284	0.518	0.210	0.137
NbTa end	3.689	1.718	3.734	0.321	0.635	0.935	1.059	2.153	0.614	0.462	0.249	0.313
Nb+Ta	0.074	0.034	0.075	0.006	0.013	0.019	0.021	0.043	0.012	0.009	0.005	0.006
Fe+Mn	0.033	0.016	0.035	0.001	0.004	0.010	0.011	0.016	0.006	0.010	0.004	0.003
Comments:	FA & FB same grain		FC & FD same grain				brown			JA & JB same grain inclusion in ferrocolumbite		

Cassiterite

	Great White North pegmatite						Marko's pegmatite				
	96-87						96-AT3				
	SA	SB	SC	SD	SE	SF	AA	AB	AC	AD	AE
SnO2	97.32	98.52	99.18	98.09	96.75	99.19	97.50	96.44	97.42	94.90	98.30
FeO	0.00	0.00	0.04	0.07	0.00	0.09	0.26	0.56	0.36	0.78	0.17
MnO	0.19	0.12	0.10	0.12	0.24	0.03	0.00	0.04	0.02	0.07	0.00
Nb2O5	1.13	0.94	0.94	1.18	1.45	0.03	0.11	0.61	0.37	0.75	0.08
Ta2O5	1.28	0.80	0.51	0.50	1.18	0.19	1.43	2.76	1.59	3.80	1.10
Total	99.92	100.38	100.77	99.95	99.62	99.52	99.31	100.41	99.76	100.30	99.65
Structural formulae based on 4 oxygens											
Sn	1.942	1.957	1.962	1.954	1.934	1.993	1.967	1.923	1.954	1.896	1.975
Fe	0.000	0.000	0.002	0.003	0.000	0.004	0.011	0.023	0.015	0.033	0.007
Mn	0.008	0.005	0.004	0.005	0.010	0.001	0.000	0.002	0.001	0.003	0.000
Nb	0.025	0.021	0.021	0.027	0.033	0.001	0.003	0.014	0.008	0.017	0.002
Ta	0.017	0.011	0.007	0.007	0.016	0.003	0.020	0.038	0.022	0.052	0.015
Total	1.993	1.995	1.996	1.996	1.993	2.002	2.000	2.000	2.000	2.001	1.999
Sn end	97.451	98.137	98.316	97.926	97.040	99.591	98.325	96.178	97.702	94.779	98.798
FeMn end	0.396	0.260	0.281	0.407	0.507	0.247	0.565	1.254	0.787	1.782	0.352
NbTa end	2.153	1.603	1.403	1.667	2.453	0.162	1.110	2.568	1.511	3.439	0.850
Nb+Ta	0.043	0.032	0.028	0.033	0.049	0.003	0.022	0.051	0.030	0.069	0.017
Fe+Mn	0.008	0.005	0.006	0.008	0.010	0.005	0.011	0.025	0.016	0.036	0.007
Comments:	SA - SD		SE & SF			AA & AB		AC - AE			
	same grain		same grain			same grain		same grain			
	from large zoned cassiterite crystals						contains tiny inclusions				

Cassiterite

	Marko's pegmatite 96-AT4				Marko's pegmatite 96-AT5					Marko's pegmatite 96-AT8			
	NA	NB	NC	ND	BA	BB	BC	BD	BE	EA	EB	EC	ED
SnO2	97.49	96.83	96.45	98.56	98.71	98.23	97.85	98.90	96.45	98.58	95.89	95.92	99.33
FeO	0.23	0.40	0.46	0.12	0.06	0.16	0.22	0.07	0.32	0.13	0.54	0.39	0.02
MnO	0.00	0.03	0.04	0.00	0.00	0.03	0.01	0.01	0.08	0.00	0.05	0.04	0.00
Nb2O5	0.12	0.43	0.50	0.05	0.04	0.05	0.45	0.02	0.14	0.06	0.59	0.51	0.00
Ta2O5	1.30	1.43	1.66	0.77	0.46	1.16	0.98	0.51	2.50	0.70	2.50	1.82	0.31
Total	99.14	99.12	99.11	99.51	99.27	99.63	99.51	99.51	99.48	99.47	99.56	98.67	99.67
Structural formulae based on 4 oxygens													
Sn	1.969	1.954	1.947	1.983	1.990	1.975	1.966	1.989	1.945	1.984	1.928	1.945	1.994
Fe	0.010	0.017	0.019	0.005	0.003	0.007	0.009	0.003	0.013	0.006	0.023	0.017	0.001
Mn	0.000	0.001	0.002	0.000	0.000	0.001	0.000	0.000	0.003	0.000	0.002	0.002	0.000
Nb	0.003	0.010	0.011	0.001	0.001	0.001	0.010	0.001	0.003	0.001	0.013	0.012	0.000
Ta	0.018	0.020	0.023	0.011	0.006	0.016	0.013	0.007	0.034	0.010	0.034	0.025	0.004
Total	2.000	2.002	2.002	2.000	2.000	2.000	1.999	2.000	1.999	2.000	2.001	2.000	2.000
Sn end	98.482	97.628	97.241	99.154	99.508	98.749	98.340	99.457	97.285	99.175	96.376	97.241	99.731
FeMn end	0.485	0.895	1.048	0.264	0.135	0.395	0.479	0.167	0.838	0.283	1.245	0.922	0.057
NbTa end	1.032	1.477	1.712	0.583	0.356	0.856	1.182	0.376	1.877	0.542	2.379	1.837	0.212
Nb+Ta	0.021	0.030	0.034	0.012	0.007	0.017	0.024	0.008	0.038	0.011	0.048	0.037	0.004
Fe+Mn	0.010	0.018	0.021	0.005	0.003	0.008	0.010	0.003	0.017	0.006	0.025	0.018	0.001
Comments:	NA - ND same grain contains many microlite inclusions and exsolved material				BA - BE same grain contains microlite and manganotantalite inclusions					EA & EB same grain contains microlite, titanowodginite & ferrotitanowodginite inclusions			

Cassiterite

	Marko's pegmatite 96-AT11A						Marko's pegmatite 96-AT11B						
	QB	QE	QG	QH	QI	QO	OA	OB	OC	OD	OE	OF	OG
SnO2	96.00	99.10	94.00	92.41	93.77	98.66	100.14	98.19	98.09	98.13	98.85	99.44	99.55
FeO	0.55	0.08	0.71	1.00	0.76	0.14	0.05	0.13	0.19	0.12	0.11	0.12	0.06
MnO	0.05	0.01	0.07	0.07	0.06	0.00	0.00	0.03	0.03	0.03	0.01	0.01	0.01
Nb2O5	0.75	0.06	0.92	1.01	0.91	0.06	0.12	0.03	0.06	0.04	0.58	0.54	0.19
Ta2O5	2.77	0.68	3.34	4.65	3.52	0.79	0.06	1.10	1.46	1.09	0.22	0.23	0.19
Total	100.12	99.93	99.04	99.14	99.02	99.66	100.20	99.48	99.83	99.41	99.78	100.34	100.00
Structural formulae based on 4 oxygens													
Sn	1.919	1.985	1.900	1.868	1.896	1.982	1.995	1.977	1.969	1.977	1.977	1.978	1.990
Fe	0.023	0.003	0.030	0.042	0.032	0.006	0.002	0.005	0.008	0.005	0.005	0.005	0.003
Mn	0.002	0.001	0.003	0.003	0.003	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000
Nb	0.017	0.001	0.021	0.023	0.021	0.001	0.003	0.001	0.001	0.001	0.013	0.012	0.004
Ta	0.038	0.009	0.046	0.064	0.049	0.011	0.001	0.015	0.020	0.015	0.003	0.003	0.003
Total	1.999	1.999	2.000	2.001	2.000	2.000	2.000	1.999	1.999	1.999	1.999	1.999	2.000
Sn end	96.007	99.283	94.991	93.376	94.783	99.089	99.718	98.869	98.470	98.897	98.929	98.958	99.508
FeMn end	1.253	0.187	1.655	2.265	1.746	0.299	0.104	0.341	0.462	0.303	0.261	0.276	0.145
NbTa end	2.739	0.530	3.354	4.359	3.470	0.611	0.177	0.790	1.068	0.800	0.810	0.766	0.347
Nb+Ta	0.055	0.011	0.067	0.087	0.069	0.012	0.004	0.016	0.021	0.016	0.016	0.015	0.007
Fe+Mn	0.025	0.004	0.033	0.045	0.035	0.006	0.002	0.007	0.009	0.006	0.005	0.006	0.003
Comments:	QB - QI same grain contains microlite & ferrotitanowodginite inclusions						OB - OD same grain contains microlite inclusion			OE - OG same grain			

Cassiterite

	Marko's pegmatite 96-AT12					Marko's pegmatite 96-AT13					Marko's peg. 96-AT15	
	GA	GB	GC	GD	GE	LA	LB	LC	LD	LE	GF	GG
SnO2	96.64	96.86	97.44	98.75	99.58	99.37	98.71	98.42	98.71	99.43	94.74	94.41
FeO	0.41	0.38	0.33	0.20	0.02	0.04	0.13	0.23	0.13	0.05	0.57	0.56
MnO	0.03	0.04	0.02	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.09	0.15
Nb2O5	0.49	0.41	0.67	0.11	0.02	0.03	0.10	0.42	0.05	0.03	0.41	0.08
Ta2O5	1.46	1.67	1.16	1.09	0.13	0.33	0.74	0.90	0.83	0.28	4.66	4.59
Total	99.03	99.36	99.62	100.15	99.75	99.77	99.69	100.01	99.72	99.79	100.46	99.80
Structural formulae based on 4 oxygens												
Sn	1.952	1.951	1.954	1.974	1.997	1.993	1.982	1.967	1.982	1.993	1.895	1.904
Fe	0.017	0.016	0.014	0.008	0.001	0.002	0.005	0.010	0.005	0.002	0.024	0.024
Mn	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.004	0.006
Nb	0.011	0.009	0.015	0.003	0.000	0.001	0.002	0.010	0.001	0.001	0.009	0.002
Ta	0.020	0.023	0.016	0.015	0.002	0.005	0.010	0.012	0.011	0.004	0.064	0.063
Total	2.002	2.001	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	1.995	1.999
Sn end	97.500	97.497	97.705	98.715	99.854	99.652	99.085	98.355	99.090	99.661	94.974	95.242
FeMn end	0.936	0.888	0.741	0.415	0.038	0.084	0.293	0.554	0.287	0.114	1.373	1.506
NbTa end	1.563	1.616	1.554	0.870	0.108	0.263	0.622	1.091	0.624	0.226	3.653	3.252
Nb+Ta	0.031	0.032	0.031	0.017	0.002	0.005	0.012	0.022	0.012	0.005	0.073	0.065
Fe+Mn	0.019	0.018	0.015	0.008	0.001	0.002	0.006	0.011	0.006	0.002	0.027	0.030
Comments:	GA & GB same grain		GD & GE same grain			LA - LE same grain					GF & GG same grain	
	contains microlite, titanowodginite & ferrotitanowodginite inclusions					contains microlite inclusions						

Cassiterite

	Marko's pegmatite 96-AT17					Pegmatite 6 96-AT21A				
	RR	RT	RU	RV	RW	RX	KA	KB	KD	KE
SnO2	92.99	95.31	97.26	93.37	93.27	93.09	97.16	97.64	98.03	97.14
FeO	0.91	0.62	0.32	0.84	0.85	0.94	0.35	0.32	0.22	0.40
MnO	0.10	0.07	0.02	0.09	0.08	0.05	0.01	0.01	0.00	0.01
Nb2O5	0.88	0.65	0.51	0.78	0.76	0.89	0.24	0.24	0.19	0.50
Ta2O5	4.65	3.09	1.30	4.27	4.32	4.62	1.51	1.38	0.89	1.31
Total	99.53	99.74	99.41	99.36	99.28	99.57	99.26	99.59	99.33	99.35
Structural formulae based on 4 oxygens										
Sn	1.874	1.914	1.956	1.884	1.884	1.875	1.960	1.963	1.975	1.955
Fe	0.039	0.026	0.014	0.036	0.036	0.040	0.015	0.013	0.009	0.017
Mn	0.004	0.003	0.001	0.004	0.003	0.002	0.000	0.000	0.000	0.000
Nb	0.020	0.015	0.012	0.018	0.017	0.020	0.006	0.005	0.004	0.011
Ta	0.064	0.042	0.018	0.059	0.060	0.063	0.021	0.019	0.012	0.018
Total	2.000	2.000	2.000	2.001	2.000	2.000	2.001	2.001	2.000	2.001
Sn end	93.669	95.699	97.795	94.196	94.185	93.741	97.943	98.089	98.710	97.683
FeMn end	2.136	1.442	0.732	1.968	1.968	2.075	0.742	0.698	0.460	0.850
NbTa end	4.194	2.858	1.472	3.836	3.848	4.183	1.315	1.214	0.829	1.466
Nb+Ta	0.084	0.057	0.029	0.077	0.077	0.084	0.026	0.024	0.017	0.029
Fe+Mn	0.043	0.029	0.015	0.039	0.039	0.042	0.015	0.014	0.009	0.017
Comments:	RT - RU		RV - RX			KA - KE				
	same grain		same grain			same grain				
	contains euhedral inclusions of zoned antimonian microlite & ferrotitanowodginite									

Cassiterite

Pegmatite 5							
96-AT23							
	NA	NC	ND	NE	NL	NM	NS
SnO2	90.54	92.71	98.75	94.39	90.45	90.05	90.97
FeO	1.28	1.04	0.28	0.75	1.26	1.33	1.26
MnO	0.05	0.05	0.01	0.04	0.07	0.06	0.07
Nb2O5	0.89	0.58	0.11	0.47	0.97	0.86	0.84
Ta2O5	6.47	5.52	1.62	3.77	6.52	6.90	6.85
Total	99.23	99.90	100.76	99.43	99.27	99.19	99.99
Structural formulae based on 4 oxygens							
Sn	1.834	1.866	1.963	1.905	1.831	1.827	1.831
Fe	0.054	0.044	0.012	0.032	0.053	0.056	0.053
Mn	0.002	0.002	0.001	0.002	0.003	0.002	0.003
Nb	0.020	0.013	0.002	0.011	0.022	0.020	0.019
Ta	0.089	0.076	0.022	0.052	0.090	0.095	0.094
Total	2.001	2.001	2.000	2.001	2.000	2.001	2.000
Sn end	91.685	93.250	98.168	95.195	91.567	91.302	91.532
FeMn end	2.826	2.298	0.613	1.672	2.815	2.942	2.815
NbTa end	5.489	4.451	1.219	3.133	5.618	5.755	5.653
Nb+Ta	0.110	0.089	0.024	0.063	0.112	0.115	0.113
Fe+Mn	0.057	0.046	0.012	0.033	0.056	0.059	0.056
Comments:	NA - NE same grain			NL - NS same grain			
	contains large inclusions of tungsteniferous ferrowodginite						

Cassiterite

Near School of Fish										
97-1										
	CE	CF	CG	QA	QB	QC	QI	QJ	QL	QM
SnO2	97.94	97.28	99.09	99.14	99.68	98.95	99.10	99.44	97.67	99.39
FeO	0.32	0.30	0.07	0.23	0.09	0.29	0.15	0.10	0.41	0.20
MnO	0.02	0.00	0.00	0.01	0.00	0.02	0.03	0.00	0.05	0.06
Nb2O5	0.45	0.48	0.05	0.30	0.05	0.40	0.28	0.04	0.46	0.21
Ta2O5	0.75	1.30	0.38	0.73	0.21	0.68	0.67	0.34	1.57	0.60
Total	99.48	99.36	99.59	100.41	100.04	100.33	100.22	99.92	100.16	100.46
Structural formulae based on 4 oxygens										
Sn	1.967	1.958	1.991	1.974	1.993	1.971	1.977	1.991	1.951	1.979
Fe	0.013	0.013	0.003	0.010	0.004	0.012	0.006	0.004	0.017	0.008
Mn	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.002	0.002
Nb	0.010	0.011	0.001	0.007	0.001	0.009	0.006	0.001	0.010	0.005
Ta	0.010	0.018	0.005	0.010	0.003	0.009	0.009	0.005	0.021	0.008
Total	2.002	1.999	2.000	2.001	2.001	2.002	2.000	2.001	2.002	2.002
Sn end	98.265	97.924	99.535	98.675	99.603	98.462	98.870	99.507	97.449	98.822
FeMn end	0.710	0.638	0.150	0.495	0.195	0.629	0.358	0.218	0.966	0.535
NbTa end	1.025	1.439	0.315	0.830	0.202	0.910	0.771	0.275	1.585	0.643
Nb+Ta	0.021	0.029	0.006	0.017	0.004	0.018	0.015	0.005	0.032	0.013
Fe+Mn	0.014	0.013	0.003	0.010	0.004	0.013	0.007	0.004	0.019	0.011
Comments:	CE - CG same grain rim			QA - QC same grain		QI & QJ same grain		inclusions in garnet		

Cassiterite

	SW Beryl pegmatite 97-16A							SW Be peg. 97-16B			SW Beryl aplite 97-69				
	NE	NF	NG	NH	NI	NJ	NK	NL	EG	EH	CG	CH	CI	CJ	CK
SnO2	98.98	98.02	98.89	99.87	98.86	97.43	96.78	99.27	99.45	98.85	95.23	96.32	96.07	97.53	98.93
FeO	0.09	0.15	0.19	0.00	0.09	0.18	0.44	0.06	0.01	0.11	0.46	0.42	0.49	0.29	0.07
MnO	0.03	0.08	0.01	0.00	0.04	0.10	0.08	0.02	0.00	0.01	0.08	0.01	0.01	0.02	0.00
Nb2O5	0.08	0.25	0.20	0.03	0.16	0.28	1.32	0.07	0.00	0.09	0.18	0.08	0.16	0.52	0.01
Ta2O5	0.83	1.58	0.79	0.19	0.83	1.90	1.12	0.72	0.25	0.66	3.17	2.36	2.74	1.64	0.61
Total	100.01	100.08	100.07	100.09	99.97	99.89	99.74	100.13	99.71	99.72	99.12	99.18	99.47	99.99	99.62
Structural formulae based on 4 oxygens															
Sn	1.981	1.961	1.977	1.996	1.979	1.954	1.933	1.984	1.996	1.984	1.929	1.948	1.938	1.951	1.988
Fe	0.004	0.006	0.008	0.000	0.004	0.007	0.018	0.003	0.000	0.005	0.019	0.018	0.021	0.012	0.003
Mn	0.001	0.004	0.000	0.000	0.002	0.004	0.003	0.001	0.000	0.000	0.004	0.001	0.000	0.001	0.000
Nb	0.002	0.006	0.005	0.001	0.004	0.006	0.030	0.001	0.000	0.002	0.004	0.002	0.004	0.012	0.000
Ta	0.011	0.022	0.011	0.003	0.011	0.026	0.015	0.010	0.003	0.009	0.044	0.032	0.038	0.022	0.008
Total	1.999	1.998	2.000	1.999	1.999	1.998	1.999	1.999	1.999	2.000	2.000	2.001	2.000	1.998	1.999
Sn end	99.083	98.136	98.827	99.830	98.984	97.795	96.658	99.270	99.811	99.197	96.453	97.377	96.886	97.644	99.429
FeMn end	0.265	0.500	0.409	0.008	0.270	0.582	1.079	0.164	0.017	0.255	1.149	0.910	1.041	0.645	0.146
NbTa end	0.652	1.364	0.765	0.161	0.746	1.623	2.263	0.566	0.172	0.549	2.398	1.713	2.073	1.711	0.425
Nb+Ta	0.013	0.027	0.015	0.003	0.015	0.032	0.045	0.011	0.003	0.011	0.048	0.034	0.041	0.034	0.009
Fe+Mn	0.005	0.010	0.008	0.000	0.005	0.012	0.022	0.003	0.000	0.005	0.023	0.018	0.021	0.013	0.003
Comments:	NE & NF same grain		NG & NH same grain		NI & NJ same grain		NK & NL same grain core rim		EG & EH same grain rim		CG - CI same grain contains inclusions of ferrotapiolite & ferrowodginite			CJ & CK same grain	

Cassiterite

	School of Fish 97-70		SW Beryl pegmatite 97-134A									
	EK	EL	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DQ
SnO2	99.29	99.00	99.27	97.53	98.67	92.23	94.07	99.44	91.91	99.13	99.59	99.04
FeO	0.06	0.08	0.09	0.08	0.01	0.06	0.03	0.01	0.22	0.11	0.10	0.12
MnO	0.00	0.00	0.00	0.16	0.06	0.81	0.61	0.00	0.67	0.00	0.00	0.01
Nb2O5	0.08	0.14	0.11	0.19	0.04	0.89	0.73	0.00	0.65	0.14	0.07	0.15
Ta2O5	0.10	0.18	0.21	1.94	0.89	5.31	3.97	0.15	5.37	0.28	0.14	0.19
Total	99.53	99.40	99.68	99.89	99.67	99.30	99.40	99.60	98.82	99.66	99.89	99.51
Structural formulae based on 4 oxygens												
Sn	1.995	1.991	1.991	1.956	1.982	1.864	1.897	1.997	1.869	1.989	1.994	1.990
Fe	0.003	0.004	0.004	0.003	0.000	0.002	0.001	0.000	0.009	0.005	0.004	0.005
Mn	0.000	0.000	0.000	0.007	0.003	0.035	0.026	0.000	0.029	0.000	0.000	0.000
Nb	0.002	0.003	0.002	0.004	0.001	0.020	0.017	0.000	0.015	0.003	0.002	0.003
Ta	0.001	0.002	0.003	0.027	0.012	0.073	0.055	0.002	0.074	0.004	0.002	0.003
Total	2.001	2.000	2.001	1.997	1.998	1.995	1.996	2.000	1.997	2.001	2.001	2.001
Sn end	99.703	99.541	99.536	97.951	99.200	93.448	95.060	99.882	93.607	99.416	99.625	99.428
FeMn end	0.135	0.177	0.198	0.512	0.143	1.862	1.367	0.019	1.917	0.231	0.201	0.276
NbTa end	0.162	0.282	0.267	1.537	0.657	4.690	3.574	0.099	4.476	0.353	0.174	0.296
Nb+Ta	0.003	0.006	0.005	0.031	0.013	0.094	0.071	0.002	0.089	0.007	0.003	0.006
Fe+Mn	0.003	0.004	0.004	0.010	0.003	0.037	0.027	0.000	0.038	0.005	0.004	0.006
Comments:	EK & EL same grain associated with ferrocolumbite		DF - DH same grain		DI - DL same grain spectacularly zoned (in Ta) crystal associated with ferrocolumbite				DM & DN same grain core rim			

Cassiterite

	Big Whopper 97-185B				Big Whopper pegmatite 97-186A				
	AH	AI	AJ	AK	DC	DM	DN	HB	HC
SnO2	98.55	95.77	99.14	99.26	96.53	99.61	98.94	98.63	95.45
FeO	0.13	0.38	0.02	0.10	0.51	0.01	0.06	0.15	0.29
MnO	0.06	0.18	0.00	0.02	0.03	0.01	0.07	0.00	0.20
Nb2O5	0.33	0.80	0.19	0.10	0.23	0.06	0.40	0.09	0.63
Ta2O5	0.99	2.79	0.23	0.82	2.55	0.36	0.63	0.83	3.33
Total	100.05	99.92	99.58	100.30	99.85	100.04	100.11	99.71	99.91
Structural formulae based on 4 oxygens									
Sn	1.970	1.918	1.990	1.981	1.939	1.992	1.975	1.980	1.915
Fe	0.005	0.016	0.001	0.004	0.022	0.000	0.002	0.006	0.012
Mn	0.002	0.008	0.000	0.001	0.001	0.000	0.003	0.000	0.009
Nb	0.007	0.018	0.004	0.002	0.005	0.001	0.009	0.002	0.014
Ta	0.013	0.038	0.003	0.011	0.035	0.005	0.009	0.011	0.046
Total	1.999	1.998	1.999	1.999	2.001	1.999	1.998	2.000	1.995
Sn end	98.573	95.997	99.593	99.078	96.858	99.655	98.844	99.006	95.960
FeMn end	0.381	1.189	0.036	0.250	1.141	0.032	0.272	0.316	1.036
NbTa end	1.046	2.815	0.371	0.672	2.001	0.313	0.884	0.678	3.003
Nb+Ta	0.021	0.056	0.007	0.013	0.040	0.006	0.018	0.014	0.060
Fe+Mn	0.008	0.024	0.001	0.005	0.023	0.001	0.005	0.006	0.021
Comments:	AH - AJ same grain brown brown brown colourless				DM & DN same grain brown colourless				

Cassiterite

	Big Whopper peg. 97-186B			Big Whopper pegmatite 97-186C				
	JE	JF	JG	CI	CK	CL	CM	CO
SnO2	99.84	99.42	99.13	98.94	99.71	100.25	99.47	99.43
FeO	0.05	0.03	0.00	0.10	0.07	0.01	0.09	0.05
MnO	0.04	0.04	0.07	0.06	0.03	0.02	0.02	0.04
Nb2O5	0.01	0.01	0.01	0.68	0.13	0.01	0.12	0.28
Ta2O5	0.25	0.37	0.45	0.65	0.73	0.10	0.65	0.41
Total	100.18	99.87	99.66	100.41	100.67	100.39	100.35	100.21
Structural formulae based on 4 oxygens								
Sn	1.994	1.992	1.991	1.967	1.982	1.997	1.983	1.983
Fe	0.002	0.002	0.003	0.004	0.003	0.000	0.004	0.002
Mn	0.000	0.001	0.000	0.002	0.001	0.001	0.001	0.002
Nb	0.001	0.001	0.000	0.015	0.003	0.000	0.003	0.006
Ta	0.003	0.005	0.006	0.009	0.010	0.001	0.009	0.006
Total	2.000	2.000	2.000	1.997	1.999	2.000	1.999	1.999
Sn end	99.689	99.597	99.530	98.474	99.148	99.865	99.187	99.216
FeMn end	0.090	0.114	0.160	0.321	0.209	0.053	0.237	0.185
NbTa end	0.221	0.290	0.310	1.205	0.642	0.082	0.576	0.599
Nb+Ta	0.004	0.006	0.006	0.024	0.013	0.002	0.012	0.012
Fe+Mn	0.002	0.002	0.003	0.006	0.004	0.001	0.005	0.004
Comments:	JE - JG same grain			cluster of grains contains a few inclusions pale colourless brown				

Cassiterite

	Big Whopper 97-186X			Big Whopper 97-186X				Big Whopper pegmatite 97-186Z						
	GA	GB	GD	GE	GF	GK	GN	GO	CA	CB	CC	CL	CM	CN
SnO2	99.63	99.33	99.50	99.25	99.08	99.72	98.21	98.38	99.29	95.39	100.11	99.66	97.69	100.21
FeO	0.02	0.00	0.00	0.04	0.02	0.04	0.05	0.11	0.03	0.31	0.01	0.02	0.06	0.03
MnO	0.00	0.01	0.02	0.03	0.00	0.01	0.02	0.00	0.05	0.27	0.01	0.00	0.09	0.00
Nb2O5	0.00	0.00	0.02	0.01	0.05	0.04	0.12	0.12	0.08	1.24	0.00	0.02	0.80	0.06
Ta2O5	0.13	0.14	0.25	0.57	0.23	0.35	0.86	0.65	0.54	2.07	0.06	0.14	0.74	0.21
Total	99.78	99.48	99.80	99.89	99.38	100.16	99.26	99.26	99.99	99.28	100.19	99.83	99.38	100.52
Structural formulae based on 4 oxygens														
Sn	1.998	1.997	1.995	1.989	1.994	1.992	1.980	1.983	1.987	1.917	1.999	1.997	1.961	1.994
Fe	0.001	0.000	0.000	0.002	0.001	0.002	0.002	0.005	0.001	0.013	0.000	0.001	0.003	0.001
Mn	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.002	0.012	0.001	0.000	0.004	0.000
Nb	0.000	0.000	0.000	0.000	0.001	0.001	0.003	0.003	0.002	0.028	0.000	0.000	0.018	0.001
Ta	0.002	0.002	0.003	0.008	0.003	0.005	0.012	0.009	0.007	0.028	0.001	0.002	0.010	0.003
Total	2.000	2.000	1.999	1.999	1.999	2.000	1.998	1.999	1.999	1.998	2.000	2.000	1.996	2.000
Sn end	99.882	99.881	99.760	99.456	99.742	99.616	99.127	99.185	99.373	95.940	99.917	99.856	98.246	99.717
FeMn end	0.032	0.023	0.045	0.146	0.046	0.105	0.142	0.233	0.167	1.229	0.040	0.032	0.334	0.067
NbTa end	0.087	0.095	0.195	0.399	0.211	0.279	0.731	0.582	0.460	2.832	0.043	0.112	1.420	0.216
Nb+Ta	0.002	0.002	0.004	0.008	0.004	0.006	0.015	0.012	0.009	0.057	0.001	0.002	0.028	0.004
Fe+Mn	0.001	0.000	0.001	0.003	0.001	0.002	0.003	0.005	0.003	0.025	0.001	0.001	0.007	0.001
Comments:	GA & GB same grain black brown			GE & GF same grain colourless brown		GN & GO same grain			CA - CC same grain			dark brown brown colourless		
	associated with manganocolumbite													

Cassiterite

	Big Whopper pegmatite 97-186vii							Big Whopper 97-198		
	AA	AB	AC	AD	AE	AG	AI	GF	GG	
SnO2	99.21	99.51	99.50	98.95	98.51	98.53	99.24	99.26	99.71	
FeO	0.10	0.05	0.08	0.06	0.08	0.23	0.09	0.05	0.05	
MnO	0.01	0.00	0.01	0.01	0.04	0.00	0.00	0.03	0.01	
Nb2O5	0.06	0.05	0.04	0.04	0.25	0.09	0.02	0.13	0.07	
Ta2O5	0.62	0.40	0.56	0.61	0.70	1.32	0.37	0.50	0.33	
Total	99.82	99.92	100.06	99.56	99.21	99.85	99.61	99.96	100.18	
Structural formulae based on 4 oxygens										
Sn	1.986	1.991	1.988	1.987	1.978	1.970	1.991	1.986	1.991	
Fe	0.004	0.002	0.003	0.003	0.003	0.010	0.004	0.002	0.002	
Mn	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.000	
Nb	0.001	0.001	0.001	0.001	0.006	0.002	0.000	0.003	0.002	
Ta	0.008	0.005	0.008	0.008	0.010	0.018	0.005	0.007	0.004	
Total	2.000	1.999	2.000	1.999	1.999	2.000	2.001	1.999	2.000	
Sn end	99.302	99.559	99.403	99.385	98.986	98.517	99.524	99.355	99.558	
FeMn end	0.212	0.113	0.174	0.152	0.250	0.478	0.202	0.160	0.136	
NbTa end	0.486	0.328	0.423	0.463	0.764	1.005	0.274	0.485	0.305	
Nb+Ta	0.010	0.007	0.008	0.009	0.015	0.020	0.005	0.010	0.006	
Fe+Mn	0.004	0.002	0.003	0.003	0.005	0.010	0.004	0.003	0.003	
Comments:	AA - AC same grain		AD & AE same grain light dark colourless				GF & GG same grain brown brown			

Cassiterite

	School of Fish 97-264									Bob's pegmatite 97-BP1				
	HA	HB	HR	HH	HI	HJ	HN	HO	HQ	BH	BI	BJ	BO	BP
SnO2	100.18	100.15	100.19	100.43	92.85	100.80	96.98	98.10	96.54	94.66	96.72	95.25	99.63	98.96
FeO	0.01	0.03	0.01	0.07	0.72	0.00	0.59	0.36	0.63	0.88	0.50	0.68	0.07	0.13
MnO	0.01	0.00	0.00	0.00	0.35	0.00	0.01	0.02	0.01	0.06	0.04	0.04	0.00	0.01
Nb2O5	0.00	0.11	0.00	0.02	1.69	0.03	0.19	0.11	0.17	0.60	0.30	0.47	0.05	0.05
Ta2O5	0.10	0.19	0.12	0.36	4.74	0.11	3.04	1.93	3.01	4.33	2.58	3.42	0.38	0.58
Total	100.30	100.48	100.32	100.88	100.34	100.94	100.80	100.52	100.36	100.53	100.14	99.85	100.13	99.72
Structural formulae based on 4 oxygens														
Sn	1.998	1.993	1.998	1.992	1.850	1.997	1.931	1.956	1.930	1.890	1.936	1.913	1.991	1.986
Fe	0.000	0.001	0.000	0.003	0.030	0.000	0.024	0.015	0.026	0.037	0.021	0.028	0.003	0.005
Mn	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.001	0.000	0.003	0.002	0.002	0.000	0.000
Nb	0.000	0.003	0.000	0.001	0.038	0.001	0.004	0.002	0.004	0.014	0.007	0.011	0.001	0.001
Ta	0.001	0.003	0.002	0.005	0.064	0.001	0.041	0.026	0.041	0.059	0.035	0.047	0.005	0.008
Total	2.000	1.999	2.000	2.000	1.997	1.999	2.001	2.001	2.002	2.002	2.001	2.001	2.000	2.001
Sn end	99.893	99.685	99.903	99.586	92.628	99.891	96.481	97.775	96.422	94.418	96.783	95.624	99.551	99.259
FeMn end	0.038	0.056	0.015	0.148	2.238	0.000	1.242	0.793	1.330	1.962	1.117	1.502	0.136	0.293
NbTa end	0.069	0.259	0.082	0.267	5.134	0.109	2.277	1.432	2.248	3.620	2.100	2.874	0.313	0.449
Nb+Ta	0.001	0.005	0.002	0.005	0.103	0.002	0.046	0.029	0.045	0.072	0.042	0.057	0.006	0.009
Fe+Mn	0.001	0.001	0.000	0.003	0.045	0.000	0.025	0.016	0.027	0.039	0.022	0.030	0.003	0.006
Comments:	HA, HB & HR same grain few inclusions			HH - HJ same grain			HN & HO same grain mantles ferrotantalite			BO & BP same grain				

Cassiterite

	Bob's pegmatite 97-BP2			Bob's peg. 97-BP3				Bob's pegmatite 97-BP3						
	AA	AB	BG	RA	RC	RD	RE	RF	RG	QA	QH	QI	QK	QJ
SnO2	95.11	98.04	97.46	98.15	97.04	98.69	97.71	97.02	98.43	99.54	100.25	100.40	94.68	99.32
FeO	0.65	0.23	0.33	0.09	0.29	0.07	0.13	0.32	0.15	0.15	0.06	0.05	0.74	0.17
MnO	0.07	0.04	0.02	0.00	0.02	0.00	0.01	0.02	0.02	0.00	0.01	0.01	0.06	0.02
Nb2O5	0.30	0.13	0.11	0.13	0.13	0.07	0.08	0.15	0.26	0.28	0.08	0.06	0.50	0.68
Ta2O5	3.62	1.42	1.65	0.35	1.53	0.44	0.77	1.51	2.09	0.45	0.29	0.39	3.74	0.22
Total	99.75	99.86	99.57	98.73	99.02	99.27	98.69	99.01	100.95	100.43	100.70	100.91	99.72	100.41
Structural formulae based on 4 oxygens														
Sn	1.914	1.966	1.961	1.988	1.963	1.989	1.982	1.963	1.954	1.981	1.991	1.991	1.905	1.973
Fe	0.027	0.010	0.014	0.004	0.012	0.003	0.005	0.013	0.006	0.006	0.003	0.002	0.031	0.007
Mn	0.003	0.002	0.001	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.003	0.001
Nb	0.007	0.003	0.003	0.003	0.003	0.001	0.002	0.003	0.006	0.006	0.002	0.001	0.011	0.015
Ta	0.050	0.019	0.023	0.005	0.021	0.006	0.011	0.021	0.028	0.006	0.004	0.005	0.051	0.003
Total	2.001	2.000	2.001	2.000	2.001	2.000	2.000	2.001	1.995	2.000	2.000	2.000	2.001	1.999
Sn end	95.661	98.314	98.005	99.402	98.126	99.471	99.093	98.078	97.936	99.050	99.557	99.554	95.173	98.691
FeMn end	1.512	0.567	0.739	0.206	0.673	0.150	0.279	0.715	0.353	0.326	0.154	0.119	1.695	0.396
NbTa end	2.827	1.119	1.256	0.391	1.201	0.379	0.628	1.207	1.711	0.624	0.288	0.327	3.132	0.913
Nb+Ta	0.057	0.022	0.025	0.008	0.024	0.008	0.013	0.024	0.034	0.012	0.006	0.007	0.063	0.018
Fe+Mn	0.030	0.011	0.015	0.004	0.013	0.003	0.006	0.014	0.007	0.007	0.003	0.002	0.034	0.008
Comments:	AA & AB same grain			brown		RD & RE same grain			QH & QI same grain brown					

Cassiterite

	Big Whopper pegmatite 97-BW2				Big Whopper peg. 97-BW3			Whopper 97-BW4
	LA	LB	LC	LD	BA	BB	BF	LK
SnO2	97.39	98.50	99.64	99.49	99.04	99.64	99.48	100.06
FeO	0.28	0.13	0.04	0.01	0.04	0.01	0.01	0.00
MnO	0.04	0.02	0.01	0.00	0.12	0.01	0.01	0.02
Nb2O5	0.28	0.16	0.03	0.01	0.22	0.02	0.05	0.00
Ta2O5	1.28	0.68	0.22	0.10	0.83	0.11	0.11	0.11
Total	99.27	99.47	99.94	99.61	99.87	99.75	99.59	100.18
Structural formulae based on 4 oxygens								
Sn	1.963	1.981	1.994	1.998	1.976	1.997	1.996	1.998
Fe	0.012	0.005	0.002	0.000	0.002	0.000	0.001	0.000
Mn	0.002	0.001	0.000	0.000	0.005	0.000	0.000	0.001
Nb	0.006	0.004	0.001	0.000	0.005	0.000	0.001	0.000
Ta	0.018	0.009	0.003	0.001	0.011	0.002	0.002	0.001
Total	2.001	2.000	2.000	2.000	1.999	2.000	2.000	2.000
Sn end	98.128	99.051	99.725	99.903	98.852	99.863	99.821	99.896
FeMn end	0.671	0.304	0.088	0.019	0.334	0.036	0.042	0.032
NbTa end	1.201	0.645	0.187	0.078	0.814	0.101	0.137	0.072
Nb+Ta	0.024	0.013	0.004	0.002	0.016	0.002	0.003	0.001
Fe+Mn	0.013	0.006	0.002	0.000	0.007	0.001	0.001	0.001
Comments:	LA & LB same grain				all colourless			colourless few tiny inclusions

Cassiterite

Big Whopper								
97-BW5								
	HO	HP	HQ	HR	HS	HU	HV	HW
SnO2	99.40	98.55	99.38	99.50	93.97	94.76	99.30	94.66
FeO	0.13	0.16	0.07	0.01	0.79	0.70	0.07	0.83
MnO	0.02	0.00	0.00	0.00	0.12	0.08	0.01	0.10
Nb2O5	0.05	0.13	0.07	0.04	0.96	0.95	0.03	1.87
Ta2O5	0.62	0.53	0.22	0.15	3.80	3.46	0.28	2.58
Total	100.22	99.37	99.74	99.71	99.64	99.95	99.69	100.04
Structural formulae based on 4 oxygens								
Sn	1.985	1.984	1.993	1.996	1.888	1.898	1.993	1.884
Fe	0.005	0.007	0.003	0.000	0.033	0.029	0.003	0.035
Mn	0.001	0.000	0.000	0.000	0.005	0.003	0.001	0.004
Nb	0.001	0.003	0.002	0.001	0.022	0.022	0.001	0.042
Ta	0.008	0.007	0.003	0.002	0.052	0.047	0.004	0.035
Total	2.001	2.001	2.000	1.999	2.001	1.999	2.001	2.000
Sn end	99.214	99.159	99.628	99.825	94.388	94.918	99.597	94.198
FeMn end	0.308	0.329	0.143	0.023	1.914	1.643	0.179	1.944
NbTa end	0.477	0.512	0.229	0.152	3.698	3.440	0.224	3.859
Nb+Ta	0.010	0.010	0.005	0.003	0.074	0.069	0.004	0.077
Fe+Mn	0.006	0.007	0.003	0.000	0.038	0.033	0.004	0.039
Comments:	HO & HP same grain colourless		HQ - HS same grain colourless brown brown			HV & HW same grain brown dark brown		
			large euhedral zoned crystals with ferrocolumbite inclusions					

Cassiterite

	Big Whopper pegmatite 97-BW6				Big Whopper pegmatite 97-BW7B										
	PA	PB	PC	PD	JE	JF	JH	LE	XX1	XX2	XX3	XX4	XX5	XX6	
SnO2	96.19	99.32	98.52	89.58	98.13	96.60	96.88	98.57	98.87	97.64	97.90	97.03	98.94	98.89	
FeO	0.23	0.03	0.02	0.46	0.20	0.31	0.33	0.15	0.06	0.18	0.14	0.26	0.16	0.14	
MnO	0.26	0.00	0.02	0.77	0.01	0.08	0.06	0.01	0.00	0.02	0.02	0.06	0.00	0.02	
Nb2O5	0.87	0.05	0.01	1.87	0.08	0.43	0.34	0.07	0.04	0.12	0.11	0.32	0.04	0.05	
Ta2O5	2.20	0.22	0.19	5.75	1.12	1.93	2.01	0.96	0.34	1.02	0.80	1.83	0.87	0.59	
Total	99.76	99.61	98.76	98.43	99.54	99.34	99.62	99.76	99.30	98.98	98.98	99.51	100.00	99.69	
Structural formulae based on 4 oxygens															
Sn	1.927	1.994	1.995	1.820	1.974	1.946	1.948	1.978	1.992	1.975	1.979	1.952	1.981	1.985	
Fe	0.010	0.001	0.001	0.020	0.008	0.013	0.014	0.006	0.003	0.008	0.006	0.011	0.007	0.006	
Mn	0.011	0.000	0.001	0.033	0.000	0.003	0.003	0.000	0.000	0.001	0.001	0.003	0.000	0.001	
Nb	0.020	0.001	0.000	0.043	0.002	0.010	0.008	0.002	0.001	0.003	0.003	0.007	0.001	0.001	
Ta	0.030	0.003	0.003	0.080	0.015	0.026	0.028	0.013	0.005	0.014	0.011	0.025	0.012	0.008	
Total	1.998	2.000	2.000	1.996	2.000	1.999	2.000	2.000	2.000	2.000	2.000	1.999	2.000	2.001	
Sn end	98.128	98.128	98.128	98.128	98.704	97.368	97.406	98.923	99.595	98.749	98.974	97.684	99.035	99.203	
FeMn end	0.671	0.671	0.671	0.671	0.433	0.816	0.837	0.339	0.129	0.410	0.342	0.688	0.332	0.339	
NbTa end	1.201	1.201	1.201	1.201	0.864	1.815	1.757	0.738	0.276	0.842	0.684	1.628	0.634	0.458	
Nb+Ta	0.050	0.004	0.003	0.123	0.017	0.036	0.035	0.015	0.006	0.017	0.014	0.033	0.013	0.009	
Fe+Mn	0.021	0.001	0.002	0.053	0.009	0.016	0.017	0.007	0.003	0.008	0.007	0.014	0.007	0.007	
Comments:	PA & PB same grain light brown		PC & PD same grain light brown dark brown		JE, JF & JH same giant grain as traverse XX brown brown			XX traverse is through a 7700 µm long crystal with an early Ta-poor unzoned part and a later oscillatory zoned Ta-rich part							

Cassiterite

Big Whopper pegmatite																
97-BW7B																
	XX7	XX8	XX9	XX10	XX11	XX12	XX13	XX14	XX15	XX16	XX17	XX18	XX19	XX20	XX21	XX22
SnO2	99.14	98.86	98.65	98.86	99.30	99.30	99.22	99.33	99.18	98.53	96.21	96.45	96.72	96.05	94.63	94.89
FeO	0.06	0.05	0.02	0.13	0.01	0.02	0.04	0.03	0.02	0.01	0.36	0.32	0.32	0.45	0.60	0.52
MnO	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.07	0.07	0.06	0.07	0.15	0.14
Nb2O5	0.06	0.06	0.02	0.06	0.01	0.00	0.01	0.02	0.00	0.06	0.71	0.61	0.66	0.99	0.96	0.92
Ta2O5	0.40	0.35	0.22	0.24	0.10	0.18	0.05	0.13	0.22	0.10	1.92	1.63	1.40	1.94	3.21	2.97
Total	99.66	99.34	98.94	99.29	99.42	99.50	99.31	99.51	99.43	98.70	99.26	99.08	99.15	99.50	99.55	99.43
Structural formulae based on 4 oxygens																
Sn	1.990	1.991	1.995	1.991	1.998	1.997	1.998	1.996	1.996	1.996	1.938	1.946	1.949	1.928	1.902	1.909
Fe	0.002	0.002	0.001	0.005	0.001	0.001	0.002	0.001	0.001	0.001	0.015	0.014	0.013	0.019	0.025	0.022
Mn	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.003	0.002	0.003	0.006	0.006
Nb	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.016	0.014	0.015	0.022	0.022	0.021
Ta	0.005	0.005	0.003	0.003	0.001	0.002	0.001	0.002	0.003	0.001	0.026	0.022	0.019	0.027	0.044	0.041
Total	2.000	2.000	2.000	2.001	2.000	2.000	2.001	2.000	2.000	2.000	1.998	1.999	1.999	1.999	1.999	1.999
Sn end	99.520	99.545	99.739	99.495	99.896	99.833	99.881	99.819	99.782	99.824	96.964	97.357	97.493	96.443	95.109	95.510
FeMn end	0.135	0.146	0.081	0.266	0.027	0.044	0.076	0.068	0.068	0.036	0.911	0.828	0.792	1.107	1.593	1.410
NbTa end	0.345	0.309	0.179	0.239	0.077	0.122	0.043	0.113	0.150	0.140	2.125	1.815	1.714	2.450	3.298	3.080
Nb+Ta	0.007	0.006	0.004	0.005	0.002	0.002	0.001	0.002	0.003	0.003	0.042	0.036	0.034	0.049	0.066	0.062
Fe+Mn	0.003	0.003	0.002	0.005	0.001	0.001	0.002	0.001	0.001	0.001	0.018	0.017	0.016	0.022	0.032	0.028

Comments:

XX traverse is through a 7700 µm long crystal
with an early Ta-poor unzoned part and
a later oscillatory zoned Ta-rich part

Cassiterite

Big Whopper pegmatite																
97-BW7B																
	XX23	XX24	XX25	XX26	XX27	XX28	XX29	XX30	XX31	XX32	XX33	XX34	XX35	XX36	XX37	XX38
SnO2	95.00	94.22	94.60	94.61	95.28	94.39	94.83	93.73	94.80	93.62	95.98	96.20	97.55	97.37	95.71	97.00
FeO	0.42	0.51	0.62	0.53	0.47	0.60	0.54	0.72	0.58	0.62	0.47	0.35	0.29	0.28	0.51	0.25
MnO	0.12	0.11	0.16	0.16	0.12	0.15	0.15	0.17	0.13	0.15	0.10	0.09	0.02	0.02	0.12	0.04
Nb2O5	0.73	0.67	0.87	0.77	0.61	0.92	0.68	1.00	0.63	1.08	0.78	0.74	0.70	0.59	1.47	0.20
Ta2O5	2.46	2.95	3.40	3.21	2.89	3.41	3.28	4.06	3.37	3.53	2.40	1.98	0.91	1.11	1.48	1.42
Total	98.74	98.46	99.65	99.28	99.36	99.46	99.47	99.67	99.51	98.99	99.72	99.35	99.46	99.37	99.29	98.91
Structural formulae based on 4 oxygens																
Sn	1.925	1.916	1.901	1.908	1.921	1.900	1.910	1.883	1.909	1.892	1.925	1.936	1.958	1.958	1.920	1.964
Fe	0.018	0.022	0.026	0.022	0.020	0.025	0.023	0.030	0.025	0.026	0.020	0.015	0.012	0.012	0.022	0.011
Mn	0.005	0.005	0.007	0.007	0.005	0.006	0.006	0.007	0.006	0.006	0.004	0.004	0.001	0.001	0.005	0.002
Nb	0.017	0.016	0.020	0.018	0.014	0.021	0.016	0.023	0.014	0.025	0.018	0.017	0.016	0.013	0.033	0.005
Ta	0.034	0.041	0.047	0.044	0.040	0.047	0.045	0.056	0.046	0.049	0.033	0.027	0.012	0.015	0.020	0.020
Total	1.999	1.999	2.000	1.999	1.999	1.999	1.999	1.999	2.000	1.998	1.999	1.998	1.999	1.999	2.000	2.000
Sn end	96.298	95.862	95.028	95.452	96.070	95.031	95.520	94.202	95.450	94.701	96.291	96.880	97.948	97.935	95.994	98.184
FeMn end	1.162	1.315	1.658	1.460	1.249	1.583	1.451	1.879	1.516	1.629	1.183	0.915	0.634	0.635	1.324	0.608
NbTa end	2.540	2.823	3.313	3.088	2.682	3.385	3.029	3.920	3.034	3.670	2.526	2.205	1.417	1.430	2.682	1.208
Nb+Ta	0.051	0.056	0.066	0.062	0.054	0.068	0.061	0.078	0.061	0.073	0.051	0.044	0.028	0.029	0.054	0.024
Fe+Mn	0.023	0.026	0.033	0.029	0.025	0.032	0.029	0.038	0.030	0.033	0.024	0.018	0.013	0.013	0.026	0.012

Comments:

XX traverse is through a 7700 µm long crystal
with an early Ta-poor unzoned part and
a later oscillatory zoned Ta-rich part

Cassiterite

Big Whopper pegmatite													
97-BW7B													
	XX39	XX40	XX41	XX42	XX43	XX44	XX45	XX46	XX47	XX48	XX49	XX50	XX51
SnO2	94.45	96.16	96.72	97.65	94.52	98.59	96.25	93.00	97.03	96.64	98.68	98.80	98.26
FeO	0.63	0.39	0.35	0.15	0.62	0.16	0.43	0.77	0.39	0.33	0.17	0.04	0.12
MnO	0.12	0.05	0.05	0.00	0.13	0.00	0.05	0.12	0.02	0.04	0.02	0.01	0.01
Nb2O5	0.93	0.81	0.76	0.07	0.81	0.04	1.40	1.22	0.17	1.13	0.56	0.00	0.11
Ta2O5	3.38	1.82	1.35	0.73	3.42	0.87	1.21	3.68	1.93	0.97	0.46	0.13	0.66
Total	99.51	99.24	99.23	98.59	99.50	99.66	99.33	98.79	99.54	99.10	99.89	98.98	99.17
Structural formulae based on 4 oxygens													
Sn	1.900	1.936	1.947	1.982	1.902	1.981	1.930	1.882	1.953	1.944	1.972	1.997	1.983
Fe	0.027	0.016	0.015	0.006	0.026	0.007	0.018	0.033	0.016	0.014	0.007	0.001	0.005
Mn	0.005	0.002	0.002	0.000	0.005	0.000	0.002	0.005	0.001	0.001	0.001	0.001	0.001
Nb	0.021	0.019	0.017	0.002	0.018	0.001	0.032	0.028	0.004	0.026	0.013	0.000	0.003
Ta	0.046	0.025	0.018	0.010	0.047	0.012	0.016	0.051	0.026	0.013	0.006	0.002	0.009
Total	1.999	1.998	2.000	2.000	1.999	2.000	1.998	1.999	2.001	1.998	1.999	2.001	2.000
Sn end	95.034	96.887	97.361	99.099	95.146	99.027	96.579	94.153	97.616	97.281	98.658	99.808	99.142
FeMn end	1.592	0.935	0.848	0.319	1.580	0.327	1.003	1.906	0.870	0.765	0.399	0.100	0.275
NbTa end	3.373	2.177	1.791	0.582	3.274	0.647	2.418	3.941	1.514	1.954	0.943	0.092	0.583
Nb+Ta	0.067	0.044	0.036	0.012	0.065	0.013	0.048	0.079	0.030	0.039	0.019	0.002	0.012
Fe+Mn	0.032	0.019	0.017	0.006	0.032	0.007	0.020	0.038	0.017	0.015	0.008	0.002	0.006

Comments:

XX traverse is through a 7700 μm long
crystal with an early Ta-poor unzoned
part and a later oscillatory zoned Ta-rich part

Cassiterite

Big Whopper pegmatite															
97-BW8															
	FA	FB	FH	FI	FJ	EA	EB	EC	ED	EE	EF	EG	EI	EJ	EK
SnO2	95.10	98.93	97.89	96.86	96.57	97.99	98.02	99.75	95.94	95.89	99.13	99.38	99.39	94.62	99.77
FeO	0.72	0.12	0.20	0.33	0.17	0.19	0.02	0.01	0.07	0.06	0.02	0.01	0.05	0.63	0.01
MnO	0.02	0.01	0.05	0.10	0.17	0.10	0.08	0.00	0.29	0.31	0.02	0.00	0.00	0.19	0.00
Nb2O5	0.40	0.10	0.19	0.37	1.05	0.51	0.62	0.04	1.40	0.96	0.16	0.03	0.05	0.83	0.00
Ta2O5	3.58	0.50	1.40	2.40	1.11	1.26	0.57	0.17	1.70	2.12	0.38	0.28	0.22	3.93	0.06
Total	99.82	99.66	99.73	100.05	99.07	100.05	99.31	99.97	99.40	99.34	99.70	99.69	99.70	100.20	99.84
Structural formulae based on 4 oxygens															
Sn	1.912	1.986	1.965	1.940	1.944	1.958	1.971	1.996	1.924	1.929	1.988	1.994	1.994	1.892	1.999
Fe	0.030	0.005	0.008	0.014	0.007	0.008	0.001	0.000	0.003	0.002	0.001	0.001	0.002	0.026	0.000
Mn	0.001	0.000	0.002	0.004	0.007	0.004	0.003	0.000	0.012	0.013	0.001	0.000	0.000	0.008	0.000
Nb	0.009	0.002	0.004	0.008	0.024	0.012	0.014	0.001	0.032	0.022	0.004	0.001	0.001	0.019	0.000
Ta	0.049	0.007	0.019	0.033	0.015	0.017	0.008	0.002	0.023	0.029	0.005	0.004	0.003	0.054	0.001
Total	2.001	2.000	1.999	1.999	1.997	1.999	1.997	1.999	1.994	1.995	1.998	1.999	2.000	1.999	2.000
Sn end	95.540	99.272	98.292	97.048	97.315	97.960	98.698	99.820	96.475	96.667	99.489	99.755	99.692	94.659	99.945
FeMn end	1.551	0.274	0.530	0.894	0.717	0.606	0.205	0.023	0.763	0.782	0.070	0.025	0.107	1.715	0.017
NbTa end	2.909	0.454	1.178	2.059	1.968	1.433	1.097	0.157	2.762	2.551	0.441	0.220	0.201	3.626	0.038
Nb+Ta	0.058	0.009	0.024	0.041	0.039	0.029	0.022	0.003	0.055	0.051	0.009	0.004	0.004	0.072	0.001
Fe+Mn	0.031	0.005	0.011	0.018	0.014	0.012	0.004	0.000	0.015	0.016	0.001	0.001	0.002	0.034	0.000
Comments:	core	rim	core	rim				EB - ED same grain colourless brown			EF & EG same grain colourless dark both colourless brown		EI & EJ same grain		

Cassiterite

Great White North pegmatite 97-GWN2																
	KJ	KK	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HQ	HR	HS
SnO2	99.53	98.97	96.48	95.65	99.02	99.80	94.65	92.73	93.11	100.23	99.66	93.60	93.00	98.13	94.63	97.10
FeO	0.05	0.07	0.03	0.05	0.02	0.05	0.03	0.09	0.14	0.03	0.06	0.07	0.08	0.28	0.64	0.16
MnO	0.02	0.02	0.29	0.37	0.10	0.05	0.54	0.84	0.74	0.01	0.03	0.69	0.72	0.07	0.33	0.21
Nb2O5	0.00	0.03	1.32	1.09	1.02	0.04	1.27	0.90	0.95	0.08	0.08	1.77	1.70	0.89	1.66	0.62
Ta2O5	0.41	0.77	1.78	2.70	0.66	0.91	3.65	5.93	5.38	0.23	0.77	3.91	4.70	1.05	3.34	2.15
Total	100.01	99.86	99.91	99.86	100.82	100.84	100.14	100.49	100.31	100.58	100.60	100.04	100.20	100.42	100.59	100.24
Structural formulae based on 4 oxygens																
Sn	1.992	1.984	1.925	1.914	1.958	1.982	1.890	1.854	1.863	1.993	1.983	1.867	1.855	1.950	1.877	1.938
Fe	0.002	0.003	0.001	0.002	0.001	0.002	0.001	0.004	0.006	0.001	0.002	0.003	0.003	0.012	0.027	0.007
Mn	0.001	0.001	0.012	0.016	0.004	0.002	0.023	0.036	0.032	0.001	0.001	0.029	0.031	0.003	0.014	0.009
Nb	0.000	0.001	0.030	0.025	0.023	0.001	0.029	0.020	0.022	0.002	0.002	0.040	0.039	0.020	0.037	0.014
Ta	0.006	0.011	0.024	0.037	0.009	0.012	0.050	0.081	0.073	0.003	0.010	0.053	0.064	0.014	0.045	0.029
Total	2.000	1.999	1.993	1.993	1.994	1.999	1.992	1.994	1.995	2.000	1.999	1.993	1.991	1.999	2.000	1.997
Sn end	99.578	99.250	96.602	96.019	98.159	99.141	94.849	92.949	93.376	99.671	99.195	93.699	93.158	97.549	93.862	97.058
FeMn end	0.145	0.188	0.678	0.888	0.246	0.201	1.213	1.978	1.867	0.082	0.193	1.616	1.696	0.740	2.016	0.775
NbTa end	0.276	0.563	2.720	3.094	1.595	0.658	3.938	5.073	4.757	0.247	0.612	4.684	5.146	1.711	4.121	2.167
Nb+Ta	0.006	0.011	0.054	0.062	0.032	0.013	0.078	0.101	0.095	0.005	0.012	0.093	0.102	0.034	0.082	0.043
Fe+Mn	0.003	0.004	0.014	0.018	0.005	0.004	0.024	0.039	0.037	0.002	0.004	0.032	0.034	0.015	0.040	0.015
Comments:	KJ & KK same grain		HA & HB same grain brown brown		HC & HD same grain colourless brown		HE & HF same grain brown brown			HI - HK same grain colourless colourless dark brown dark brown						
some cassiterite in this sample is strongly zoned																

Cassiterite

Great White North pegmatite				
97-GWN3				
	FG	FK	FL	FM
SnO2	99.40	100.21	100.13	100.02
FeO	0.18	0.00	0.01	0.04
MnO	0.01	0.01	0.02	0.04
Nb2O5	0.21	0.01	0.04	0.29
Ta2O5	0.96	0.07	0.27	0.39
Total	100.76	100.30	100.45	100.77
Structural formulae based on 4 oxygens				
Sn	1.974	1.998	1.994	1.984
Fe	0.007	0.000	0.000	0.002
Mn	0.001	0.001	0.001	0.002
Nb	0.005	0.000	0.001	0.006
Ta	0.013	0.001	0.004	0.005
Total	2.000	2.000	1.999	1.999
Sn end	98.717	99.913	99.728	99.256
FeMn end	0.400	0.025	0.046	0.153
NbTa end	0.883	0.062	0.225	0.591
Nb+Ta	0.018	0.001	0.005	0.012
Fe+Mn	0.008	0.001	0.001	0.003
Comments:	dark brown	colourless		
	dark brown			
	some grains			
	contain tiny inclusions			

Cassiterite

	Gt. White Nth. 97-GWN3		Great White North 97-GWN4					Great White North 97-GWN5		
	FN	FO	RA	RB	RC	RF	RG	KO	KP	KQ
SnO2	99.01	100.60	97.82	96.89	98.92	97.53	98.42	95.61	95.95	96.35
FeO	0.07	0.01	0.35	0.43	0.23	0.45	0.37	0.39	0.37	0.31
MnO	0.09	0.00	0.06	0.12	0.03	0.08	0.06	0.18	0.12	0.10
Nb2O5	0.41	0.04	1.03	1.00	0.23	1.10	0.92	1.49	1.38	0.97
Ta2O5	0.77	0.24	0.79	1.44	0.92	0.98	0.75	1.81	1.65	1.94
Total	100.34	100.89	100.05	99.87	100.33	100.13	100.52	99.47	99.47	99.68
Structural formulae based on 4 oxygens										
Sn	1.972	1.995	1.949	1.936	1.972	1.941	1.952	1.915	1.922	1.931
Fe	0.003	0.000	0.015	0.018	0.010	0.019	0.016	0.016	0.016	0.013
Mn	0.004	0.000	0.003	0.005	0.001	0.003	0.002	0.007	0.005	0.004
Nb	0.009	0.001	0.023	0.023	0.005	0.025	0.021	0.034	0.031	0.022
Ta	0.010	0.003	0.011	0.020	0.012	0.013	0.010	0.025	0.023	0.027
Total	1.998	1.999	2.000	2.001	2.001	2.002	2.001	1.997	1.997	1.997
Sn end	98.680	99.768	97.442	96.735	98.565	96.994	97.559	95.883	96.264	96.698
FeMn end	0.339	0.025	0.867	1.157	0.553	1.104	0.900	1.187	1.039	0.868
NbTa end	0.981	0.207	1.692	2.108	0.882	1.902	1.541	2.930	2.697	2.434
Nb+Ta	0.020	0.004	0.034	0.042	0.018	0.038	0.031	0.059	0.054	0.049
Fe+Mn	0.007	0.000	0.017	0.023	0.011	0.022	0.018	0.024	0.021	0.017
Comments:	brown		RA - RC		RF & RG		KO - KQ			
	colourless		same grain		same grain		same grain			
			brown				many tiny			
							wodginite inclusions			

Cassiterite

Great White North pegmatite											
97-GWN6											
	MA	MB	MF	MG	MH	MI	MJ	MK	ML	MM	MQ
SnO2	99.22	96.42	95.30	95.73	99.43	99.32	97.76	94.83	97.37	97.23	98.33
FeO	0.01	0.15	0.17	0.29	0.06	0.02	0.09	0.42	0.33	0.07	0.14
MnO	0.01	0.16	0.32	0.18	0.00	0.02	0.06	0.18	0.02	0.09	0.01
Nb2O5	0.05	0.68	1.11	1.19	0.03	0.06	0.07	1.26	0.78	0.60	0.07
Ta2O5	0.16	1.49	2.17	1.30	0.37	0.42	1.21	2.30	0.72	0.92	0.82
Total	99.45	98.89	99.07	98.69	99.89	99.82	99.18	98.99	99.22	98.90	99.37
Structural formulae based on 4 oxygens											
Sn	1.995	1.948	1.921	1.934	1.992	1.991	1.974	1.912	1.958	1.964	1.981
Fe	0.000	0.006	0.007	0.012	0.003	0.001	0.004	0.018	0.014	0.003	0.006
Mn	0.000	0.007	0.014	0.008	0.000	0.001	0.003	0.008	0.001	0.004	0.001
Nb	0.001	0.015	0.025	0.027	0.001	0.001	0.002	0.029	0.018	0.014	0.002
Ta	0.002	0.021	0.030	0.018	0.005	0.006	0.017	0.032	0.010	0.013	0.011
Total	2.000	1.998	1.921	1.999	1.992	1.999	1.999	1.998	2.000	1.997	2.000
Sn end	99.796	97.533	96.191	96.746	99.583	99.586	98.770	95.710	97.885	98.345	99.027
FeMn end	0.040	0.666	1.046	0.995	0.128	0.063	0.324	1.273	0.732	0.335	0.330
NbTa end	0.164	1.801	2.763	2.259	0.289	0.351	0.907	3.017	1.383	1.319	0.643
Nb+Ta	0.003	0.036	0.055	0.045	0.006	0.007	0.018	0.060	0.028	0.026	0.013
Fe+Mn	0.001	0.013	0.021	0.020	0.003	0.001	0.006	0.025	0.015	0.007	0.007
Comments:	MA & MB same grain colourless			MJ & MK same grain colourless				ML & MM same grain light brown dark brown			

Cassiterite

	Pegmatite 7 97-P7-1						Pegmatite 10 97-P10-1											
	SA	SB	SC	SJ	SS	SW	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VT	VU	VV
SnO2	95.57	91.28	94.42	99.22	98.10	93.02	99.76	98.06	98.50	97.53	97.55	98.20	97.80	97.88	99.13	97.04	97.54	97.94
FeO	0.70	1.31	0.82	0.13	0.30	1.10	0.04	0.30	0.25	0.36	0.37	0.27	0.32	0.39	0.16	0.41	0.32	0.30
MnO	0.02	0.06	0.03	0.01	0.00	0.05	0.00	0.00	0.02	0.03	0.03	0.01	0.01	0.02	0.00	0.03	0.00	0.02
Nb2O5	0.30	0.80	0.33	0.05	0.11	0.62	0.03	0.13	0.11	0.15	0.25	0.14	0.09	0.33	0.12	0.17	0.12	0.11
Ta2O5	3.60	6.64	4.15	0.87	1.48	5.42	0.41	1.29	1.26	2.39	2.15	1.51	1.68	1.79	0.94	1.94	1.72	1.45
Total	100.17	100.09	99.75	100.28	99.99	100.21	100.24	99.77	100.13	100.45	100.36	100.13	99.91	100.41	100.35	99.59	99.70	99.81
Structural formulae based on 4 oxygens																		
Sn	1.915	1.834	1.901	1.981	1.965	1.865	1.991	1.968	1.970	1.947	1.948	1.964	1.962	1.952	1.977	1.953	1.960	1.965
Fe	0.029	0.055	0.035	0.005	0.012	0.046	0.002	0.013	0.010	0.015	0.016	0.011	0.014	0.016	0.007	0.017	0.014	0.012
Mn	0.001	0.003	0.001	0.000	0.000	0.002	0.000	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.001
Nb	0.007	0.018	0.007	0.001	0.002	0.014	0.001	0.003	0.002	0.003	0.006	0.003	0.002	0.008	0.003	0.004	0.003	0.003
Ta	0.049	0.091	0.057	0.012	0.020	0.074	0.006	0.018	0.017	0.033	0.029	0.021	0.023	0.024	0.013	0.027	0.024	0.020
Total	2.001	2.002	2.002	2.000	2.001	2.002	1.999	2.001	2.001	1.999	2.000	2.000	2.001	2.001	2.000	2.002	2.000	2.001
Sn end	95.702	91.646	94.979	99.059	98.236	93.162	99.595	98.346	98.463	97.396	97.404	98.229	98.045	97.547	98.882	97.545	98.005	98.223
FeMn end	1.506	2.899	1.802	0.291	0.628	2.428	0.101	0.625	0.554	0.811	0.849	0.579	0.705	0.860	0.343	0.930	0.676	0.657
NbTa end	2.791	5.455	3.219	0.649	1.136	4.410	0.304	1.029	0.983	1.792	1.746	1.192	1.250	1.594	0.775	1.525	1.319	1.121
Nb+Ta	0.056	0.109	0.064	0.013	0.023	0.088	0.006	0.021	0.020	0.036	0.035	0.024	0.025	0.032	0.016	0.031	0.026	0.022
Fe+Mn	0.030	0.058	0.036	0.006	0.013	0.049	0.002	0.013	0.011	0.016	0.017	0.012	0.014	0.017	0.007	0.019	0.014	0.013
Comments:	SA - SC same grain		close association with ferrowodginite				pale brown			VH - VL same large grain colourless			VM & VN same grain		VO & VP same grain		VU & VV same grain brown	
contains inclusions of ferrowodginite, ferrotapiolite & microlite																		

Cassiterite

Pegmatite 10															
97-P10-1															
	WA	WB	WL	WM	WN	WO	JA	JB	JC	JF	JD	JE	JG	JH	
SnO2	98.14	97.88	95.93	97.86	95.86	99.05	99.55	98.54	99.29	97.46	91.28	98.97	93.48	95.83	
FeO	0.19	0.33	0.52	0.24	0.39	0.08	0.06	0.17	0.05	0.25	0.44	0.09	0.75	0.58	
MnO	0.00	0.01	0.03	0.00	0.14	0.01	0.00	0.02	0.01	0.02	0.67	0.03	0.10	0.01	
Nb2O5	0.17	0.21	0.63	0.17	0.25	0.02	0.02	0.13	0.02	0.10	0.46	0.09	0.31	0.17	
Ta2O5	1.04	1.52	2.38	1.15	3.44	0.55	0.44	0.94	0.43	1.89	7.26	1.05	5.33	2.98	
Total	99.54	99.94	99.49	99.43	100.07	99.71	100.06	99.80	99.79	99.72	100.10	100.23	99.97	99.57	
Structural formulae based on 4 oxygens															
Sn	1.973	1.961	1.930	1.970	1.923	1.988	1.991	1.976	1.991	1.959	1.839	1.977	1.882	1.932	
Fe	0.008	0.014	0.022	0.010	0.016	0.004	0.002	0.007	0.002	0.010	0.018	0.004	0.032	0.024	
Mn	0.000	0.000	0.001	0.000	0.006	0.000	0.000	0.001	0.001	0.001	0.029	0.001	0.004	0.000	
Nb	0.004	0.005	0.014	0.004	0.006	0.001	0.000	0.003	0.000	0.002	0.011	0.002	0.007	0.004	
Ta	0.014	0.021	0.033	0.016	0.047	0.007	0.006	0.013	0.006	0.026	0.100	0.014	0.073	0.041	
Total	2.000	2.001	2.000	2.000	1.998	2.000	2.000	2.000	2.000	1.999	1.996	1.999	1.998	2.001	
Sn end	98.697	98.024	96.500	98.504	96.254	99.404	99.558	98.810	99.567	98.019	92.113	98.917	94.186	96.516	
FeMn end	0.403	0.704	1.148	0.511	1.107	0.196	0.120	0.400	0.124	0.570	2.363	0.263	1.801	1.244	
NbTa end	0.901	1.272	2.352	0.986	2.639	0.400	0.322	0.790	0.308	1.411	5.523	0.820	4.013	2.239	
Nb+Ta	0.018	0.025	0.047	0.020	0.053	0.008	0.006	0.016	0.006	0.028	0.110	0.016	0.080	0.045	
Fe+Mn	0.008	0.014	0.023	0.010	0.022	0.004	0.002	0.008	0.002	0.011	0.047	0.005	0.036	0.025	
Comments:	WA & WB same grain brown	WL & WM same grain							JC & JF same grain	JD & JE same grain	JG & JH same grain				

sample contains many grains of cassiterite & columbite

Cassiterite

Pegmatite 10													
97-P10-1													
	JI	JL	JM	JQ	JR	JS	JT	JW	JX	JY	JZ	KF	KG
SnO2	93.64	98.63	88.06	98.66	99.44	99.62	97.31	98.26	97.31	98.78	97.17	98.94	97.46
FeO	0.32	0.09	0.50	0.21	0.09	0.08	0.42	0.26	0.28	0.22	0.49	0.17	0.08
MnO	0.44	0.04	1.04	0.00	0.01	0.01	0.00	0.00	0.09	0.01	0.01	0.00	0.10
Nb2O5	0.35	0.05	0.91	0.07	0.04	0.04	0.28	0.14	0.12	0.18	0.18	0.03	0.70
Ta2O5	5.13	1.15	9.71	1.07	0.40	0.50	2.13	1.27	2.28	1.12	2.64	0.96	1.34
Total	99.88	99.95	100.22	100.02	99.98	100.24	100.13	99.93	100.08	100.30	100.49	100.10	99.68
Structural formulae based on 4 oxygens													
Sn	1.886	1.976	1.774	1.975	1.990	1.989	1.947	1.969	1.950	1.971	1.940	1.979	1.953
Fe	0.014	0.004	0.021	0.009	0.004	0.003	0.018	0.011	0.012	0.009	0.020	0.007	0.003
Mn	0.019	0.002	0.044	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.001	0.000	0.004
Nb	0.008	0.001	0.021	0.002	0.001	0.001	0.006	0.003	0.003	0.004	0.004	0.001	0.016
Ta	0.070	0.016	0.133	0.015	0.005	0.007	0.029	0.017	0.031	0.015	0.036	0.013	0.018
Total	1.997	1.998	1.994	2.000	2.000	2.000	2.000	2.000	1.999	2.000	2.000	2.000	1.995
Sn end	94.444	98.888	88.973	98.736	99.481	99.443	97.349	98.423	97.536	98.558	96.960	98.956	97.909
FeMn end	1.626	0.268	3.287	0.447	0.195	0.174	0.888	0.553	0.774	0.477	1.045	0.357	0.378
NbTa end	3.930	0.844	7.740	0.817	0.324	0.383	1.763	1.025	1.690	0.964	1.995	0.687	1.714
Nb+Ta	0.078	0.017	0.154	0.016	0.006	0.008	0.035	0.020	0.034	0.019	0.040	0.014	0.034
Fe+Mn	0.032	0.005	0.066	0.009	0.004	0.003	0.018	0.011	0.015	0.010	0.021	0.007	0.008
Comments:	JL & JM same grain				JW & JX same grain				JY & JZ same grain		KF & KG same grain		

sample contains many grains of cassiterite & columbite

Cassiterite

Pegmatite 10													
97-P10-1													
	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM
SnO2	91.16	90.23	95.13	89.18	92.91	96.72	98.04	97.43	96.70	98.42	90.61	91.54	92.37
FeO	0.46	0.47	0.43	0.53	0.61	0.27	0.13	0.12	0.42	0.20	0.42	0.39	0.35
MnO	0.62	0.72	0.18	0.81	0.28	0.13	0.04	0.13	0.02	0.00	0.70	0.64	0.53
Nb2O5	0.50	0.46	0.51	0.63	0.41	0.19	0.10	0.10	0.14	0.05	0.54	0.39	0.45
Ta2O5	6.85	7.84	3.48	8.53	5.61	2.52	1.21	2.22	2.42	1.15	7.43	6.73	6.08
Total	99.60	99.72	99.73	99.68	99.82	99.83	99.51	100.01	99.70	99.81	99.70	99.69	99.78
Structural formulae based on 4 oxygens													
Sn	1.844	1.826	1.913	1.806	1.873	1.943	1.973	1.954	1.945	1.975	1.833	1.851	1.864
Fe	0.020	0.020	0.018	0.022	0.026	0.011	0.005	0.005	0.018	0.009	0.018	0.016	0.015
Mn	0.026	0.031	0.008	0.035	0.012	0.006	0.002	0.006	0.001	0.000	0.030	0.028	0.023
Nb	0.011	0.011	0.012	0.014	0.009	0.004	0.002	0.002	0.003	0.001	0.012	0.009	0.010
Ta	0.095	0.108	0.048	0.118	0.077	0.035	0.017	0.030	0.033	0.016	0.102	0.093	0.084
Total	1.997	1.996	1.998	1.996	1.997	1.999	1.999	1.997	2.000	2.000	1.995	1.997	1.995
Sn end	92.381	91.512	95.741	90.504	93.780	97.211	98.702	97.826	97.260	98.736	91.838	92.700	93.418
FeMn end	2.308	2.534	1.286	2.870	1.885	0.847	0.360	0.538	0.926	0.427	2.413	2.205	1.866
NbTa end	5.311	5.955	2.973	6.626	4.335	1.942	0.938	1.635	1.813	0.836	5.750	5.095	4.716
Nb+Ta	0.106	0.119	0.059	0.132	0.087	0.039	0.019	0.033	0.036	0.017	0.115	0.102	0.094
Fe+Mn	0.046	0.051	0.026	0.057	0.038	0.017	0.007	0.011	0.019	0.009	0.048	0.044	0.037
Comments:	TA - TG same grain as JD & JE						TH - TM same grain as JG & JH deep red						black
sample contains many grains of cassiterite & columbite													

Cassiterite

Pegmatite 10												
97-P10-1												
	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY
SnO2	96.95	97.24	97.53	88.10	98.09	96.85	97.36	98.68	86.82	93.85	87.22	98.98
FeO	0.26	0.36	0.32	0.48	0.16	0.36	0.41	0.07	0.52	0.88	0.53	0.07
MnO	0.05	0.02	0.00	0.99	0.06	0.06	0.00	0.03	1.07	0.01	1.06	0.01
Nb2O5	0.14	0.07	0.22	0.79	0.09	0.11	0.16	0.08	0.82	0.55	0.76	0.00
Ta2O5	2.21	2.06	1.75	9.43	1.51	2.27	1.89	0.96	10.34	4.32	10.08	0.35
Total	99.62	99.75	99.81	99.78	99.91	99.64	99.81	99.81	99.57	99.61	99.64	99.41
Structural formulae based on 4 oxygens												
Sn	1.951	1.955	1.957	1.783	1.967	1.949	1.955	1.979	1.763	1.891	1.770	1.992
Fe	0.011	0.015	0.013	0.020	0.007	0.015	0.017	0.003	0.022	0.037	0.023	0.003
Mn	0.002	0.001	0.000	0.042	0.002	0.003	0.000	0.001	0.046	0.000	0.046	0.000
Nb	0.003	0.002	0.005	0.018	0.002	0.003	0.004	0.002	0.019	0.013	0.017	0.000
Ta	0.030	0.028	0.024	0.130	0.021	0.031	0.026	0.013	0.143	0.059	0.140	0.005
Total	1.998	2.001	2.000	1.994	1.999	2.000	2.001	1.998	1.993	2.001	1.995	2.001
Sn end	97.650	97.705	97.886	89.424	98.406	97.439	97.665	99.049	88.450	94.532	88.714	99.584
FeMn end	0.671	0.799	0.674	3.137	0.460	0.877	0.865	0.205	3.412	1.872	3.421	0.175
NbTa end	1.679	1.495	1.440	7.439	1.133	1.684	1.471	0.746	8.138	3.596	7.865	0.240
Nb+Ta	0.034	0.030	0.029	0.148	0.023	0.034	0.029	0.015	0.162	0.072	0.157	0.005
Fe+Mn	0.013	0.016	0.013	0.063	0.009	0.018	0.017	0.004	0.068	0.037	0.068	0.004
Comments:	TN - TP		TQ - TY same grain as JL & JM									
	same grain		discrete Ta-poor & Ta-rich parts to this grain									
	deep red			pale brown								red
sample contains many grains of cassiterite & columbite												

Cassiterite

Pegmatite 10										
97-P10-2										
	LC	LD	LG	LI	LJ	LK	LO	LR	LS	LW
SnO2	96.88	96.28	96.37	95.98	98.39	99.27	95.86	97.04	97.05	95.70
FeO	0.45	0.35	0.52	0.42	0.24	0.12	0.47	0.23	0.25	0.39
MnO	0.00	0.13	0.03	0.06	0.01	0.01	0.08	0.12	0.12	0.13
Nb2O5	0.17	0.13	0.20	0.12	0.19	0.00	0.28	0.19	0.17	0.21
Ta2O5	2.49	3.18	3.32	3.40	1.33	0.70	3.20	2.54	2.44	3.26
Total	99.99	100.08	100.45	99.98	100.15	100.10	99.89	100.12	100.02	99.69
Structural formulae based on 4 oxygens										
Sn	1.943	1.932	1.926	1.928	1.967	1.985	1.926	1.944	1.946	1.927
Fe	0.019	0.015	0.022	0.018	0.010	0.005	0.020	0.010	0.010	0.016
Mn	0.000	0.006	0.001	0.003	0.000	0.000	0.003	0.005	0.005	0.006
Nb	0.004	0.003	0.005	0.003	0.004	0.000	0.006	0.004	0.004	0.005
Ta	0.034	0.044	0.045	0.047	0.018	0.010	0.044	0.035	0.033	0.045
Total	2.000	1.999	1.999	1.998	2.000	2.000	1.999	1.998	1.998	1.999
Sn end	97.152	96.652	96.341	96.513	98.372	99.250	96.333	97.300	97.369	96.418
FeMn end	0.951	1.025	1.171	1.022	0.510	0.271	1.153	0.752	0.769	1.102
NbTa end	1.897	2.323	2.488	2.465	1.119	0.479	2.514	1.948	1.862	2.479
Nb+Ta	0.038	0.046	0.050	0.049	0.022	0.010	0.050	0.039	0.037	0.050
Fe+Mn	0.019	0.020	0.023	0.020	0.010	0.005	0.023	0.015	0.015	0.022
Comments:	LI & LJ same grain									

Cassiterite

	Pegmatite 10 97-P10-3							Pegmatite 10 97-P10-4											
	NA	NB	NC	NF	NJ	NK	MC	MD	MG	MH	MI	MJ	MK	ML	MO	MP	MQ	MR	
SnO2	98.13	95.62	98.41	97.28	96.15	98.67	96.71	98.09	97.88	97.95	100.32	98.75	90.54	88.16	97.77	95.39	95.06	99.01	
FeO	0.06	0.52	0.25	0.35	0.44	0.23	0.34	0.25	0.27	0.38	0.05	0.11	0.95	1.77	0.29	0.42	0.50	0.10	
MnO	0.10	0.08	0.00	0.00	0.05	0.01	0.08	0.02	0.05	0.01	0.00	0.01	0.35	0.07	0.01	0.14	0.12	0.01	
Nb2O5	0.51	0.53	0.03	0.14	0.54	0.15	0.22	0.28	0.15	0.38	0.04	0.13	0.54	0.77	0.17	0.31	0.78	0.02	
Ta2O5	1.61	3.55	1.46	1.96	2.64	1.10	2.58	1.28	2.14	1.67	0.39	0.80	7.67	9.18	1.48	3.70	3.27	0.62	
Total	100.41	100.29	100.15	99.74	99.82	100.16	99.93	99.91	100.49	100.39	100.80	99.80	100.04	99.96	99.71	99.97	99.73	99.75	
Structural formulae based on 4 oxygens																			
Sn	1.955	1.912	1.969	1.955	1.929	1.972	1.941	1.965	1.953	1.953	1.991	1.980	1.825	1.781	1.964	1.916	1.909	1.987	
Fe	0.002	0.022	0.011	0.015	0.018	0.010	0.014	0.011	0.011	0.016	0.002	0.005	0.040	0.075	0.012	0.018	0.021	0.004	
Mn	0.004	0.004	0.000	0.000	0.002	0.000	0.003	0.001	0.002	0.001	0.000	0.001	0.015	0.003	0.000	0.006	0.005	0.000	
Nb	0.011	0.012	0.001	0.003	0.012	0.003	0.005	0.006	0.003	0.009	0.001	0.003	0.012	0.018	0.004	0.007	0.018	0.000	
Ta	0.022	0.048	0.020	0.027	0.036	0.015	0.035	0.017	0.029	0.023	0.005	0.011	0.105	0.126	0.020	0.051	0.045	0.008	
Total	1.995	1.997	2.000	2.000	1.998	2.000	1.999	2.000	1.998	2.000	2.000	1.999	1.998	2.003	2.000	1.997	1.997	2.000	
Sn end	97.997	95.722	98.439	97.751	96.541	98.589	97.101	98.244	97.712	97.605	99.582	99.058	91.353	88.901	98.170	95.915	95.561	99.326	
FeMn end	0.331	1.258	0.533	0.746	1.029	0.491	0.878	0.566	0.659	0.828	0.110	0.253	2.754	3.900	0.626	1.189	1.306	0.230	
NbTa end	1.671	3.021	1.028	1.503	2.430	0.920	2.021	1.191	1.629	1.567	0.308	0.689	5.893	7.199	1.205	2.896	3.133	0.445	
Nb+Ta	0.033	0.060	0.021	0.030	0.049	0.018	0.040	0.024	0.033	0.031	0.006	0.014	0.118	0.144	0.024	0.058	0.063	0.009	
Fe+Mn	0.007	0.025	0.011	0.015	0.021	0.010	0.018	0.011	0.013	0.017	0.002	0.005	0.055	0.078	0.013	0.024	0.026	0.005	
Comments:	NA - NC same grain contains tiny inclusions				NJ & NK same grain contains ferrowodginite inclusions				MQ & MR same grain note high Ta content of many of these analyses										

Cassiterite

	Pegmatite 10 97-P10-4								Pegmatite 10 97-P10-5					
	EA	EB	EC	ED	EE	EF	EG	EH	WA	WB	WC	WD	WE	WJ
SnO2	98.44	99.06	88.57	95.76	89.93	93.87	89.52	88.24	96.19	93.92	97.02	95.05	98.31	97.99
FeO	0.12	0.04	0.57	0.21	0.45	0.25	0.46	1.69	0.52	0.73	0.39	0.69	0.27	0.26
MnO	0.00	0.01	0.89	0.18	0.79	0.44	0.80	0.06	0.02	0.07	0.00	0.05	0.00	0.00
Nb2O5	0.02	0.00	0.64	0.17	0.55	0.39	0.58	0.74	0.47	0.53	0.42	0.46	0.20	0.13
Ta2O5	0.86	0.24	9.35	2.77	7.89	4.77	8.23	9.16	2.24	4.22	1.72	3.77	1.43	1.49
Total	99.43	99.36	100.02	99.08	99.61	99.71	99.60	99.89	99.43	99.47	99.55	100.02	100.21	99.86
Structural formulae based on 4 oxygens														
Sn	1.982	1.995	1.789	1.939	1.821	1.892	1.814	1.784	1.937	1.895	1.950	1.907	1.964	1.965
Fe	0.005	0.002	0.024	0.009	0.019	0.011	0.019	0.072	0.022	0.031	0.017	0.029	0.011	0.011
Mn	0.000	0.000	0.038	0.008	0.034	0.019	0.035	0.002	0.001	0.003	0.000	0.002	0.000	0.000
Nb	0.000	0.000	0.015	0.004	0.013	0.009	0.013	0.017	0.011	0.012	0.010	0.010	0.004	0.003
Ta	0.012	0.003	0.129	0.038	0.109	0.066	0.114	0.126	0.031	0.058	0.024	0.052	0.019	0.020
Total	1.999	2.000	1.995	1.998	1.996	1.996	1.995	2.001	2.001	2.000	2.000	2.000	2.000	2.000
Sn end	99.142	99.720	89.684	97.069	91.245	94.808	90.924	89.135	96.807	94.784	97.515	95.337	98.240	98.294
FeMn end	0.248	0.113	3.126	0.825	2.659	1.462	2.709	3.710	1.125	1.708	0.833	1.560	0.564	0.536
NbTa end	0.610	0.166	7.190	2.106	6.096	3.729	6.367	7.155	2.068	3.508	1.652	3.102	1.197	1.169
Nb+Ta	0.012	0.003	0.143	0.042	0.122	0.074	0.127	0.143	0.041	0.070	0.033	0.062	0.024	0.023
Fe+Mn	0.005	0.002	0.062	0.016	0.053	0.029	0.054	0.074	0.023	0.034	0.017	0.031	0.011	0.011
Comments:	EA - EG same grain								large grains containing many tiny inclusions core rim core rim					
	mottled grain with ferrotapiolite exsolution discrete Ta-poor & Ta-rich regions													

Cassiterite

Swamp pegmatite														
97-SP1														
	NE	NF	NJ	NK	JE	JF	JL	JP	JS	AA	AB	AK	AV	AW
SnO2	98.85	98.57	98.54	99.03	100.71	97.19	93.43	97.32	99.57	100.03	99.92	100.27	99.91	99.90
FeO	0.01	0.05	0.09	0.01	0.00	0.31	0.50	0.42	0.05	0.01	0.02	0.03	0.04	0.01
MnO	0.00	0.04	0.05	0.02	0.00	0.12	0.45	0.05	0.05	0.02	0.02	0.00	0.00	0.00
Nb2O5	0.01	0.04	0.20	0.03	0.05	0.55	0.64	0.91	0.13	0.03	0.02	0.10	0.01	0.00
Ta2O5	0.27	0.75	0.42	0.51	0.19	1.82	4.96	1.24	1.00	0.26	0.46	0.31	0.37	0.31
Total	99.13	99.44	99.29	99.60	100.95	99.97	99.97	99.94	100.80	100.34	100.43	100.71	100.32	100.21
Structural formulae based on 4 oxygens														
Sn	1.995	1.984	1.984	1.990	1.995	1.945	1.877	1.943	1.977	1.994	1.991	1.991	1.993	1.995
Fe	0.000	0.002	0.004	0.001	0.000	0.013	0.021	0.017	0.002	0.000	0.001	0.001	0.001	0.000
Mn	0.000	0.002	0.002	0.001	0.000	0.005	0.019	0.002	0.002	0.001	0.001	0.000	0.000	0.000
Nb	0.000	0.001	0.004	0.001	0.001	0.012	0.015	0.021	0.003	0.001	0.000	0.002	0.000	0.000
Ta	0.004	0.010	0.006	0.007	0.003	0.025	0.068	0.017	0.014	0.003	0.006	0.004	0.005	0.004
Total	1.999	1.999	2.000	1.999	1.999	2.000	1.999	2.000	1.998	1.999	1.999	1.999	1.999	1.999
Sn end	99.791	99.256	99.208	99.547	99.817	97.252	93.869	97.150	98.967	0.000	0.000	0.000	0.000	0.000
FeMn end	0.015	0.187	0.280	0.074	0.000	0.889	2.001	0.977	0.206	0.070	0.060	0.108	0.006	0.002
NbTa end	0.194	0.557	0.512	0.379	0.183	1.860	4.130	1.873	0.827	99.930	99.940	99.892	99.994	99.998
Nb+Ta	0.004	0.011	0.010	0.008	0.004	0.037	0.083	0.037	0.017	0.004	0.007	0.006	0.005	0.004
Fe+Mn	0.000	0.004	0.006	0.001	0.000	0.018	0.040	0.020	0.004	0.001	0.001	0.001	0.001	0.000
Comments:	NE & NF same grain	NJ & NK same grain		JE & JF same grain contains tiny inclusions brown		many inclusions in grain JL			AA & AB same grain contains tiny inclusions			AV & AW same grain		

Cassiterite

	West pegmatite 97-WP1												West pegmatite 97-WP3			
	QA	QB	QC	QD	QE	QH	QI	QJ	QK	QO	QU	QV	DE	DJ	DO	DP
SnO2	98.54	98.04	98.06	98.33	97.12	98.70	98.79	96.95	97.46	97.46	95.61	97.56	99.40	98.68	98.06	98.46
FeO	0.31	0.23	0.29	0.21	0.42	0.10	0.13	0.48	0.37	0.38	0.66	0.26	0.08	0.24	0.32	0.24
MnO	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.00	0.02	0.00	0.01
Nb2O5	0.34	0.13	0.37	0.61	1.21	0.18	0.18	0.88	0.61	0.16	1.06	0.20	0.08	0.26	0.53	0.31
Ta2O5	0.39	1.09	0.33	0.38	0.53	0.36	0.40	0.75	0.38	1.52	1.83	1.27	0.30	0.75	0.83	0.75
Total	99.59	99.49	99.04	99.54	99.31	99.33	99.49	99.07	98.84	99.51	99.17	99.31	99.87	99.94	99.74	99.77
Structural formulae based on 4 oxygens																
Sn	1.977	1.973	1.978	1.971	1.947	1.987	1.985	1.952	1.968	1.962	1.924	1.966	1.991	1.975	1.964	1.973
Fe	0.013	0.010	0.012	0.009	0.017	0.004	0.005	0.020	0.016	0.016	0.028	0.011	0.003	0.010	0.013	0.010
Mn	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001
Nb	0.008	0.003	0.008	0.014	0.028	0.004	0.004	0.020	0.014	0.004	0.024	0.005	0.002	0.006	0.012	0.007
Ta	0.005	0.015	0.004	0.005	0.007	0.005	0.005	0.010	0.005	0.021	0.025	0.017	0.004	0.010	0.011	0.010
Total	2.004	2.000	2.003	2.000	2.001	2.000	2.000	2.003	2.003	2.002	2.002	2.000	2.000	2.001	2.001	2.001
Sn end	98.660	98.630	98.743	98.582	97.320	99.345	99.260	97.450	98.234	97.991	96.133	98.300	99.527	98.660	98.164	98.612
FeMn end	0.696	0.477	0.610	0.459	0.942	0.209	0.263	1.035	0.808	0.793	1.402	0.599	0.174	0.542	0.670	0.525
NbTa end	0.645	0.894	0.646	0.960	1.738	0.446	0.477	1.515	0.959	1.216	2.464	1.101	0.299	0.799	1.166	0.862
Nb+Ta	0.013	0.018	0.013	0.019	0.035	0.009	0.010	0.030	0.019	0.024	0.049	0.022	0.006	0.016	0.023	0.017
Fe+Mn	0.014	0.010	0.012	0.009	0.019	0.004	0.005	0.021	0.016	0.016	0.028	0.012	0.003	0.011	0.013	0.011
Comments:	QA - QD			QJ & QK				QU & QV				DO & DP				
	same grain			same grain				same grain				same grain				
	brown		brown	brown			brown	brown			brown	brown				
		colourless														
	cassiterite is earlier than garnet															

Cassiterite

	West pegmatite 97-WP3						Big Mack 98-83E			Big Mack pegmatite 98-83G							
	NH	NI	NK	NM	NN	NO	KI	GA1	GA2	GA3	GA4	GA5	GB1	GB2	GB3	GB4	GB5
SnO2	95.51	98.17	99.02	97.08	97.88	98.27	96.57	92.41	92.99	93.28	94.63	93.76	94.25	97.67	95.62	97.29	93.83
FeO	0.67	0.16	0.15	0.48	0.26	0.19	0.46	1.20	1.07	1.08	0.86	1.03	0.74	0.23	0.57	0.41	0.91
MnO	0.01	0.00	0.00	0.02	0.02	0.02	0.13	0.01	0.04	0.01	0.00	0.12	0.01	0.01	0.02	0.01	0.02
Nb2O5	0.48	0.13	0.06	0.49	0.20	0.15	1.13	1.64	1.62	1.64	1.64	1.99	0.88	0.09	1.05	0.77	0.75
Ta2O5	2.53	0.81	0.72	1.83	0.98	0.67	1.47	3.97	3.54	3.30	2.36	3.09	2.73	1.30	1.67	1.02	3.87
Total	99.20	99.26	99.95	99.90	99.33	99.30	99.75	99.23	99.27	99.31	99.49	100.00	98.61	99.29	98.93	99.50	99.38
Structural formulae based on 4 oxygens																	
Sn	1.928	1.979	1.983	1.944	1.972	1.980	1.931	1.860	1.870	1.874	1.895	1.867	1.912	1.970	1.929	1.952	1.892
Fe	0.028	0.007	0.006	0.020	0.011	0.008	0.019	0.051	0.045	0.045	0.036	0.043	0.031	0.010	0.024	0.017	0.039
Mn	0.001	0.000	0.000	0.001	0.001	0.001	0.006	0.000	0.002	0.000	0.000	0.005	0.000	0.000	0.001	0.000	0.001
Nb	0.011	0.003	0.001	0.011	0.005	0.003	0.026	0.038	0.037	0.037	0.037	0.045	0.020	0.002	0.024	0.018	0.017
Ta	0.035	0.011	0.010	0.025	0.013	0.009	0.020	0.054	0.049	0.045	0.032	0.042	0.038	0.018	0.023	0.014	0.053
Total	2.003	2.000	2.000	2.001	2.001	2.001	2.001	2.003	2.002	2.002	2.001	2.002	2.001	2.000	2.001	2.001	2.002
Sn end	96.279	98.963	99.125	97.152	98.512	98.926	96.487	92.858	93.377	93.592	94.706	93.253	95.512	98.500	96.402	97.556	94.520
FeMn end	1.436	0.340	0.321	1.048	0.590	0.444	1.236	2.548	2.349	2.279	1.822	2.406	1.588	0.508	1.252	0.864	1.970
NbTa end	2.285	0.696	0.554	1.800	0.899	0.630	2.277	4.593	4.273	4.129	3.472	4.341	2.900	0.992	2.345	1.580	3.511
Nb+Ta	0.046	0.014	0.011	0.036	0.018	0.013	0.046	0.092	0.086	0.083	0.069	0.087	0.058	0.020	0.047	0.032	0.070
Fe+Mn	0.029	0.007	0.006	0.021	0.012	0.009	0.025	0.051	0.047	0.046	0.036	0.048	0.032	0.010	0.025	0.017	0.039
Comments:	NH & NI same grain		NM - NO same grain contains inclusions of manganocolumbite dark brown				single tiny grain	500 µm traverse across grain					820 µm traverse across grain contains inclusions of ferrotantalite				

Cassiterite

	Big Mack pegmatite					Big Whopper pegmatite				Big Whopper lepidolite unit									
	98-38G					98-ATBW1				98-SS27									
	GB6	GB7	GB8	GB9	GB10	BF	BG	BH	BI	HE	HF	HH	HI	WH	WI	WJ	WK	WM	
SnO2	95.04	96.87	96.92	97.84	96.27	99.10	97.05	99.44	96.27	98.68	98.83	99.65	99.67	99.28	99.64	99.50	89.74	100.85	
FeO	0.70	0.48	0.43	0.43	0.53	0.08	0.24	0.09	0.37	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.31	0.03	
MnO	0.04	0.02	0.04	0.03	0.06	0.02	0.08	0.02	0.19	0.01	0.01	0.01	0.00	0.00	0.00	0.03	1.00	0.00	
Nb2O5	1.03	1.12	1.18	0.70	1.24	0.32	0.27	0.16	1.21	0.07	0.06	0.02	0.00	0.18	0.01	0.13	0.92	0.00	
Ta2O5	2.40	0.95	0.81	0.65	1.21	0.41	1.95	0.38	1.57	0.26	0.30	0.09	0.13	0.22	0.12	0.43	7.65	0.10	
Total	99.21	99.43	99.36	99.65	99.31	99.92	99.59	100.08	99.61	99.01	99.21	99.77	99.81	99.69	99.77	100.09	99.61	100.98	
Structural formulae based on 4 oxygens																			
Sn	1.914	1.942	1.943	1.959	1.932	1.982	1.952	1.987	1.927	1.993	1.993	1.998	1.998	1.991	1.998	1.988	1.814	1.998	
Fe	0.030	0.020	0.018	0.018	0.022	0.003	0.010	0.004	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.001	
Mn	0.002	0.001	0.002	0.001	0.003	0.001	0.003	0.001	0.008	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.043	0.000	
Nb	0.023	0.025	0.027	0.016	0.028	0.007	0.006	0.004	0.027	0.002	0.001	0.000	0.000	0.004	0.000	0.003	0.021	0.000	
Ta	0.033	0.013	0.011	0.009	0.017	0.006	0.027	0.005	0.021	0.004	0.004	0.001	0.002	0.003	0.002	0.006	0.105	0.001	
Total	2.002	2.001	2.000	2.004	2.001	1.999	1.999	2.000	2.000	1.999	1.999	2.000	2.000	1.998	2.000	1.998	1.996	2.000	
Sn end	95.609	97.027	97.141	97.793	96.525	99.147	97.676	99.329	96.374	99.725	99.697	99.883	99.895	99.636	99.903	99.491	90.871	99.881	
FeMn end	1.577	1.057	0.970	0.976	1.234	0.210	0.678	0.231	1.181	0.017	0.026	0.040	0.013	0.004	0.000	0.068	2.794	0.052	
NbTa end	2.814	1.915	1.889	1.231	2.241	0.643	1.647	0.440	2.445	0.257	0.277	0.077	0.093	0.359	0.097	0.441	6.335	0.068	
Nb+Ta	0.056	0.038	0.038	0.025	0.045	0.013	0.033	0.009	0.049	0.005	0.006	0.002	0.002	0.007	0.002	0.009	0.126	0.001	
Fe+Mn	0.032	0.021	0.019	0.020	0.025	0.004	0.014	0.005	0.024	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.056	0.001	
Comments:						BF & BG same grain core rim Avalon Resources trench				exceptionally pure cassiterite				exceptionally pure cassiterite apart from WK					

Cassiterite

	Big Whopper 98-SS29		SW Beryl pegmatite 99-AT6081										
	PF1	PF2	BA	BB	BF	BG	BH1	BH2	BH3	BH4	BJ	BN1	BN2
SnO2	99.62	98.57	99.10	97.80	98.39	95.20	97.74	99.61	97.87	97.54	96.80	95.73	97.39
FeO	0.00	0.05	0.24	0.13	0.15	0.84	0.44	0.06	0.39	0.35	0.48	0.72	0.39
MnO	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.03	0.00	0.01	0.00
Nb2O5	0.00	0.01	0.40	0.06	0.01	1.14	0.54	0.14	0.54	0.44	0.61	1.12	0.69
Ta2O5	0.08	0.32	0.46	0.80	0.66	2.38	0.88	0.20	1.09	0.96	1.31	2.03	0.91
Total	99.70	98.96	100.20	98.79	99.21	99.56	99.61	100.01	99.89	99.33	99.20	99.61	99.38
Structural formulae based on 4 oxygens													
Sn	1.999	1.993	1.976	1.982	1.985	1.909	1.960	1.992	1.958	1.963	1.950	1.918	1.957
Fe	0.000	0.000	0.010	0.006	0.006	0.035	0.019	0.002	0.016	0.015	0.020	0.030	0.016
Mn	0.000	0.002	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Nb	0.000	0.000	0.009	0.001	0.000	0.026	0.012	0.003	0.012	0.010	0.014	0.026	0.016
Ta	0.001	0.004	0.006	0.011	0.009	0.032	0.012	0.003	0.015	0.013	0.018	0.028	0.012
Total	2.000	2.000	2.001	2.000	2.001	2.003	2.004	2.000	2.001	2.002	2.002	2.002	2.001
Sn end	100.00	99.892	24.461	61.514	57.909	34.540	27.565	33.368	34.222	33.448	34.467	33.126	28.099
FeMn end	0.000	0.000	38.760	31.053	40.497	37.417	42.770	29.099	37.489	37.315	38.513	36.033	36.572
NbTa end	0.000	0.108	36.779	7.433	1.595	28.042	29.665	37.533	28.289	29.237	27.020	30.842	35.328
Nb+Ta	0.001	0.004	0.015	0.012	0.009	0.058	0.024	0.006	0.027	0.023	0.032	0.053	0.028
Fe+Mn	0.000	0.002	0.010	0.006	0.006	0.036	0.019	0.002	0.016	0.016	0.020	0.030	0.016
Comments:	99-ATZ11 is a cassiterite-rich sample from which many individual grains were recovered (some up to 1 cm in length)										contains ferrocolumbite inclusions		

Cassiterite

SW Beryl pegmatite							
99-AT6081							
	AA1	AA2	AA3	AA4	AA5	AA6	AA7
SnO2	98.03	96.67	97.07	96.78	95.62	96.47	96.81
FeO	0.19	0.49	0.40	0.49	0.67	0.60	0.53
MnO	0.01	0.00	0.02	0.01	0.03	0.01	0.01
Nb2O5	0.43	0.98	0.72	0.92	1.17	0.79	0.69
Ta2O5	0.45	1.08	0.97	0.99	1.72	1.64	1.54
Total	99.11	99.22	99.17	99.18	99.21	99.51	99.58
Structural formulae based on 4 oxygens							
Sn	1.976	1.943	1.954	1.946	1.922	1.937	1.943
Fe	0.008	0.021	0.017	0.021	0.028	0.025	0.022
Mn	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Nb	0.010	0.022	0.016	0.021	0.027	0.018	0.016
Ta	0.006	0.015	0.013	0.014	0.024	0.023	0.021
Total	2.000	2.001	2.001	2.002	2.002	2.003	2.002
Sn end	25.493	25.645	28.029	24.459	29.506	34.100	35.733
FeMn end	32.577	35.713	35.297	37.150	35.206	38.271	37.364
NbTa end	41.931	38.642	36.674	38.391	35.288	27.628	26.902
Nb+Ta	0.016	0.037	0.030	0.034	0.050	0.040	0.037
Fe+Mn	0.008	0.021	0.018	0.021	0.030	0.026	0.022

Comments:

4600 μm traverse
 cassiterite-rich zone at margin of pegmatite

Cassiterite

SW Beryl pegmatite									
99-AT6081									
	AB1	AB2	AB3	AB4	AB5	AB6	AB7	AB8	AB9
SnO2	98.86	99.27	95.33	98.01	99.12	95.19	99.12	98.53	95.87
FeO	0.08	0.08	0.81	0.30	0.12	0.84	0.11	0.27	0.74
MnO	0.00	0.00	0.02	0.02	0.00	0.01	0.00	0.01	0.06
Nb2O5	0.17	0.09	1.12	0.17	0.11	1.13	0.10	0.28	1.82
Ta2O5	0.16	0.22	2.44	1.15	0.26	2.54	0.28	0.90	1.89
Total	99.27	99.66	99.72	99.65	99.62	99.71	99.61	99.99	100.38
Structural formulae based on 4 oxygens									
Sn	1.991	1.992	1.909	1.969	1.990	1.907	1.990	1.971	1.900
Fe	0.003	0.003	0.034	0.012	0.005	0.035	0.005	0.011	0.031
Mn	0.000	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.003
Nb	0.004	0.002	0.025	0.004	0.003	0.026	0.002	0.006	0.041
Ta	0.002	0.003	0.033	0.016	0.004	0.035	0.004	0.012	0.026
Total	2.000	2.000	2.003	2.002	2.001	2.003	2.001	2.001	2.000
Sn end	23.415	36.895	35.649	47.894	31.491	36.078	34.899	40.114	25.555
FeMn end	35.558	39.176	36.467	37.876	44.922	36.618	42.851	37.418	30.985
NbTa end	41.027	23.929	27.884	14.231	23.587	27.304	22.251	22.468	43.460
Nb+Ta	0.006	0.005	0.059	0.020	0.006	0.060	0.006	0.019	0.066
Fe+Mn	0.003	0.003	0.035	0.013	0.005	0.036	0.005	0.012	0.033

Comments:

4500 µm traverse
contains ferrocolumbite inclusions

Cassiterite

SW Beryl pegmatite										
99-AT6081										
	AC1	AC2	AC3	AC4	AD1	AD2	AD3	AD4	AD5	
SnO2	99.25	96.65	97.47	98.08	97.05	96.21	97.41	97.31	98.59	
FeO	0.07	0.55	0.33	0.40	0.40	0.64	0.50	0.51	0.38	
MnO	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.00	
Nb2O5	0.06	0.82	0.45	0.46	0.56	0.94	0.74	0.77	0.64	
Ta2O5	0.14	1.64	0.97	1.09	1.21	1.69	1.27	1.26	0.62	
Total	99.51	99.66	99.23	100.03	99.22	99.49	99.92	99.86	100.23	
Structural formulae based on 4 oxygens										
Sn	1.995	1.937	1.963	1.960	1.955	1.931	1.947	1.946	1.963	
Fe	0.003	0.023	0.014	0.017	0.017	0.027	0.021	0.021	0.016	
Mn	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	
Nb	0.001	0.019	0.010	0.010	0.013	0.021	0.017	0.017	0.014	
Ta	0.002	0.022	0.013	0.015	0.017	0.023	0.017	0.017	0.008	
Total	2.001	2.001	2.001	2.002	2.001	2.003	2.002	2.002	2.002	
Sn end	31.533	34.924	35.039	35.554	35.965	32.061	31.245	30.390	21.695	
FeMn end	47.423	36.171	36.730	39.548	36.470	37.367	38.206	37.811	41.253	
NbTa end	21.045	28.905	28.231	24.898	27.565	30.572	30.549	31.799	37.052	
Nb+Ta	0.003	0.041	0.024	0.025	0.029	0.044	0.034	0.035	0.023	
Fe+Mn	0.003	0.023	0.014	0.017	0.017	0.028	0.021	0.022	0.016	
Comments:	3000 µm traverse					3000 µm traverse				

Cassiterite

SW Beryl pegmatite														
99-AT6081														
	AE1	AE2	AE3	AE4	AF1	AF2	AF3	AF4	AF5	AF6	AF7	AF8	AF9	AF10
SnO2	97.29	98.54	95.87	94.01	96.42	95.85	95.65	96.13	95.50	96.38	96.32	96.31	96.65	96.90
FeO	0.51	0.16	0.69	0.96	0.53	0.76	0.71	0.68	0.78	0.69	0.53	0.62	0.51	0.55
MnO	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.01
Nb2O5	0.98	0.12	1.38	1.44	0.72	1.03	1.01	0.87	1.08	1.03	0.70	0.84	0.67	0.68
Ta2O5	1.00	0.67	1.48	2.69	1.55	2.24	2.00	2.14	2.33	1.97	1.65	1.68	1.45	1.56
Total	99.78	99.49	99.44	99.12	99.22	99.87	99.37	99.83	99.69	100.06	99.20	99.47	99.28	99.70
Structural formulae based on 4 oxygens														
Sn	1.945	1.982	1.921	1.892	1.942	1.917	1.922	1.924	1.913	1.923	1.941	1.934	1.945	1.942
Fe	0.021	0.007	0.029	0.041	0.023	0.032	0.030	0.028	0.033	0.029	0.022	0.026	0.021	0.023
Mn	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Nb	0.022	0.003	0.031	0.033	0.016	0.023	0.023	0.020	0.024	0.023	0.016	0.019	0.015	0.015
Ta	0.014	0.009	0.020	0.037	0.021	0.031	0.027	0.029	0.032	0.027	0.023	0.023	0.020	0.021
Total	2.002	2.001	2.002	2.003	2.002	2.002	2.002	2.002	2.003	2.002	2.002	2.003	2.002	2.003
Sn end	23.801	48.703	24.922	33.305	35.208	35.751	34.142	37.735	35.489	33.918	37.259	33.184	35.145	35.448
FeMn end	37.147	35.648	35.448	36.589	37.421	37.039	36.991	36.696	36.801	36.482	36.715	37.545	37.838	38.341
NbTa end	39.052	15.649	39.629	30.106	27.371	27.210	28.868	25.569	27.710	29.600	26.027	29.271	27.018	26.211
Nb+Ta	0.036	0.012	0.052	0.070	0.038	0.054	0.051	0.049	0.056	0.050	0.039	0.042	0.035	0.037
Fe+Mn	0.021	0.007	0.030	0.041	0.023	0.032	0.030	0.029	0.033	0.029	0.022	0.027	0.021	0.023
Comments:	4000 μm traverse contains ferrocolumbite inclusions						3100 μm traverse							

Cassiterite

Glitter pegmatite								
99-GZ1								
	AA	AB	AC	AD	AE	AG	AH	AI
SnO2	97.45	96.93	98.89	97.16	98.62	99.04	98.77	99.31
FeO	0.55	0.56	0.22	0.45	0.25	0.28	0.31	0.19
MnO	0.03	0.00	0.00	0.00	0.01	0.00	0.02	0.01
Nb2O5	1.88	0.73	0.42	0.18	0.47	0.42	0.68	0.38
Ta2O5	0.30	1.82	0.09	2.00	0.39	0.14	0.33	0.02
Total	100.20	100.03	99.62	99.34	99.74	99.88	100.10	99.91
Structural formulae based on 4 oxygens								
Sn	1.930	1.937	1.982	1.951	1.975	1.980	1.968	1.985
Fe	0.023	0.023	0.009	0.019	0.010	0.012	0.013	0.008
Mn	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001
Nb	0.042	0.017	0.009	0.004	0.011	0.010	0.015	0.009
Ta	0.004	0.025	0.001	0.027	0.005	0.002	0.005	0.000
Total	2.001	2.001	2.002	2.002	2.001	2.003	2.002	2.002
Sn end	96.483	96.772	99.001	97.482	98.666	98.843	98.330	99.129
FeMn end	1.212	1.162	0.466	0.949	0.531	0.584	0.679	0.430
NbTa end	2.306	2.066	0.533	1.569	0.803	0.573	0.991	0.442
Nb+Ta	0.046	0.041	0.011	0.031	0.016	0.011	0.020	0.009
Fe+Mn	0.024	0.023	0.009	0.019	0.011	0.012	0.014	0.009
Comments:	AA - AD		contains					
	same grain		ferrotapiolite					
	contains many inclusions		inclusion AF					

Cassiterite

Glitter pegmatite										
99-GZ4										
	DA	DG	DO	DC2	DD2	DE2	EM	EQ	ET	EX
SnO2	99.64	98.51	99.10	98.60	99.04	98.15	98.99	96.93	98.40	98.84
FeO	0.08	0.26	0.15	0.16	0.12	0.34	0.14	0.31	0.26	0.16
MnO	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.04	0.05	0.01
Nb2O5	0.11	0.36	0.09	0.13	0.11	0.34	0.10	0.12	0.11	0.13
Ta2O5	0.38	1.13	0.67	0.80	0.48	1.41	0.64	1.98	0.81	0.71
Total	100.21	100.27	100.01	99.69	99.75	100.25	99.87	99.36	99.62	99.85
Structural formulae based on 4 oxygens										
Sn	1.989	1.965	1.983	1.979	1.986	1.959	1.983	1.955	1.977	1.981
Fe	0.003	0.011	0.006	0.007	0.005	0.014	0.006	0.013	0.011	0.007
Mn	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.001
Nb	0.003	0.008	0.002	0.003	0.002	0.008	0.002	0.003	0.002	0.003
Ta	0.005	0.015	0.009	0.011	0.007	0.019	0.009	0.027	0.011	0.010
Total	2.000	2.000	2.000	2.000	2.000	2.001	2.000	2.000	2.003	2.000
Sn end	99.444	98.243	99.125	98.962	99.302	97.918	99.150	97.784	98.681	99.006
FeMn end	0.172	0.578	0.319	0.347	0.248	0.735	0.305	0.722	0.647	0.360
NbTa end	0.384	1.180	0.556	0.691	0.449	1.347	0.545	1.494	0.672	0.634
Nb+Ta	0.008	0.024	0.011	0.014	0.009	0.027	0.011	0.030	0.013	0.013
Fe+Mn	0.003	0.012	0.006	0.007	0.005	0.015	0.006	0.014	0.013	0.007
Comments:	DA - DE2 same grain this sample contains large cassiterite grains containing many inclusions of ferrocolumbite, and less common ferrotapiolite							inclusion in garnet		

Cassiterite

	Glitter pegmatite 99-GZ5						Glitter peg. 99-GZ6	
	BA	BB	BG	BH	BM	BB2	CC	CE
SnO2	97.88	97.32	98.89	97.80	96.72	97.98	97.34	97.66
FeO	0.34	0.35	0.20	0.35	0.35	0.27	0.29	0.18
MnO	0.00	0.01	0.00	0.00	0.04	0.02	0.00	0.01
Nb2O5	0.17	0.21	0.08	0.13	0.66	0.17	0.12	0.09
Ta2O5	1.65	1.68	1.05	1.89	1.52	1.23	1.45	1.13
Total	100.03	99.56	100.22	100.16	99.28	99.68	99.19	99.06
Structural formulae based on 4 oxygens								
Sn	1.960	1.958	1.976	1.957	1.947	1.968	1.966	1.974
Fe	0.014	0.015	0.008	0.015	0.015	0.011	0.012	0.008
Mn	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000
Nb	0.004	0.005	0.002	0.003	0.015	0.004	0.003	0.002
Ta	0.023	0.023	0.014	0.026	0.021	0.017	0.020	0.016
Total	2.001	2.001	2.000	2.000	1.999	2.001	2.000	2.000
Sn end	97.972	97.860	98.778	97.834	97.398	98.344	98.257	98.716
FeMn end	0.714	0.749	0.417	0.732	0.806	0.615	0.610	0.401
NbTa end	1.314	1.391	0.805	1.434	1.796	1.041	1.134	0.884
Nb+Ta	0.026	0.028	0.016	0.029	0.036	0.021	0.023	0.018
Fe+Mn	0.014	0.015	0.008	0.015	0.016	0.012	0.012	0.008
Comments:	BA & BB same grain contains many inclusions of ferrowodginite						CC contains ferrocolumbite inclusion	

Cassiterite

	Wolf pegmatite 99-WZ1									Wolf pegmatite 99-WZ2					
	GA	GB	GH	GI	GJ	GK	GL	GM	GN	JG	JH	JI	JJ	JK	JL
SnO2	98.87	96.98	94.89	99.66	95.73	96.69	99.75	97.18	99.85	95.90	99.72	96.21	99.14	97.31	99.21
FeO	0.15	0.43	0.85	0.07	0.62	0.54	0.06	0.37	0.05	0.57	0.10	0.62	0.14	0.43	0.16
MnO	0.01	0.01	0.06	0.02	0.03	0.04	0.00	0.01	0.01	0.05	0.00	0.02	0.00	0.03	0.01
Nb2O5	0.12	0.50	0.86	0.07	0.57	0.49	0.09	0.30	0.02	0.56	0.15	0.59	0.11	0.46	0.14
Ta2O5	0.90	1.92	3.53	0.47	2.97	2.53	0.20	1.71	0.53	2.85	0.47	2.81	0.69	2.08	0.95
Total	100.05	99.84	100.20	100.29	99.92	100.27	100.10	99.57	100.46	99.92	100.45	100.26	100.08	100.30	100.46
Structural formulae based on 4 oxygens															
Sn	1.978	1.944	1.896	1.988	1.919	1.931	1.993	1.954	1.989	1.923	1.986	1.922	1.982	1.942	1.977
Fe	0.006	0.018	0.036	0.003	0.026	0.022	0.002	0.016	0.002	0.024	0.004	0.026	0.006	0.018	0.007
Mn	0.000	0.000	0.003	0.001	0.001	0.002	0.000	0.001	0.000	0.002	0.000	0.001	0.000	0.001	0.000
Nb	0.003	0.011	0.019	0.002	0.013	0.011	0.002	0.007	0.000	0.013	0.003	0.013	0.002	0.010	0.003
Ta	0.012	0.026	0.048	0.006	0.041	0.034	0.003	0.023	0.007	0.039	0.006	0.038	0.009	0.028	0.013
Total	2.000	2.000	2.002	2.000	2.000	2.001	2.000	2.000	1.999	2.000	2.000	2.001	2.000	2.000	1.999
Sn end	98.921	97.199	94.711	99.422	95.965	96.526	99.635	97.681	99.499	96.131	99.288	96.065	99.120	97.112	98.856
FeMn end	0.334	0.923	1.913	0.178	1.355	1.199	0.130	0.806	0.121	1.288	0.226	1.349	0.283	0.953	0.345
NbTa end	0.746	1.878	3.376	0.400	2.680	2.275	0.235	1.514	0.379	2.581	0.486	2.585	0.597	1.935	0.799
Nb+Ta	0.015	0.038	0.068	0.008	0.054	0.046	0.005	0.030	0.008	0.052	0.010	0.052	0.012	0.039	0.016
Fe+Mn	0.007	0.018	0.038	0.004	0.027	0.024	0.003	0.016	0.002	0.026	0.005	0.027	0.006	0.019	0.007
Comments:	GA & GB same grain brown	GB colourless	GH - GJ same grain red	GH - GJ colourless	GK - GN same grain red	GK - GN red	GK - GN colourless	GL brown rim	GM black rim	JG - JI same grain pink	JG - JI colourless	JG - JI colourless	JG - JI red	JK pink	JL pale brown

Cassiterite

	Wolf pegmatite 99-WZ3							Wolf pegmatite 99-WZ4						
	FA	FB	FC	FD	FE	FG	FH	DB	DC	DG	DH	DM	DN	DQ
SnO2	98.91	97.86	98.39	97.01	96.14	99.94	94.90	99.29	97.32	98.95	96.15	96.54	96.41	99.10
FeO	0.19	0.32	0.26	0.46	0.59	0.06	0.74	0.14	0.47	0.21	0.59	0.48	0.49	0.10
MnO	0.01	0.02	0.02	0.02	0.02	0.00	0.03	0.00	0.00	0.00	0.03	0.02	0.05	0.00
Nb2O5	0.14	0.34	0.25	0.49	0.64	0.05	0.77	0.15	0.39	0.23	0.55	0.42	0.43	0.15
Ta2O5	0.87	1.48	1.22	2.01	2.66	0.27	3.26	0.72	2.16	0.91	2.83	2.28	2.34	0.44
Total	100.13	100.01	100.14	99.98	100.05	100.32	99.71	100.31	100.34	100.29	100.15	99.74	99.72	99.78
Structural formulae based on 4 oxygens														
Sn	1.977	1.958	1.966	1.942	1.924	1.993	1.906	1.981	1.942	1.974	1.923	1.938	1.936	1.986
Fe	0.008	0.013	0.011	0.019	0.025	0.002	0.031	0.006	0.020	0.009	0.025	0.020	0.021	0.004
Mn	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.002	0.000
Nb	0.003	0.008	0.006	0.011	0.014	0.001	0.018	0.003	0.009	0.005	0.012	0.010	0.010	0.003
Ta	0.012	0.020	0.017	0.027	0.036	0.004	0.045	0.010	0.029	0.012	0.039	0.031	0.032	0.006
Total	2.001	2.000	2.000	2.000	2.000	2.000	2.001	2.000	2.000	2.000	2.000	2.000	2.001	2.000
Sn end	98.814	97.897	98.296	97.074	96.176	99.634	95.257	99.047	97.108	98.697	96.144	96.898	96.781	99.329
FeMn end	0.430	0.716	0.589	1.002	1.285	0.121	1.630	0.291	0.986	0.429	1.305	1.064	1.130	0.206
NbTa end	0.756	1.387	1.115	1.925	2.540	0.245	3.113	0.662	1.906	0.874	2.551	2.039	2.090	0.465
Nb+Ta	0.015	0.028	0.022	0.039	0.051	0.005	0.062	0.013	0.038	0.017	0.051	0.041	0.042	0.009
Fe+Mn	0.009	0.014	0.012	0.020	0.026	0.002	0.033	0.006	0.020	0.009	0.026	0.021	0.023	0.004
Comments:	FA - FC same grain		FD & FE same grain		FG & FH same grain			few tiny inclusions		DM & DN same grain		brown colourless red		
	colourless	red	pinky	red		pink								
	contains many			pink		colourless								
	tiny inclusions													

Cassiterite

	Big Whopper pegmatite DC97-7-55				Big Whopper peg. DC97-8-91			Big Whopper peg. DC97-8-124							
	AA	AB	AC	AD	BH	BJ	BK	BA	BB	BC	BD	BE	BF	BI	
SnO2	98.64	99.87	89.03	97.49	99.70	100.20	100.36	98.29	99.92	95.97	99.54	99.40	99.69	99.65	
FeO	0.00	0.01	0.02	0.06	0.04	0.02	0.03	0.32	0.06	0.54	0.10	0.13	0.09	0.13	
MnO	0.12	0.03	1.20	0.24	0.00	0.00	0.00	0.02	0.01	0.10	0.02	0.00	0.01	0.08	
Nb2O5	0.73	0.01	0.91	1.10	0.05	0.05	0.04	0.70	0.04	0.82	0.09	0.24	0.07	0.11	
Ta2O5	1.18	0.42	8.85	1.38	0.17	0.18	0.15	0.47	0.35	2.91	0.56	0.24	0.46	0.49	
Total	100.67	100.34	100.01	100.28	99.96	100.45	100.59	99.80	100.38	100.35	100.32	100.00	100.32	100.47	
Structural formulae based on 4 oxygens															
Sn	1.957	1.992	1.796	1.939	1.995	1.995	1.996	1.965	1.992	1.914	1.985	1.987	1.988	1.984	
Fe	0.000	0.000	0.001	0.003	0.001	0.001	0.001	0.014	0.002	0.023	0.004	0.005	0.004	0.006	
Mn	0.005	0.001	0.051	0.010	0.000	0.000	0.000	0.001	0.000	0.004	0.001	0.000	0.001	0.003	
Nb	0.016	0.000	0.021	0.025	0.001	0.001	0.001	0.016	0.001	0.019	0.002	0.005	0.002	0.003	
Ta	0.016	0.006	0.122	0.019	0.002	0.002	0.002	0.006	0.005	0.040	0.008	0.003	0.006	0.007	
Total	1.994	1.999	1.990	1.995	2.000	2.000	2.000	2.002	2.000	1.999	2.000	2.000	2.000	2.002	
Sn end	98.129	99.626	90.212	97.181	99.745	99.783	99.782	98.172	99.584	95.742	99.254	99.305	99.384	99.095	
FeMn end	0.247	0.076	2.625	0.631	0.080	0.040	0.069	0.721	0.130	1.350	0.264	0.264	0.226	0.446	
NbTa end	1.624	0.298	7.163	2.188	0.175	0.177	0.149	1.107	0.286	2.908	0.482	0.431	0.390	0.458	
Nb+Ta	0.032	0.006	0.143	0.044	0.004	0.004	0.003	0.022	0.006	0.058	0.010	0.009	0.008	0.009	
Fe+Mn	0.005	0.002	0.052	0.013	0.002	0.001	0.001	0.014	0.003	0.027	0.005	0.005	0.005	0.009	
Comments:	Avalon Resources borehole				BJ & BK same grain brown brown Avalon Resources borehole			BA & BB same grain black brown black Avalon Resources borehole			associated with manganocolumbite				

Cassiterite

SW Petalite pegmatite																
EFR-6059																
	PC	PD	PE	PF	SA	SB	SD	PG	BA	BB	BC	BD	BE	BH	PG	
SnO2	95.15	96.80	99.64	99.60	96.31	97.35	98.43	99.52	99.98	98.52	98.99	99.73	99.30	99.62	99.52	
FeO	0.36	0.31	0.00	0.03	0.23	0.20	0.13	0.06	0.01	0.22	0.17	0.03	0.09	0.09	0.06	
MnO	0.20	0.09	0.00	0.02	0.12	0.05	0.01	0.02	0.00	0.01	0.02	0.01	0.00	0.01	0.02	
Nb2O5	0.84	0.76	0.02	0.03	0.65	0.55	0.05	0.04	0.01	0.09	0.13	0.04	0.07	0.06	0.04	
Ta2O5	2.72	1.46	0.04	0.17	1.49	0.96	0.57	0.51	0.19	1.11	1.05	0.24	0.66	0.56	0.51	
Total	99.27	99.42	99.70	99.85	98.80	99.11	99.18	100.14	100.20	99.95	100.37	100.04	100.11	100.35	100.14	
Structural formulae based on 4 oxygens																
Sn	1.917	1.945	1.999	1.995	1.948	1.963	1.986	1.989	1.996	1.974	1.974	1.994	1.985	1.986	1.989	
Fe	0.015	0.013	0.000	0.001	0.010	0.009	0.006	0.003	0.001	0.009	0.007	0.001	0.004	0.004	0.003	
Mn	0.009	0.004	0.000	0.001	0.005	0.002	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.001	
Nb	0.019	0.017	0.000	0.001	0.015	0.013	0.001	0.001	0.000	0.002	0.003	0.001	0.002	0.001	0.001	
Ta	0.037	0.020	0.001	0.002	0.021	0.013	0.008	0.007	0.003	0.015	0.014	0.003	0.009	0.008	0.007	
Total	1.998	1.999	2.000	2.000	1.999	1.999	2.001	2.000	2.000	2.001	2.000	2.000	1.999	2.000	2.000	
Sn end	95.981	97.280	99.955	99.743	97.477	98.178	99.263	99.450	99.828	98.650	98.726	99.724	99.288	99.323	99.450	
FeMn end	1.186	0.854	0.000	0.110	0.744	0.539	0.290	0.164	0.027	0.490	0.411	0.069	0.187	0.226	0.164	
NbTa end	2.833	1.866	0.045	0.147	1.779	1.283	0.447	0.387	0.145	0.860	0.864	0.207	0.525	0.451	0.387	
Nb+Ta	0.057	0.037	0.001	0.003	0.036	0.026	0.009	0.008	0.003	0.017	0.017	0.004	0.011	0.009	0.008	
Fe+Mn	0.024	0.017	0.000	0.002	0.015	0.011	0.006	0.003	0.001	0.010	0.008	0.001	0.004	0.005	0.003	
Comments:	PC & PD same grain				SA & SB same grain Emerald Fields Resource Corporation sample											

Cassiterite

SW Beryl pegmatite										
EFR-6081										
	AA	AB	AC	AD	AE	AF	AH	AL	AM	AN
SnO2	99.30	98.27	99.54	96.66	97.99	97.84	97.98	97.71	98.81	95.67
FeO	0.06	0.29	0.06	0.70	0.30	0.30	0.34	0.51	0.17	0.79
MnO	0.00	0.00	0.00	0.02	0.00	0.00	0.04	0.03	0.01	0.01
Nb2O5	0.05	0.47	0.12	0.98	0.60	0.49	0.39	0.46	0.10	1.48
Ta2O5	0.30	0.59	0.20	1.35	0.73	0.69	1.07	2.11	0.51	1.96
Total	99.71	99.62	99.92	99.70	99.61	99.31	99.43	100.28	99.60	99.90
Structural formulae based on 4 oxygens										
Sn	1.992	1.970	1.992	1.934	1.964	1.968	1.963	1.940	1.984	1.908
Fe	0.003	0.012	0.003	0.029	0.013	0.012	0.014	0.021	0.007	0.033
Mn	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.001	0.000	0.001
Nb	0.001	0.011	0.003	0.022	0.014	0.011	0.009	0.010	0.002	0.033
Ta	0.004	0.008	0.003	0.018	0.010	0.009	0.015	0.029	0.007	0.027
Total	2.000	2.001	2.000	2.005	2.000	2.001	2.002	2.001	2.001	2.002
Sn end	99.599	98.460	99.594	96.474	98.191	98.352	98.038	96.932	99.153	95.327
FeMn end	0.137	0.599	0.139	1.501	0.633	0.624	0.798	1.122	0.379	1.676
NbTa end	0.264	0.941	0.267	2.025	1.176	1.024	1.164	1.946	0.468	2.997
Nb+Ta	0.005	0.019	0.005	0.041	0.024	0.020	0.023	0.039	0.009	0.060
Fe+Mn	0.003	0.012	0.003	0.030	0.013	0.012	0.016	0.022	0.008	0.034
Comments:	AH - AN same grain this grain alone contains small inclusions									
Emerald Fields Resource Corporation sample										

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
<i>SI Unit</i>	<i>Multiplied by</i>	<i>Gives</i>	<i>Imperial Unit</i>	<i>Multiplied by</i>	<i>Gives</i>
LENGTH					
1 mm	0.039 37	inches	1 inch	25.4	mm
1 cm	0.393 70	inches	1 inch	2.54	cm
1 m	3.280 84	feet	1 foot	0.304 8	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	1.609 344	km
AREA					
1 cm ²	0.155 0	square inches	1 square inch	6.451 6	cm ²
1 m ²	10.763 9	square feet	1 square foot	0.092 903 04	m ²
1 km ²	0.386 10	square miles	1 square mile	2.589 988	km ²
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
VOLUME					
1 cm ³	0.061 023	cubic inches	1 cubic inch	16.387 064	cm ³
1 m ³	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m ³
1 m ³	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m ³
CAPACITY					
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	4.546 090	L
MASS					
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	31.103 476 8	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	0.453 592 37	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	907.184 74	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	0.907 184 74	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	1016.046 908 8	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	1.016 046 90	t
CONCENTRATION					
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	<i>Multiplied by</i>	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

ISSN 0826-9580
ISBN 0-7794-0048-8