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HILLGROVE RESOURCES

Bismuth distribution in the Cu-Au Mineralisation of the Kanmantoo Deposit, South Australia

Honours Thesis

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ABSTRACT

Bismuth at the Kanmantoo Cu-Au mineralisation, South Australia, exists as an unwanted accessory element. Despite extensive recent work, its distribution and genetic behaviour are largely unanswered. Methods ranging from core logging and petrography to EMPA, LA-ICPMS and TEM were adopted to determine Bi content in minerals of the ore assemblage, identify Bi minerals and constrain Bi distribution to particular control mechanisms. Bismuth exists primarily as native Bi, but also occurs as chalcogenides of the tetradymite group with variable numbers of components, namely as bismuthinite, binary Se bearing and tertiary Se+S laitakarites, a quaternary Se-bearing Joseite-B mineral with varying chalcogen ratios, and other unnamed Bi-tellurides. Bismuth does not occur within the main sulphides of chalcopyrite, pyrite, pyrrhotite and sphalerite. Bismuth distribution at the Kanmantoo deposit is primarily controlled by chlorite alteration, resulting from Fe-rich fluid infiltration, shown by assaying results between the altered and unaltered lithologies along with petrographic studies. Mineralisation commences immediately post-peak metamorphism, mainly shown by enhanced garnet growth in vein selvages. Chlorite geothermometry infers the major Bi introduction into the system post-dates the main initial Cu mineralising stage, as retrograde reactivation of Fe-rich fluid at approximately 300^{o}C. Bismuth mineralisation is likely to be contemporaneous with Au, primarily shown by assaying results. The source of Bi is interpreted to be surrounding granite, or at least from a volcanic source, possibly from a crystallising magma, but the fluid itself is likely to have inputs from various different sources, highlighting current debate over the deposit type.

Keywords

Hydrothermal Systems, Bismuth Mineralisation, Distribution, Tetradymite group, Copper – Gold deposits, Ore genesis.

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INTRODUCTION

Background

The Kanmantoo mine, located in the Adelaide Hills, replicates the enviable supply of South Australia's mineral resources with the recently re-explored deposit of Cu-Au (Parker 1986), revitalising the once sporadically mined locality (Both 2008). Location of the deposit can be seen in figure 1a. 1km from the town of Callington and 55km from the city of Adelaide, it is considered the closest major mine to the South Australian capital (Both 2008). Nearing full production in the coming months of 2011, geochemical anomalies need to be addressed, none more-so than the interplay of bismuth throughout the Cu-Au deposit. Bismuth existence within the final concentrate incurs a financial penalty, increasing depending on the degree of Bi impurity. A sufficient method for Bi extraction from final concentrates has not yet been utilised, and despite extensive research going into Bi in Cu and Au deposits, this has largely been aimed at these processing stages.

This paper seeks to investigate the nature of the distribution of Bismuth at the Kanmantoo mine, providing much needed knowledge to its geochemical and genetic behaviour, and in turn improving our understanding of this element in hydrothermal ore systems. A range of selected methods and approaches have been adopted to adequately provide a more advanced understanding of this element.

The choice of approaches consists of a number of analytical methods to be implicated in an attempt to determine the variation of Bismuth in the deposit, leading to interpretations as to a possible control mechanism. The seemingly large number of possible trends of bismuth compared to the governing conditions can be filtered down into two main lines of approach:

1. Macro Scale – Investigating the mineralogy and chemical characteristics of the surrounding host lithologies to determine possible control of the Bismuth content through e.g. ion exchange or bismuth adsorption. Core logging, assay results and bulk rock geochemical analysis will head this approach.
2. Micro Scale – Investigation of the bismuth distribution within discrete ore minerals. Ore mineral relationships and associations are viewed to develop possible mineralising models, followed by the utilisation of key analytical techniques such as electron probe micro analysis (EPMA) and laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) to investigate interrelationships between bismuth and ore minerals, in addition to providing an overview of the variation of Bi content in different ore minerals.

Regional Geology

The Kanmantoo Cu-Au deposit is situated in the Adelaide Fold Belt in South Australia on the Palaeo-Pacific margin of Cambrian Gondwana (Flottmann *et al.* 1998, Ireland *et al.* 1998, Preiss 2000, Jago *et al.* 2003), and stratigraphically situated within the Kanmantoo Group metasediments (Jago *et al.* 2003). The Kanmantoo Group is thought to be deposited in a

tectonic regime reflecting extensional conditions (Parker 1986). This extensional tectonic regime involved deposition of immature turbidites in oxidised shallow water in this marginal zone, deepening towards the south into reduced conditions (Parker 1986), made clear by the occurrence of pyritic silts and greywackes mentioned in more detail below. Palaeocurrent directions show a source of sediments towards the south (Haines *et al.* 2001, Foden *et al.* 2006) and it is concluded that the Ross orogen striking southward through Antarctica is the source of these clastic turbidites (Foden *et al.* 2006).

The tectonic and stratigraphic progression throughout the genesis of this deposit has been debated in the past, but in light of detrital-zircon data by Ireland *et al.* (1998), the Kanmantoo Group is concluded to have commenced deposition at approximately 600Ma - 500Ma, refined to 526 ± 4 Ma (Cooper *et al.* 1992). Juxtaposed against the older underlying Normanville group, these results display a marked difference in derivation, with detrital-zircon data for the Normanville group rocks suggesting a Neoproterozoic age of up to 1500Ma (Ireland *et al.* 1998). Thus it is thought that the sedimentary genesis of the Kanmantoo Group provides evidence for a key change in the regional depositional environment (Gatehouse *et al.* 1990, Jago *et al.* 2003). The upper limit of the Kanmantoo Group deposition is defined solely by the intrusion of the first initial stage of syn-tectonic magmatism, the Rathjen Gneiss (Foden *et al.* 1999). Foden et al. (1999) concludes a likely dating for this intrusion to be 514 ± 5 Ma, giving rise to the notion of an incredibly rapid deposition period of approximately 10 Ma, or possibly even less in hindsight (Flottmann *et al.* 1998, Jago *et al.* 2003).

The Delamerian Orogeny abruptly ceased sedimentation in the Kanmantoo trough (Parker 1986, Jago *et al.* 2003, Foden *et al.* 2006), due to coeval major compressional tectonics associated with the subduction along the edge of Gondwana (Foden *et al.* 2006). This orogenic event attributed several stages of deformation (Jenkins & Sandiford 1992, Jago *et al.* 2003) shown by D_1-D_3 deformation of Kanmantoo Group units, overall resulting in thrust faults and partially overturned westward vergent folds (Foden *et al.* 2006).

The immediate host rock of the Kanmantoo Cu-Au deposit is the Tapanappa formation, existing as the longest Kanmantoo group formation at a distance of 16km and with a variable thickness that is thought to be approximately 3 km on average (Jago *et al.* 2003). A flysch-like lithology reflecting a progression of fine to coarse grained greywackes with a variable laminated texture that advances upwards into smaller grained laminated siltstone is typical of this formation, along with interspersed gravel sequences and pyritic silts throughout the entire profile. This is considered to be a result of basin-floor fan deposition (Parker 1986, Jago *et al.* 2003). The coarser grained sediments within this unit originated from a series of sediment gravity flows, often occurring as high density turbidity currents (Parker 1986, Jago *et al.* 2003). With this stratigraphical array in mind, it is defined as having a prograding thickness of sand towards the top section of the unit.

Metamorphism of rocks within the mine sequence differs to those surrounding the deposit with host rocks showing different, albeit less, microstructures (Oliver *et al.* 1998, Schiller 2000). Geology surrounding the Kanmantoo deposit reflects the complex deformation history, whereas locally, it is thought that peak metamorphic conditions have proceeded longer than the D_3 deformation and has eliminated earlier D_1 and D_2 deformations (Oliver *et al.* 1998). All that is exhibited is a weak crenulation fabric that is loosely similar in direction to the surrounding, much more pronounced, S_3 fabric.

Mineralogy

Within the Tapanappa formation are a number of mineral deposits, largely allocating the Tapanappa formation as a host of medium sized base metal stratabound deposits (Spry *et al.* 1988), of which the Kanmantoo Cu-Au mine is an example. Other satellite deposits include the Bremer Cu-Au deposit, along with Pb-Zn±Ag deposits by name of Aclare, Wheal Ellen and Angas at Strathalbyn (Both 2008). The location of these deposits with respect to the Kanmantoo deposit can be seen in figure 1b. Also spatially related as another stratabound deposit, is the Brukunga Pyrite deposit in the Nairne pyrite member. However, in terms of the genesis of these various deposits, two distinctive genetic models have been proposed and, despite heavy opposition from various authors, are commonly both used in describing the Kanmantoo Trough base metal genetic progression. A syngenetic and hydrothermal exhalative origin has been prescribed for the various nearby Pb-Zn±Ag mines (Spry *et al.* 1988, Toteff 1999), whereas an epigenetic model has been adopted for the Kanmantoo Cu-Au mineralisation (Parker 1986, Oliver *et al.* 1998, Schiller 2000). The Kanmantoo Mine itself

displays a number of features that support both models. On one hand, proximity of the surrounding exhalative stratabound deposits (Toteff 1999), along with prograding metamorphic conditions coupled with sulphide remobilisation enabling deformation (Belperio *et al.* 1998) reiterate a possible remobilisation of ore. This mechanism accompanies the proposal that the Kanmantoo mineralising system acted as a feeder system to the surrounding Zn-Pb±Ag exhalative deposits (Toteff 1999). Contrary to the exhalative perspective, the epigenetic model is thought to be chronologically related to peak or post peak temperature and pressure conditions. This is primarily supported by Oliver et al. (1998) and Schiller (2000) who propose a granitic/metamorphic fluid source (Oliver *et al.* 1998) and provide evidence such as a unique paragenetic sequence of deposit mineralogy concordant with their lack of oppressed strain, consequently presuming a fluid generated recrystallisation at peak metamorphic conditions. This debate over genetic models is discussed in other recent work with further evidence supporting each side (Tedesco 2008), and won't be elaborated here.

Mineralisation at the Kanmantoo deposit occurs within a 6km wide iron rich lens of pelite dominated by garnet + andalusite + biotite + quartz, with possible local occurrences of staurolite ± chlorite (Parker 1986, Oliver *et al.* 1998, Abbot 2005). The Kanmantoo deposit differs from its surrounding in the way that muscovite and cordierite is scarce, allowing for andalusite and staurolite, and coupled with the appearance of chlorite and magnetite conveys a general Fe enrichment at the cost of Na and Ca (Oliver *et al.* 1998). This has been metamorphosed during the Delamerian orogeny under high temperature low pressure conditions at approximately 550^{o}C in the sillimanite zone and 450^{o}C in the biotite zone

(Dymoke & Sandiford 1992, Oliver *et al.* 1998), coincidental with the formation of andalusite and staurolite. In terms of mineralisation, the Cu-Au deposit boasts the primary Cu-bearing mineral chalcopyrite along with pyrrhotite, and variable quantities of magnetite, pyrite, covellite, chalcocite and sphalerite that is not ubiquitous throughout the stockwork veining regime (Seccombe *et al.* 1985, Parker 1986, Oliver *et al.* 1998, Schiller 2000, Abbot 2005). In addition to this, several associated minerals are known to occur, namely marcasite, galena, silver, molybdenite, wolframite and native bismuth or bismuthinite (Parker 1986, Schiller 2000, Abbot 2005). This precipitation of minerals is in stockwork vein selvages, predominately by pipe-like podiform lenses predominately of chalcopyrite in S_3-parallel quartz veins discordant to relict bedding that has undergone thickening due to folding (Oliver *et al.* 1998, Abbot 2005). It is considered to be due to Fe-rich fluid metasomatism (Oliver *et al.* 1998). This is made evident by the decussate texture of biotite, garnet and staurolite, possibly deducing low strain rates and/or accelerated fluid assisted diffusion (Oliver *et al.* 1998).

Bismuth Geochemical Background

Bismuth has long been an unwanted accessory in mineral deposits due to its negative fiscal affect on mine profits, if not in significant abundance to be a by-product. Research into its existence has been studied in detail, especially in recent years.

Bismuth is a chalcophile element, and hence its existence within common ores and discrete minerals, namely bornite (Cook *et al.* 2010), galena and to a lesser degree sphalerite

(Brooks & Ahrens 1961, Gurney & Ahrens 1969, Greenland *et al.* 1973). However, while galena is abundant in the surrounding satellite deposits, it is not exclusive to the Kanmantoo deposit itself. Bornite and sphalerite, albeit known to exist at the deposit, are not overly common. Bismuth occurs to a much lesser degree within lithophilic regimes, ie silicate or oxide minerals (Marowsky & Wedepohl 1971).

Despite its distinct chalcophilic nature, Bi incorporation into the lattice of common ore minerals is limited due to large variance of bond lengths in octahedral environments, notably including chalcogenides (Wedepohl 1969), attributed to its large atomic size. This crystallo-chemical property provides a basis to the range of structures to which bismuth can interact with in a formation. Despite its lithophilic tendency, bismuth mineralisation is only subordinately attributed to sedimentary precursor sources, while the overwhelming opinion regarding the source of Bi supports a strong affinity to magmatic intrusions (Wedepohl 1969, Marowsky & Wedepohl 1971, Greenland *et al.* 1973, Ciobanu *et al.* 2010), and more specifically granitic intrusions, as opposed to basaltic sources (Marowsky & Wedepohl 1971, Ciobanu *et al.* 2010). These properties also provide a controlling factor for its dispersion into the crystalline lattice of rock forming minerals along with its (proposed) accumulation in magmatic detrital products, in turn enlightening a complex Bi genesis within magmatic crystallisation environments (Wedepohl 1969, Greenland *et al.* 1973). With this, it has been presumed that the foremost method of existence for Bi is within intrinsic minerals, such as native bismuth itself, bismuthinite, and the tetradymite series (Wedepohl 1969), also known as

Bi chalcogenides, with the chalcogens being S, Se, and Te (Wedepohl 1969, Cook *et al.* 2007, Ciobanu *et al.* 2009a, Ciobanu *et al.* 2009b, Ciobanu *et al.* 2010).

More recent work on Bismuth mineralisation has increasingly focussed on its implications on Au mineralisation, with recent findings concluding that Au can have a strong association with Bi-Te-(Se) patterns in a variety of mineralisation regimes (Ciobanu *et al.* 2009a). Investigation that followed suggests that Bi-chalcogenides often play the role of 'Au carriers' when sourced from a melt (Ciobanu *et al.* 2009a, Ciobanu *et al.* 2010). The complex variations to which Bi-chalcogenides can adjust to, ie their overwhelmingly diverse crystal structure modularity, allows for such a phenomenon (Ciobanu *et al.* 2009a). Furthermore, the M-S polyhedron configurations hosted by sulfosalts (namely bismuthinite, a Bismuth sulphide mineral), with their adjacent octahedral and tetrahedral vacancies can allow for Ag and Cu incorporation (Ciobanu *et al.* 2009a). The Kanmantoo deposit, containing modest gold levels, may provide a regime for which these hypotheses may be in effect. Recent studies at the Kanmantoo site have indicated to a possible relationship between Bi and Au mineralisation (Tedesco 2008), but confidence is an issue due to limited data. This relationship is noted to occur at other hydrothermal and magmatic ore deposits with similar properties (Oberthur & Weiser 2008, Dziggel *et al.* 2009, Graupner *et al.* 2010), leading to the possibility of a similar relationship between these two elements at the Kanmantoo deposit.

The homology of the tetradymite group leads to variable structural modules and stacking modules that can alter to suit compositional changes between native Bi to the 60 at. % X value (X being a chalcogen) of Bi_2X_3 (Ciobanu *et al.* 2009b), reflecting phase diagrams developed by (Okamoto 1994). With this, bismuth tellurides, selenides, and sulphides (bismuth chalcogenides) and their concurrent solid solution variations (eg Bi_2S_3-Bi_2Se_3-Bi_2Te_3) (Cook *et al.* 2007), are known to occur in hydrothermal, magmatic and metamorphogenic Cu-Au ores (Cook *et al.* 2007). Thus this accentuates the potential intrinsic bismuth minerals affiliated with the Kanmantoo mineralisation system, let alone the relationship that these intrinsic sulfosalts and chalocogenides may have with accompanying hydrothermal fluid components. Solid solution subsystems containing Pb as a fifth element of the above listed tetradymite series are also common (Cook *et al.* 2007), but due to lack of Pb identification at the site, this is unlikely to be a factor.

Bismuth chalcogenides principally have four isoseries that follow the general equation $Bi_x(Te,Se,S)_y$, where x and y are integer values. These isoseries span these three anions, with x:y ratios of – 2:3, 4:3, 1:1, and 3:4 (Cook *et al.* 2007). Other solid solution isoseries between these three anions and accommodated 'intermediates' exist but are less common. These solid solutions, despite the complex crystallo-chemical modularity, are limited in potential stoichiometry due to substitution mechanisms controlled by structural continuity (Cook *et al.* 2007). On that note, the Bi:Te ratio of phases involving these bismuth chalcogenides, ie tetradymite minerals, has an implication as to the redox conditions to which precipitation of the phases were under during formation (Ciobanu *et al.* 2010). Within gold bearing

environments, Bi:Te>1 suggests a reduced environment, often concomitant with the likes of native bismuth, gold bearing minerals such as maldonite and jonassonite, along with associated Fe rich stable minerals pyrrhotite and magnetite. On the other hand, a ratio Bi:Te<1 indicates an oxidised nature, leading to co-existing minerals native tellurium and gold tellurides with related stable Fe rich minerals being pyrite and hematite accordingly (Ciobanu *et al.* 2010). Supposing tellurium is included in the Kanmantoo deposit, this property may bring to light the redox conditions that the mineralising system was exposed to.

METHODS AND APPROACHES

Core Logging and Sample Collection

Based on the Hillgrove Resources Ltd. assay results showing significant bismuth anomalies, three separate drillcores were studied, KTDD180, KTDD178, and KTDD086. It is to be noted that Bi assay results are not available for KTDD086, and this core was chosen solely based on results from past studies. KTDD180 exhibited two separate bismuth anomalies in the assay results, separated by approximately 200m. The shallower section analysed in this paper will be referred to as “180s”. The ranges of depth of these four sections from the three drillcores studied are tabulated in Table 1. These sections firstly underwent core logging, documenting lithological and structural variation on metre-scales, coupled with more discrete documentation of mineralisation and alteration. It should be noted that mineralisation observations in this step are distinctly preliminary due to the micro-scale of the assemblages themselves and the macro-scale of logging, and more confident results will be described further with alternate approaches. 53 core samples were taken from all four sections, differing

between GAB schist and GBC schist with distinctly variable lithological characteristics, with some of them chosen for their exhibited mineralisation. Variation was taken into consideration of different features when choosing samples, to avoid any sort of homogeneity, however samples had to be of appreciable bismuth assay levels to be collected.

Bulk Geochemistry

18 samples, a sub-set from the above 53, exhibiting variable lithology with no visible mineralisation were crushed and milled, with approximately 200g of each sample delivered to Amdel Limited for whole rock analysis. After additional pulverisation, various schemes were adopted to procure accurate element concentrations. Major element analysis occurred via an IC4 scheme, involving fusing of 0.1g of analytical pulp with lithium metaborate followed by dissolution to give a "total solution". Inductively Coupled Plasma Optical Emission Spectroscopy (ICPOES) was then utilised on-site at Amdel Limited for the determination of trace elements, plus a select few essential traces. IC4M and IC4R schemes involve a similar methodology, but determination of elements is done by ICPMS, and these schemes focus on trace elements and rare earth elements respectively. IC3E and IC3M are both used for quantification of specific trace elements, and have a different approach to the previous schemes. 0.2g of analytical pulp is digested using an HF/multi acid digest and determination of elements is performed by ICPOES (IC3E) and ICPMS (IC3M), differing by way of nominal range and detection limits.

Micro-Analysis

Different analytical methods were utilised in this investigation, using 16 polished blocks and 6 polished thin sections from varying sections and depths, all provided by Adelaide Microscopy/The University of Adelaide. The mounted polished blocks and polished thin sections were prepared by Pontifex, and were carbon coated prior to micro-analysis. A Nikon petrographic microscope was used for petrographic studies and for imagery. Philips XL-30 and XL-40 scanning electron microscopes were utilised for back scattered electron imagery and relatively reliable compositional data, using EDAX software. Reliable compositional data was gathered by the Cameca SX51 electron microprobe, using an initial sulphide package containing 16 elements for which the weight percentages were calculated. This package was used on chalcopyrite, pyrrhotite, pyrite, sphalerite, with a package of fewer elements used for bismuth chalcogenides. Standards were utilised for each individual element from Adelaide Microscopy. Detection limits and accompanying statistics can be found in Appendix C. A silicates package containing 18 calibrated element oxides to be measured was used for garnet, chlorite, and biotite, along with the oxides magnetite, wolframite, and apatite. However, the EPMA results were constrained to detection limits on a parts per million level, whereas laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) was utilised for elemental compositions on a much more accurate level, with detection limits often at 1ppb, as seen in Appendix D. Accordingly, the New Wave 213nm Nd-YAG laser was used for a selection of the various sulphides listed above. A He atmosphere was used and an Agilent 7500cs ICP-MS provided the compositional data. Nist610 and Mass1 standards were used for calibration with Rare Earth Elements and major elements respectively. Both standards were used for the four main sulphides chalcopyrite, pyrrhotite, pyrite and sphalerite, with 35 seconds being the

regular count time for each point. Glitter software was used for data processing. A Helios Dual Beam Focussed-ion Beam (FIB, AMMRF flagship) was used to prepare and obtain minute site-specific specimens for subsequent TEM analysis on two samples. The Philips CM100 Transmission Electron Microscope with SIS MegaviewII Image Capture was the instrument chosen to undergo electron diffraction and high resolution imaging of the slices already prepared on the FIB. This TEM electron diffraction and employed imagery is potentially the most efficient method for distinguishing features of structural modularity and polysomatism of mineral series, and so will be utilised in distinguishing unknown bismuth compounds (Ciobanu *et al.* 2011).

Chlorite geothermometry was additionally used in an attempt to determine temperatures of mineral formation. Three equations, adapted from chlorite geothermometry literature were incorporated and used on probe results regarding chlorite (De Caritat *et al.* 1993). The most applicable equation to the conditions of the Kanmantoo deposit, such as Mg incorporation in chlorite, was taken from Cathelineau & Nieva (1985). All chlorite points used the equation from this source for homogeneity purposes. The temperatures calculated are dependent on the tetrahedral Aluminium content of chlorite (Cathelineau & Nieva 1985).

RESULTS

Core Logging/Mineralisation

The results of the core logging generally reflect existing and published information regarding the deposit. All three drillcores are dominated by two distinct lithologies. The first being a darker grey, coarse grain metapelite with distinct idiomorphic andalusite blasts up to 2-3cm wide, as seen in figure 2a. Coupled with the idiomorphic nature of andalusite, idiomorphic garnet co-exists with relatively small grains of approximately 2mm in size, incorporated with fabric defining biotite, which on most occasions provides the bulk of the material. The fabric seemingly controlled by biotite generally runs parallel to bedding of the metasediments, usually varying little from an arbitrary 'cross-core' angle, and also appears to diverge and subsequently merge around andalusite blasts, indicating formation under compression conditions. This GAB (garnet + andalusite + biotite) schist is the primary lithology discussed in the literature. However, despite the often recorded addition of aluminium rich staurolite in correspondence with andalusite, staurolite was not confidently identified. Staurolite has been implied to exist in areas with diffuse andalusite.

A clear indicator of a lithological change into the GBC (garnet + biotite + chlorite) schist is the increased presence of a green tinge, and the gradual fining grain size, as seen in figure 2e. Quite notable was the lack of abrupt juxtaposition between the two main lithologies, exhibiting an overly gradual change. Along with the heightening green tinge attributed to higher chlorite content from relatively pervasive metasomatism, andalusite becomes sparse at

a similar rate, leading to the most notable feature between the two lithologies being the transformation from andalusite rich to chlorite rich environments. Chlorite pervasion is often seen as completely replacing faintly seen relic andalusite blasts, which to begin with were often viewed as possibly being epidote. Having said this, epidote was noted as possibly being in existence in various locations. Despite the overly green colour of this lithology, individual chlorite grains were ultimately too small and diffuse to be recognised on a macroscopic scale, and the most pronounced areas of chlorite pervasion is attributed to adjacent veining and infill, which notably also exhibited slightly larger and more patently formed garnet grains. The overall GBC schist lithology of 180s has a slightly different physical orientation to that of the others, with a biotite + chlorite controlled fabric 45^{o} to the cross-core direction. Conjugate fractures, around 20cms apart, were noted at a couple of locations, but in general all fracturing that did not exhibit veining and infill were parallel to the stress fabric. Quartz is generally ubiquitous in both lithologies, existing in varying proportions.

Mineralisation within these lithologies is by and large controlled by variable width veining. A large proportion of these veins are associated with the GBC lithology, as they appear to co-exist with bright green chlorite envelopes. The GAB schist was in places found to exhibit quite widespread disseminated greyish pyrite, often amygdaloidal in nature. Mineralisation within separate sections was controlled by two different vein host, with KTDD180 and KTDD086 almost completely hosted by coarse quartz, indicating little stress, and KTDD180s and KTDD178 dominated by dark red highly magnetic Fe-rich magnetite veins. Despite being two diverse mineralisation hosts, chlorite envelopes were observed protruding from almost all infill

veins, displacing andalusite and thus providing a GBC schist lithology for most vein-rich areas. Chlorite envelopes varied widely in width, and therefore very proximal areas with noted chlorite pervasion are still noted as being a GAB schist lithology as a whole. Despite GAB schist often exhibiting disseminated pyrite, pyrite also exists as variable granular aggregates within mineralised veins and zones. In a similar textural manner, chalcopyrite was also abundant, notably spatially comfortable hosted within quartz and magnetite. Pyrrhotite was often found with chalcopyrite, and in some cases seemed to exist as tiny lenses, differing from magnetite due to the much weaker magnetism. Chalcopyrite was often seen hosted within these tiny lenses of pyrrhotite (1-2mm wide) as opposed to the more common and larger scale magnetite veins. However, due to their similar properties, mineralisation identified as pyrrhotite may in fact be magnetite. These lithological properties are exhibited in figures 2a-2l.

Assay results shown in Appendix A for KTDD180s, KTDD180 and KTDD178 provide levels of Au, Ag, Cu, and Bi for every metre of core logged. After allocating the lithology of each metre as either GAB or GBC schist and comparing levels of these elements within each lithological constraint, it was found that Au and Bi levels were relatively linear in distribution. This relationship is a replication of results in recent work (Tedesco 2008), and may imply a concordant or at least similar distribution mechanism of the two elements in this mineralising scheme. Figure 3a shows a linear relationship between Au and Bi in GBC schist, with maximum contents of 1114ppm and 0.56ppm for Bi and Au respectively. Figure 3b shows the same relationship but within GAB schist. Consistent axes between the two figures emphasises the distinct subordinate levels of the two elements in the GAB schist lithology, with data from

Appendix A often showing 0ppm for both elements in several metre increments. This asymmetrical relationship between the two lithologies may potentially highlight chlorite as a contributing factor to bismuth distribution. Bi levels in GAB schist are shown to reach over 150ppm. However, it was noted during core logging that several of these increments exhibited minor amounts of proximal chlorite at distinct mm-scale veins, despite being labelled as GAB schist as a whole. Bi levels from KTDD086 were unavailable.

Mineral Paragenesis

Pyrrhotite and pyrite are not ubiquitous throughout all samples, and thus the paragenesis of each section varies slightly. Petrography and SEM imagery deduced the following conclusions, with SEM images in figures 4a-h exhibiting the various paragenetic features of bismuth.

KTDD180 displays mineralisation hosted in predominately quartz vein, with pyrite and chalcopyrite aggregates spatially co-existing. Chalcopyrite and pyrite are spatially related, with chalcopyrite often surrounded by pyrite. However, minor pyrrhotite also exists in close contact with chalcopyrite in one sample (180(3)), at the expense of pyrite. However, pyrite is most commonly located within intrinsic fracturing in the pyrrhotite, seemingly commencing overprinting of pyrrhotite. This may indicate that other samples within this section had fully undergone pyrite overprinting of pyrrhotite, except for this particular sample. This section is mostly characterised by chalcopyrite with pyrite bordering between it and quartz gangue,

often in close proximity to biotite and garnet but not in direct contact. Chalcopyrite possibly has thin cubanite exsolutions, but this observation is not confident. Ce-rich monazites are also identified co-existing with Ti-rich ilmenite grains within idiomorphic garnets, which itself is often in contact with chalcopyrite, usually surrounded by mica gangue. Native bismuth is by far the most common form of bismuth, and almost exclusively exists as minute grains (≈2 microns wide) within chalcopyrite aggregates. However, the sulphur and tellurium chalcogens of the tetradymite group are also present.

The shallower section of the above drillcore, 180s, exhibits similar features, but with a further emphasis of pyrite overprinting of pyrrhotite. Pyrite reveals a dusty texture, and could quite possibly be more accurately annotated as its polymorph marcasite, and is not arsenopyrite. It often has a concentric texture synonymous with a melnikovite pyrite formation, reflecting lower temperature of formation and containing most likely goethite between layers, as seen in figure 4i. However, pyrrhotite is still featured in areas. Chalcopyrite is the overwhelming sulphide contained in these samples, often surrounding the less common sulphides. Magnetite is common as the mineralisation host in comparison to quartz, and often contains minute blebs of chalcopyrite usually in contact with a mica-textured mineral, ie biotite or chlorite, let alone showing a distinct spatial relationship with chalcopyrite. Sphalerite is also abundant, often in contact with pyrite. Similarly to the deeper section, Ce-monazites and ilmenite are commonly associated with garnet but also magnetite in some cases. Native bismuth is the dominant bismuth mineral, co-existing with chalcopyrite and/or chlorite, as evident in figures 4a and 4b. However, bismuth sulphide, telluride, and selenide are also

evident, along with an example of a bismuth telluro-selenide. One particular aggregate exists of bismuthinite with inclusions of native bismuth and native gold, surrounded by chalcopyrite, which is in turn surrounded by chlorite and quartz. Chalcopyrite also contains cassiterite in some areas.

KTDD178 most notably features a strong correlation between chalcopyrite and magnetite, with chalcopyrite often existing within chalcopyrite aggregates. Pyrrhotite is common, co-existing with chalcopyrite. Pyrite is often evident at chalcopyrite boundaries in connection with gangue but as minute aggregates, almost unrecognisable. Sphalerite is not evident. Bismuth telluride is relatively similar in abundance as native bismuth, with bismuth sulphides and selenides also present. Almost all examples exhibit a strong spatial relationship with chalcopyrite, usually as inclusion, with bismuth telluride especially notably in contact to chalcopyrite boundaries. Chlorite is often associated with these bismuth aggregates, either as surrounding gangue or in direct contact, with biotite to a lesser degree. Figure 4e shows a complex Bi rich symplectite, containing intermittent native Bi and Bi telluride components. W and Ti rich iron oxides (wolframite and ilmenite) are also common, usually as inclusions within magnetite, and to a lesser degree garnet, and cassiterite is again common, seemingly in contact with both gangue and sulphides with no particular preference.

Chalcopyrite, pyrrhotite and sphalerite are almost solely the sulphides present in KTDD086, with chalcopyrite and pyrrhotite generally spatially co-existing. Chlorite alteration is

very pervasive, often surrounding these ore mineral aggregates with garnet. Biotite is also sporadically evident. Sphalerite is usually found bounding chalcopyrite immediately adjacent to chlorite and garnet. Pyrrhotite often contains cobalt, especially aggregates located in proximity to chalcopyrite and chlorite, and this shall be explored further in micro-analysis. This setting is surrounded wholly by vein quartz gangue. Chlorite stringers/aggregates containing chalcopyrite often contain native Bi (and native Au in figure 4c), either as inclusions in chalcopyrite or immediately adjacent to. However, native bismuth also occurs within chlorite, the latter being bordered by chalcopyrite and quartz vein. Figures 4g and 4h show two compositional variations of chlorite, with Fe rich chlorite the notable host of sporadic native Bi aggregates. Figure 4d shows native Bi not only in chlorite, but also seemingly nucleating on the boundaries of a single chalcopyrite aggregate, existing as Bi exsolution blebs from the boundaries of chalcopyrite. However this Bi overprinting of chalcopyrite is relatively uncommon. One particular sample from this section contains an example of galena, but no other evidence of this mineral was found in the study. Other than native bismuth, bismuth selenide provided several examples, and it is likely that the other chalcogen anions were also included.

Apatite was evident as a secondary mineral on two occasions. Also noteworthy, back scatter electron imagery construed two variable compositions of chlorite, due to separate greyscale shades. Using EDAX software, this is presumed to be due to variable composition of iron and magnesium.

Bulk Geochemistry

Appendix B lists the results of whole rock geochemistry of various lithologies, as obtained from AMDEL. Figure 5a graphically represents bulk mass changes of major precursor oxide elements between GAB schist and highly chlorite altered GBC schist. MID is an arbitrary category that showed evidence of both schists. As expected, there is a distinct increase in Fe with increasing alteration, with a marked decrease in Ca and Na. Figure 5b compares lesser abundant trace elements between different lithologies. Al, Ca, Na, K, P and Ti all seem to decrease with increasing intensity of alteration. Figure 5b displays normalised abundances of various transition metals, the most notable being the enrichment in Cu. Figure 5c shows the Cu enrichment by 1 order of magnitude and Bi enrichment by up to 3 orders of magnitudes in the GBC schist but only by 1 order of magnitude in the GAB schist (relative to Chondrite). This may indicate an association between Bi and chlorite.

Electron Probe Micro Analysis (EPMA)

Silicates and sulphides were both analysed using EPMA, the results are shown in detail in Appendix B. Silicates and oxides including garnet, biotite, chlorite, magnetite and wolframite were analysed to deduce stoichiometry, zoning, and impurities. Approximately 200 points were probed of chlorite itself for additional use for chlorite geothermometry. As for sulphides, chalcopyrite, pyrite/marcasite, pyrrhotite, and sphalerite were examined primarily for their bismuth content.

Garnet within these mineralised zones showed evidence of zoning, with magnesium seemingly decreasing rimwards, with an Fe increase, displayed by figures 6b, 6c and 6d. Almost all data seem to be represented along an arbitrary line between the plotted compositions of almandine and pyrope, essentially known as the Almandine - Pyrope series, with the formulae $Fe_3Al_2Si_3O_{12}$ - $Mg_3Al_2Si_3O_{12}$. Stoichiometric analysis showed that every sample consisted of $X_{Alm} \approx 0.80 - 0.90$, whereas the vast majority of the remainder is represented by the pyrope endmember, ie $X_{pyp} \approx 0.10 - 0.20$. Due to the relative depletion of Mn and Ca, spessartine and grossular endmembers are negligible. Garnets from KTDD180 and KTDD180s exhibit a slight increase in Fe in a rimwise direction, as opposed to the slightly more Mg rich centre, but the other samples do not display such a systematic zoning profile, and are in fact quite variable, regardless of intrinsic position.

Biotite lacked in dominance in KTDD086, due to the overwhelming chlorite dominance, but existed in all samples' mineralising systems. Few anomalies were noted, but still show diversity. KTDD180s exhibits a significantly higher mean Fe content as opposed to other sections; KTDD180 exhibiting less Fe content. This is however explained by an inverse pattern for Mg, with the deeper section being relatively enriched as opposed to the depleted shallower section. Other striking features include KTDD180s and to a lesser degree KTDD086 samples incorporating chlorine in their respective stoichiometry, along with a peculiar high Na anomaly for KTDD178 biotite. Chlorite examined from sample 'KTDD180s7' show anomalously

low Mg levels, with X_{clc} ≈ 0.05 and Fe dominant chamosite X_{chm} ≈ 0.95, as seen in figure 6e. However, all other chlorite measurements show relatively similar compositions, with X_{clc} ≈ 0.40 and X_{chm} ≈ 0.60. Compositional data plot relatively linear along the Chamosite - Clinochlore series due to the above divalent cations Fe and Mg and their slightly variable ratio. No distinct trend regarding zoning of both biotite and chlorite is apparent, but a very loose rimwise increase in Fe seems to be noticeable. Figure 6e shows compositional differences between samples, and seems to indicate a Mg-rich cluster opposed to sporadic yet continually more Fe-rich chlorite compositions, possibly indicating two distinct chlorite types differing in Fe-Mg ratio.

Overall, magnetite was relatively homogeneous in composition between samples from drillcores KTDD178 and KTDD180s, with a widespread lack of significant impurity levels. Ti oxide levels revolve around 0.2 wt% weight percent, with Mg levels of KTDD178 up to four times that of KTDD180s, but still at an average of 0.12 wt%. Trace elements such as Co, Cr, Ni, and Zn all obtained average below 0.05 wt%. KTDD178 wolframite exhibited Mg and Mn averages of 0.58 and 0.35 wt% respectively, but no other impurities were above negligibility.

Bismuth within the four main sulphides was negligible, and was only on rare occasions above the minimum detection limit of 1732ppm. Chalcopyrite exhibited Bi content of 2000ppm in a handful of samples, with pyrite/marcasite comprising up to 2500ppm. Pyrrhotite and sphalerite displays contain up to 3000ppm and 3500ppm respectively, but again, less than

ten points were above minimum detection limit, with the vast majority under. Trace elements Co and Ni are also evident in pyrrhotite in all sections except for KTDD086, but do not exhibit high levels, with Co and Ni having maximum values of 0.2 and 0.075 wt% respectively, again slightly above minimum detection limits. Pyrrhotite seemingly exsolving from the borders of the more dominant chalcopyrite in KTDD086 exhibits such a high Co content that a separate mineral, loosely known as cobaltoan pyrrhotite, is inferred. Upon stoichiometric calculation, it was seen that the pyrrhotite diatomic formula incorporated Co to a degree. At 2 atoms per formula unit, the formula resembles $Co_{0.17}Fe_{0.8}S$, with a Metal/Sulphur ratio approximately 0.94. Extrapolating the formula in terms of atoms per formula unit, a more applicable formula containing integers of atomic ratios leads to the formula of $Co_2Fe_9S_{12}$, but even this atoms per formula unit value of 23 does not accurately apply to several other points, and thus confidence is an issue. Interestingly, Co and Ni display a highly correlated positive linear relationship within pyrite samples, indicating intimate co-existence. One particular sample contains five and four weight percent of Co and Ni respectively. Along with this, Co has a negative correlation with Fe, indicating a possible cation substitution relationship.

Mineralogy of Bi bearing minerals

Native bismuth itself dominated most bismuth containing grains probed, existing often sporadically as its own entity. However, Bismuth sulphides, tellurides and selenides, and to a lesser degree telluro-selenides were also analysed. Bismuth sulphides analysed are deduced as being bismuthinite, due to its unique Bi:S ratio. Figure 7 efficiently displays the stoichiometries of bismuth tellurides and selenides probed. Laitakarite, Bi_4Se_3 was the most common of the

selenides, but often contained a minor amount of sulphur coupled with selenium as the anionic component, often existing as $Bi_4Se_2S_1$. Bi_5Te_2 is the only probed telluride with no to negligible S+Se content. Several of these minerals share the same Bi:(Te+Se+S) ratio of 4:3, and often traverse a solid solution series between laitakerite (Bi_4Se_3) and pilsenite (Bi_4Te_3). One particular sample stoichiometrically exists as $Bi_4Te_2Se_{0.4}S_{0.6}$, presenting an Se-bearing Joseite-B variety. Almost all bismuth points measured exhibited an expected significant Pb content of approximately 1% in terms of atomic proportions. Insignificant levels of Au content were derived, with most samples exhibiting no Au incorporation.

LA-ICPMS

The Bi minimum detection limit of 1ppb provides a much more accurate assessment of Bi incorporation within the main sulphides. Despite the EPMA data exhibiting few sulphide points containing 2000-3500ppm, all points from the LA-ICPMS did not extend past 100ppm, regardless of sulphide. Pyrrhotite and pyrite often showed Bi values of less than 1ppm, evident in Appendix D. Chalcopyrite contained the highest traces of Bi, with the maximum level being 63ppm. Some results are however slightly inaccurate due to data calibration from EPMA data. No Rare Earth content was found for any point, irrelevant of sampled sulphide. The inclusion of apatite in the mineralogy, albeit in relatively negligible abundance, is presumed to be responsible for the depletion of Rare Earth's in sulphides. The relative accuracy of the LA-ICPMS as opposed to the EPMA highlight the probable interpretation that Bi within main sulphide minerals is insignificant.

Chlorite Geothermometry

Results for chlorite geothermometry can be found in Appendix G. Figures 9a-e below display an abundance of implications, comparing Fe, Mg, and Al contents with each other and resultant Temperature of formation, along with separating the points themselves into colour-coded drillcores and spatial relationships with sulphides and more importantly bismuth.

Figures 9a-b utilise points that are categorised as being in contact with sulphides, and so may provide implications enveloping sulphide genesis and not just chlorite itself. Each drillcore exhibits unique Fe:Mg ratios as exhibited by figure 8a, with KTDD178 and KTDD180s hosting a much higher proportion of Mg than that of KTDD180 and KTDD086, with KTDD086 notably showing a more widespread clustering, possibly showing 3 separate clusters and perhaps implying more than one chlorite inception. As seen in figure 8b, KTDD178 and KTDD180 show contemporaneous formation of chlorite at around 400 - 425^{o}C, whereas KTDD180 shows a cluster around 360^{o}C along with a discrete low Fe cluster at 400^{o}C. The pattern formed by these three drillcores reflects an expected increasing Fe content with decreasing temperature trend. KTDD086 on the other hand, reflecting the sporadic dispersion apparent in figure 8a, seems to follow a positive linear trend, orthogonal to the typical trend displayed by the other drillcores. It also infers an almost 200^{o}C range at which chlorite forms, with points uniform within that range.

It is clear from figure 8c that chlorite position relative to bismuth mineralisation shows an interesting trend in composition. Chlorite not in contact with bismuth or any sulphide for that matter exhibits the highest proportion of Mg, with chlorite in contact with bismuth plotting comparatively closer to Fe, with chlorite hosting Bi closer again to the Fe endmember. Figure 8d exhibits a clear pattern regarding bismuth mineralisation. Chlorite not in contact with bismuth or sulphide mineralisation exists in an Fe-poor discrete cluster between 390 - 410^{o}C. Chlorite that is in contact with bismuth is shown as being of slightly higher in terms of both Fe content and temperature of formation, the latter ranging between 400 - 420^{o}C. In comparison however, chlorite hosting bismuth inclusions is shown to have a much less temperature of formation, ranging from 360 - 320^{o}C. Figure 8e however, only demonstrates the above results and possible implication according to one drillcore section, namely KTDD086. For this particular core, it is important to distinguish that chlorite bordering Bi, forming at temperatures between 400 - 420^{o}C, is not coeval to chlorite adjacent to sulphide. In fact, it appears sulphide related chlorite does not commence formation until firstly bismuth adjacent chlorite and secondly bismuth hosted chlorite have commenced and terminated. The cessation of bismuth hosting chlorite at approximately 310^{o}C marks the beginning of sulphide adjacent chlorite.

FIB-TEM

The focussed ion-beam was utilised to extract two sections hosting bismuth telluride and mackinawite, ie ‘cobaltoan pyrrhotite’, for use with the transmission electron microscope to analyse diffraction patterns and thus identify lattice structure modularity of the two

compounds. However, the mackinawite section was destroyed in the extraction process, and thus investigation discontinued. However, figure 9a shows a competent TEM foil of two bismuth tellurides. Figure 9d-e show the unit cell (d^*) for each of the two tellurides, and from these strips, differences in reflection division distances are clear between the two tellurides. The number of divisions between reflections denotes the total number of atoms within the unit cell, along with the division width of the most intense reflections located in the middle of the strip. Figure 9d shows equal distances between reflections, and upon counting these divisions, it is concluded a total of 11 atoms are present within this unit cell (N=11), indicative of a Bi_8Te_3 formula. In contrast, figure 9e shows more divisions, and using the smallest distance indicated to count the divisions, a total of 16 atoms are concluded. Note the increase in distance between the two most intense superstructure reflections between from figure 9d to (e), despite the decrease in division distance. This is indicative of a decrease in Bi:Te ratio. It is concluded that the formula for telluride 1 is $Bi_{10}Te_6$ (N=16), equivalent to Bi_5Te_3 and reflecting the decrease in Bi:Te ratio between the two tellurides as represented by the difference in most intense superstructure reflection distances. Supposing these two tellurides were to be intergrown stacking sequences, the corresponding TEM strip would show N = 16 + 11 = 27 divisions and indicate a formula of $Bi_{18}Te_9$, ie Bi_2Te. This is reminiscent of the EMPA results concluding the aggregate as a whole as having a formula $Bi_{2.5}Te$, and so it is possible that the aggregate on some level represents a disordered intergrowth of these two phases (Ciobanu *et al.* 2010). However, these two values are not the same, and no unit cells of N=27 were found. Thus, this hypothesis is inconclusive until further investigation aimed at finding combined diffraction patterns is undergone. Figure 10a shows that these diffraction patterns were found

in separate parts of the assemblage, and so it is likely that these are two separate grains within a telluride assemblage.

DISCUSSION

The above results shown for various features of bismuth mineralisation, and when related to each other, paint an image of the nature of bismuth distribution at the Kanmantoo Mine. The results provide implications on both, the paragenetic relationships of bismuth as well as timing relationships between Bi and other components.

Backscatter electron imagery using the SEM based EDAX system provided insight into the different bismuth minerals in each drillcore section. Rare but ubiquitous native bismuth is coupled with bismuth minerals containing the chalcogen elements sulphur, selenium and tellurium at variable ratios but relatively uniform stoichiometry, often exhibiting varying Bi:X ratio, X denoting the respective chalcogen. The selenium anionic endmember laitakarite is common, with several minerals also compositionally placed along the solid solution series between laitakarite and its tellurium equivalent pilsenite, sharing Se and Te anions. Bismuth tellurides of differing stoichiometries co-exist in the same space, as deduced by electron diffraction imagery, implying diverse Bi-telluride lattice structures and further highlighting the chemical modularity of these minerals (Ciobanu *et al.* 2009a). Noteworthy also is the ratio between bismuth and tellurium in all analysed mineral grains containing these two elements. As noticed in figure 7, all tellurium containing bismuth varieties show a stoichiometry with a Bi:Te ratio of greater than 1. This indicates a reduced environment for the bismuth telluride

formation, highlighted by the presence of native bismuth, along with magnetite and pyrrhotite (Ciobanu *et al.* 2010). This reduced environment also favours native Au mineralisation. The linear relationship of Bi and Au assay results in both GAB and GBC schist logged, evident in figures 3a and 3b, along with the observation of a Bi-Au alloy, infer a contemporaneous introduction of these two elements into the system, implying similar distribution mechanisms for both elements. The O'Neill zone is known to be Au-rich in relation to the Main Zone and so it is probable that KTDD086 is also relatively richer in Bi, highlighted by the abundance of Bismuth shown in figures 3g and 3h.

Paragenetically, bismuth minerals are on every occasion linked to chlorite. This inference is drawn from two specific observations, the obvious first being that often bismuth compounds are surrounded by chlorite, and secondly bismuth compounds on a smaller scale, i.e. ranging from 2 - 5 µm, are situated within a sulphide. This sulphide can be any of the common three, chalcopyrite, pyrrhotite and pyrite, but on almost every occasion these Bi-hosting sulphides are surrounded by chlorite, and on several occasions contain micro-fractures allowing for chlorite filled conduits, which itself may or may not explain the bismuth inclusion. Generally, it seems that bismuth intrusion is related to chlorite inferred to be associated with chlorite alteration. This is reinforced by the whole rock analysis results, showing enrichment in both Fe and Bi along with Cu with increasing chlorite alteration. Figures 3a and 3b show a marked difference in Bi and Au levels between the two major lithologies, with levels of both elements in GBC schist significantly higher, implying an intimate relationship between chlorite altered lithology and Bi. The linear correlation between the two elements in both of these lithologies

suggest parallel distribution mechanisms for the two, furthering the hypothesis made by Tedesco (2008), with Bi possibly acting as a Au 'scavenger' (Ciobanu *et al.* 2009a). These paragenetic and quantitative relationships between chlorite and Bi suggest chlorite alteration acts as a primary control mechanism for the distribution of Bi, and in a similar fashion, Au.

Chlorite relationships resemble lamellae intermittent with each other, as shown in figures 3g and 3h. Lighter (Fe-rich) chlorite is often the host of Bismuth aggregates, whereas the adjacent darker chlorite (Mg-rich), although often bordering Bi as denoted by the diamond shaped points in figure 8d, does not include Bi aggregates. Both fluids are rich in Fe, but the darker chlorite contains higher levels of Mg. This along with figure 8e suggests two separate fluids infiltrating the system at different times. Figure 8d especially suggests two vastly different temperatures of formations for these two chlorites. The Mg-rich chlorite is formed at higher temperatures at around 400^{o}C, whereas the 'bismuth hosting' chlorite (Fe-rich) is formed at temperatures much lower at around 300^{o}C, notably close to the native bismuth melting point of 271^{o}C. These two implications from BSE imagery and chlorite geothermometry clearly suggest a mineralisation regime of at least two fluids. The first being early, Mg-rich chlorite, and the second being later, Mg-poor, Fe-rich bismuth hosting chlorite. Figure 8e shows that sulphide related chlorite is formed prior to bismuth precipitation, including chalcopyrite related chlorite, inferring the high temperature Fe-rich fluid with Mg enrichment infiltrated the system first, and as it evolved, carried Cu essential for the main mineralisation. During this high temperature first stage of fluid infiltration, enhanced garnet formed along vein selvages, with Mg-rich core and Fe-rich rims suggesting a gradual decrease

in temperature during formation and the existence of which further highlighting formation at close to post-peak metamorphism time. These implications are furthered by more in-depth transgranular studies of garnets at the Kanmantoo deposit (Wilson 2009). As Mg began to decrease in the system, the following second generation Fe-rich fluid then distributed Bi along with contemporaneous Au. The Fe-rich fluid for this mineralisation process corresponds with the Fe alteration halo of the deposit and is considered related to the sporadic magnetite veining hosting various sulphides. The initial high temperature Mg and Fe-rich fluid is inferred to migrate through compressional shear zones, causing the enhanced garnet growth and first generation chlorite alteration in vein selvages. It is possible the following Cu infiltration with this Fe-rich fluid could be coeval with the system changing to an extensional regime, leading to the later stage chlorite associated Bi and Au mineralisation and retrograde cooling. The initial formation of pyrrhotite, which is overprinted by pyrite during retrogression, may indicate that the first stage fluid was relatively sulphur-poor, whereas the second fluid may have either been sulphur-rich or may have remobilised earlier sulphide. The timing and nature of quartz veining within GAB schist that does not exhibit chloritisation is not known. Sulphide adjacent chlorite in KTDD086 is seen forming at temperatures below the formation of Bi, which may be attributed to a third, late stage retrograde cooling path. The notably odd orthogonal relationship between Fe and temperature of chlorite related to sulphides evident in figure 8e may indicate a redox front and subsequent change of redox conditions in the system, or possibly the introduction of a separate Mg-rich fluid. The orthogonal relationship of these lower temperature KTDD086 chlorite does not follow the typical trend of increasing Fe to decreasing temperature, as shown by sulphide related chlorite by other sections, and is attributed to increasing Mg in the system. Various chlorite in KTDD086 adjacent to

chalcopyrite often had increasing levels of Mg away from chalcopyrite towards the quartz adjacent rim, which may help to infer a late stage Mg increase in the system during retrograde cooling. However, any inferences drawn for the cause of this anomaly is only conjecture, and needs to be studied further.

LA-ICPMS data shows a distinct lack of Bi within all four main sulphides. This can be interpreted as a lack of Bi within the system during main sulphide and Cu mineralisation. This reinforces the suggestion that the sulphide forming stage and the bismuth forming stage were separate. However, certain chalcopyrite aggregates in KTDD086 (figure 4b), reminiscent of other studies (Cepedal *et al.* 2006), show large blebs of native Bi exsolving out of solution relative to chalcopyrite. However, this phenomenon is only observed in KTDD086, and only on rare occasions. This may suggest a minor Bi component in the initial mineralisation phase, with Bi exsolving out during prolonged cooling. The existence of Bi-tellurides in all samples also suggests the possibility of residual Bi within the initial ore fluid coincident with the main Cu depositing stage. Figure 10 shows a phase diagram for bismuth tellurides of varying ratios, of which pilsenite (Bi_4Te_3) is shown having a solidus temperature of 420^{o}C. Pilsenite is observed in all drillcore samples, and has the lowest Bi:Te ratio of all bismuth minerals present at the Kanmantoo deposit. This leads to the interpretation that initial Bi deposition was in the form of pilsenite at approximately 420^{o}C, notably coincidental with the formation of the first sulphides, as shown by figure 8e. As such, the lack of Bi within first stage sulphides may discount the possibility of a Bi component in the first phase of mineralisation, but these two observations raised suggest that one cannot completely discount this possibility. In any case, the second

stage of mineralisation was the dominant Bi-Au stage, native Bi being the primary mineral as opposed to Bi chalcogenides due to lower temperatures. It is possible that localised fluid remobilisation of first stage Cu in the South East Zone is the cause of the late stage chalcopyrite. Supposing the interpretation of early stage trace Bi ensued, this may give rise to a scenario in which the second stage Bi-Au rich fluid remobilised a proportion of trace Bi from the first stage of mineralisation, leading to the high amounts of native Bi aggregates as opposed to the Bi-chalcogenides. Whether or not this suggestion of first stage residual Bi within the Cu-rich fluid is proven or not does not change the interpretation that the major Bi-Au introduction is through second stage Fe-rich fluids.

The high Co content in both pyrite and pyrrhotite, along with the identification of cobalt bearing mackinawite, indicates that the ore bearing fluid was enriched in Co, consistent with either a magmatic source or a sedimentary hosted exhalative type of origin. Recent work at the Kanmantoo deposit concludes that Co enrichment in the mineralising fluid indicates a magmatic input (Focke 2010), related to the A-type granites and mafic intrusions in the area (Foden *et al.* 2006). Other work provides similar conclusions from alternative results (Tedesco 2008). However, recent studies from various other Co deposits that contain Bi provide contrasting implications for Co deposition, with the Idaho Cu-Co Belt, US, Tuolugou Co deposit, China, and Katanga Cu-Co belt, Congo, indicating a most likely marine source for Co and being of Volcanogenic Massive Sulphide (VMS) or Sedimentary Exhalative (SEDEX) nature (Feng *et al.* 2006, El Desouky *et al.* 2010, Lund *et al.* 2011, Trumbull *et al.* 2011). However, these deposits all indicate a fluid interaction with a proximal granitic or at least volcanic wall-rock, or a

separate volcanic fluid. Despite the genetic model of these deposits currently still in debate, the common feature of a granite input into the fluid composition, or at least volcanic input in all of them may imply a granite derivation for Co. This is markedly concordant with the view that intrusive granite is the most likely source for Bi (Ciobanu *et al.* 2010). The Fe-rich fluid causing Fe-metasomatism and chlorite alteration is most likely attributed to a crystallising magma (Oliver *et al.* 1998), namely an underlying or stratigraphically related granitoid. Oliver et al. (1998) presents the notion that at the Kanmantoo deposit, sulphur is derived from an igneous suite or an admixture of fluids containing sulphur from surrounding metasediments. Oxygen isotopes in mineralised veins also indicate an igneous source (Oliver *et al.* 1998). Thus, it is interpreted that Bi is mobilised and transported in this Fe-rich fluid most likely by granitic wall-rock interaction with the Fe-rich fluid, possibly by the regional A-type granites (Foden *et al.* 2006, Focke 2010) or it already existed in the initial crystallising Fe-rich magma, indicating a granitic magmatic intrusion. The latter mechanism implies one distinct crystallising magma of granitic composition as the source for Bi, Fe and possibly Cu and Co in the Kanmantoo deposit, whereas the former may imply a mixture of magmatic fluids and metamorphic/meteoric fluid, reflecting points made by Oliver et al. (1998). A combination of both of these mechanisms is most likely. Whatever the case, Bi is most likely sourced from regional granite, and at some point during fluid transgression likely scavenged Au in the process (Ciobanu *et al.* 2009a), subsequently leading to contemporaneous Bi and Au. These results alone are not formidable enough to confidently determine a single genetic model for the deposit however, of which is not the aim of this paper. Sphalerite, despite being the most common ore source of cadmium (Qian 1987, Cook *et al.* 2009), an element that is indicative of a magmatic source, often does not contain appreciable amounts of Cd in the Kanmantoo deposit and levels between samples

are sporadic. The Se/Te ratio in sphalerites, thought to also be an indicator of fluid source (Qian 1987), does not suggest a confident implication. However, telluride assemblages are viewed as being indicative of a magmatic origin, but has recently been expanded to be independent of deposit type (Ciobanu *et al.* 2010). Nickel impurities in pyrrhotite is widely known to suggest a magmatic source of mineralisation , but no distinct Ni peaks have been found in any pyrrhotites, with no Ni levels above 0.1 W(%). Further investigation is recommended to confidently prescribe the surrounding granite as the primary fluid source for the Kanmantoo deposit.

CONCLUSION

Bismuth distribution at the Kanmantoo deposit reflected variable stoichiometric modularity, with Bi associated with chalcogens from the tetradymite group. Despite most commonly occurring as native Bi, it also occurs in binary forms with any of S, Se or Te, as bismuthinite, laitakerite, and an unnamed Bi_5Te_2 telluride. Bi_5Te_3 and Bi_8Te_3 unnamed tellurides were also present. Tertiary forms of bismuth with Se and S coexisting as anions were evident along with a quaternary Se-bearing Joseite-B variety with an anionic composition consisting of all three chalcogens. Major bismuth distribution is concluded to be directly related to second generation chlorite alteration, inferred to be an Fe-rich fluid post-dating the main Cu-hosting mineralising stage and most likely related to a retrograde reactivation of fluid flow. The main Cu-hosting mineralising stage is transported via a higher temperature first generation Fe-Mg-rich fluid, commencing chlorite alteration and depositing first generation sulphides of chalcopyrite, pyrite, pyrrhotite and sphalerite. This is highlighted by the much richer Bi component within the GBC schist as opposed to the unaltered GAB lithology. LA-ICPMS data shows little to no incorporation of Bi within discrete sulphides, namely chalcopyrite, pyrite, pyrrhotite and sphalerite. However, the possibility of a Bi component in the first stage of mineralisation cannot be completely discounted due to observable exsolution of Bi from chalcopyrite along with the higher temperature of formation of certain Bi-tellurides. A likely mechanism for the ore genesis of the Kanmantoo Deposit involves an Fe-rich Cu-Fe-Zn-S initial stage, followed by the major Bi-Au second stage. The source of this Bi is suggested to be from a granite derived magmatic or volcanic source related to Co, most likely the regional granites surrounding the deposit, and quite possibly related to the Fe-rich fluid source suggested by Oliver et al. (1998) of an underlying crystallising magma. While soluble in mineralising fluids, Bi

is thought to scavenge Au, leading to contemporaneous formation of both elements in the second mineralisation stage. This source however isn't substantial for the ore deposit as a whole, and was probably coupled with fluids from other sources, and needs to be further explored. This paper has subsequently constrained bismuth mineralisation on a lithological scale, but to constrain Bi distribution further, a structural approach to Bi distribution should be utilised. In addition, further micro-analytical work focussing on a wider spatial range of sulphides is encouraged to adequately show that Bi incorporation in sulphides at the Kanmantoo deposit is not an issue, despite this paper already providing conclusions interpreted from this method.

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TABLE CAPTIONS

- ***Table 1)*** Brief Outline on the depths of each drillcore studied. An expanded table with assay results and core logging results can be found for each section in Appendix A.

FIGURE CAPTIONS

- ***Figure 1a)*** 1 : 50, 000 scale geological map of the local Kanmantoo deposit region, South Australia. Adapted from (Schiller 2000).
- ***Figure 1b)*** 1 : 500,000 scale geological map of the Kanmantoo deposit and its surrounding satellite deposits of mostly Zn/Pb. Adapted from Hillgrove Resources, 2007.
- ***Figure 2a)*** GAB schist showing andalusite blasts surrounded by biotite, garnet and minor quartz. (KTDD178, 118.0 - 118.3m)
- ***Figure 2b)*** GCB schist with pyrrhotite stringers with chlorite alteration in the surrounding rock. Note the much smaller grain size of the GCB schist as opposed to the GAB schist. (KTDD086, 145.0 - 145.3m)
- ***Figure 2c)*** Similar to figure 2b but with a 2cm wide quartz vein towards the left end, hosting pyrrhotite stringers with ± cp/py, along with showing green tinged chlorite alteration proximal to veining. (KTDD086, 150.0 - 150.2m)
- ***Figure 2d)*** An example of relic andalusite blasts undergoing but not completely altering to chlorite. The GCB-like smaller grain size is evident on the right side, incidental with more abundant enhanced garnet (hard to see), proximal to a quartz vein hosting cp/py. Chloritisation is inferred to permeate from this conduit. (KTDD180, 248.6 - 248.85m)
- ***Figure 2e)*** Lithological boundaries between GAB and GCB schists, exemplified by the appearance and disappearance of andalusite blasts along with colour changes from grey to green respectively. (KTDD086)
- ***Figure 2f)*** Magnetite + pyrrhotite infill adjacent to quartz vein, containing cp/py, with a chlorite envelope shown on the left. (KTDD178, 125.0 - 125.1m)
- ***Figure 2g)*** GAB schist with a 2cm quartz vein showing proximal chlorite alteration. (KTDD180, 241.85 - 242.0)

- ***Figure 2h)*** Quartz vein containing large aggregates of py/cp in the mid-SW quadrant, along with showing larger, more enhanced red garnet blasts along the vein selvages. (KTDD180, 245.9 - 246m)
- ***Figure 2i)*** Quartz vein with large cp/py aggregates on the left side, with enhanced garnet growth again exhibited on the right side. (KTDD180, 250.5 - 250.6m)
- ***Figure 2j)*** Thin pyrrhotite stringers in GCB schist often containing cp/py aggregates, with strong yellowy green chlorite alteration proximal to the stringers, weakening with distance from veining. (KTDD086, 148.2 - 148.3m)
- ***Figure 2k)*** Pyrrhotite infill with quartz veining, containing cp/py aggregates in areas and exhibiting chlorite alteration to the right. (KTDD086, 153.85 - 153.9m)
- ***Figure 2l)*** Wide Magnetite ± pyrrhotite juxtaposed with quartz vein within GCB schist. Chlorite alteration evident to the right of the sample. (KTDD180s, 44.3 - 44.5m)
- ***Figure 3a)*** Comparison of Bi and Au assay results from every metre denoted as GBC schist. Note the line of best fit here shows a correlation value of 0.3361, but excluding the probable outlier with a Bi level of more than 1000ppm, has a correlation value of approximately 0.70.
- ***Figure 3b)*** Comparison of Bi and Au assay results from every metre denoted as GAB schist. Note that the axes from figure 3a and 3b are identical to highlight the relatively small levels of these elements in GAB schist.
- ***Figure 4a)*** Bismuth mineral assemblage containing Bi(Te-Se), native Bi and bismuthinite, in contact with the darker lamellar chlorite grain and largely surrounded by chalcopyrite. (KTDD180s)
- ***Figure 4b)*** Minute laitakerite (labelled Lt) aggregate within chalcopyrite and also in surrounding pyrite. Extensive chlorite alteration is evident adjacent to the chalcopyrite grain, and also within grain fractures. Bismuthinite (labelled BiS) is also seen in the NW quadrant. (KTDD180s)
- ***Figure 4c)*** Chalcopyrite stringer within lamellae of chlorite, with special noting to the two separate shades of chlorite. The brighter grains within chalcopyrite and/or chlorite are native Bi, with the aggregate in the SW quadrant in particular an alloy of Au and Bi. Quartz is the surrounding gangue mineral. (KTDD086)

- ***Figure 4d)*** Sporadic minute native Bi grains hosted in chlorite, with a few hosted on the boundary of the isolated chalcopyrite aggregate seemingly existing as exsolution blebs. Surrounding gangue is again quartz. (KTDD086)
- ***Figure 4e)*** Bismuth symplectite, exhibiting various light shades consistent with Bi-telluride and native Bi. This symplectite is in direct contact with chlorite and, and possibly with ilmenite, although potential contacts are perceived to be separated by a thin border of chlorite. Chalcopyrite is the sulphide surrounding the aggregate. (KTDD178)
- ***Figure 4f)*** In the same environment as the previous figure, the central grain shown is a bismuth telluro-selenide, surrounded by chlorite and possibly in contact with chalcopyrite. (KTDD178)
- ***Figure 4g)*** Adjacent chlorite lamellae of two definable compositions, the darker being Mg-rich (high T) and the lighter being Fe-rich (low T). Note the sporadic Bi aggregates are located within the lighter Fe-rich chlorite. (KTDD086)
- ***Figure 4h)*** Large aggregate of chalcopyrite, adjacent to lamellar chlorite, which again has two different compositions, as mentioned in figure 3g. Note again that bismuth is hosted in the Fe-rich chlorite, which itself seems to surround the Mg-rich chlorite.
- ***Figure 4i)*** Reflected light image displaying the concentric melnikovite pyrite aggregate in the centre, with abundant chalcopyrite to the south and north-west, mostly surrounded by gangue.
- ***Figure 5a)*** Whole rock analysis results, plotting each major element percentage of its oxide, the Y axis of course being the percentage. Note that any colour absent from the accompanying legends for figures 5a-c are due to overlapping of different coloured points.
- ***Figure 5b)*** Whole rock analysis results for trace elements on a logarithmic scale, indicating the increase of copper with chlorite alteration. The black line at 1ppm represents the base normalisation.
- ***Figure 5c)*** Whole rock analysis results for Bi in comparison to Cu, showing the similar increase in Bi composition with chlorite alteration along with the degree of Bi enrichment itself. The black line at 1ppm represents the base normalisation. Note the lines between the points are only shown to connect Cu and Bi values for the each sample.
- **Figure 6a)** Legend to be referred to for figures 6b-e, 7a-e and 9a and b.

- ***Figure 6b)*** Ternary plot showing the compositional variation of garnet on the almandine - pyrope garnet series, notably unanimously close to the Fe endmember almandine. The obvious outliers are considered to be of a different mineral. 10% increments are shown by gridlines and points. Legend is shown in figure 6a.
- ***Figure 6c)*** Enhanced view of the cluster observed in figure 5b, indicating minor compositional variation in garnets between different samples. Legend is shown in figure 6a.
- ***Figure 6d)*** Visual representation of the Fe-Mg content in garnet. Note that points taken centrally (squares) are usually higher in Mg than points taken from the rim of the grain. Legend is shown in figure 6a.
- ***Figure 6e)*** Ternary plot showing the compositional variation of chlorite in various samples. Note the large precise cluster of points towards the centre of relatively Mg-rich composition, with other chlorite points spreading towards more Fe-rich, Mg-poor compositions. 10% increments are shown by gridlines and points. Legend is shown in figure 6a.
- ***Figure 7)*** Ternary diagram displaying the variation in stoichiometries of bismuth minerals. Note that native bismuth points have not been plotted. There are four particular patches shown, namely laitakerite (filled squares) with and without minor tellurium content, the somewhat Joseite related variety (hollow squares) with a Te:(Se+S) ratio of 2:1, and an unnamed Bi_5Te_2 mineral (diamonds). *Hed* = Hedleyite, *Pls* = Pilsenite, *Ts* = Tsumoite, *Tbs* = Tellurobismuthite.
- ***Figure 8a)*** Compositional variation plot displaying the negative trend of Mg and Fe. These points are classified as points that are in contact with sulphides, and are quite clearly unique in Fe:Mg ratio. KTDD086 by far shows the most variation. Legend is shown in figure 6a.
- ***Figure 8b)*** Temperature plot with respect to Fe content of chlorite in contact with sulphides. Legend is shown in figure 6a.
- ***Figure 8c)*** Ternary plot displaying variable concentration levels of chlorite dependent on positioning with regards to sulphide and Bi. Circles denote chlorite with no spatial relation to sulphide or Bismuth, diamonds denote chlorite that is in contact with bismuth but not

necessarily hosting it, and triangles denote chlorite that contains bismuth inclusions. This is also the notation for shapes in the following figures.

- ***Figure 8d)*** Temperature plot relative to Fe, similar to figure 8b, but comparing chlorite with different spatial relations to bismuth.
- ***Figure 8e)*** Temperature plot on a similar scale to that of figure 8d, but incorporating all results and colour coded to correspond with core section. Legend is shown in figure 6a.
- ***Figure 9a)*** Spatial relationship of the TEM foil after extraction from polished block. Pyrrhotite and magnetite is annotated, with the two unknown tellurides identified using SEM EDAX software, with chalcopyrite also associated but unseen.
- ***Figure 9b)*** Electron diffraction pattern of tell2 (Bi_8Te_3).
- ***Figure 9c)*** Electron diffraction pattern of tell1 (Bi_5Te_3). Note the difference in patterning as opposed to that of tell2, despite the equivalently orientated angle.
- ***Figure 9d)*** Tell2 (Bi_8Te_3) electron diffraction pattern strip with inverted contrast to the previous images, arrows highlighting reflection division distances.
- ***Figure 9e)*** In the same vain as figure 9d, but displaying that of tell1 (Bi_5Te_3). Note the two most intense reflections as a pair in the middle, increasing from a to b due to a decrease in the Bi:Te ratio.
- ***Figure 10)*** Phase diagram for Bi tellurides, indicating a decreasing temperature of formation with decreasing tellurium content, with native Bi (100% Bi) showing a temperature of 271^{o}C. Adapted from Ciobanu (2010).

TABLES

Drillcore Section	Ore Zone	Depth studied
KTDD180	Main Zone/SE Zone	223-260m
KTDD180s (“180s”)	Main Zone/SE Zone	44-53m
KTDD178	Main Zone	116-145m
KTDD086	O’Neill Zone	131-162m

Table 1)

FIGURES

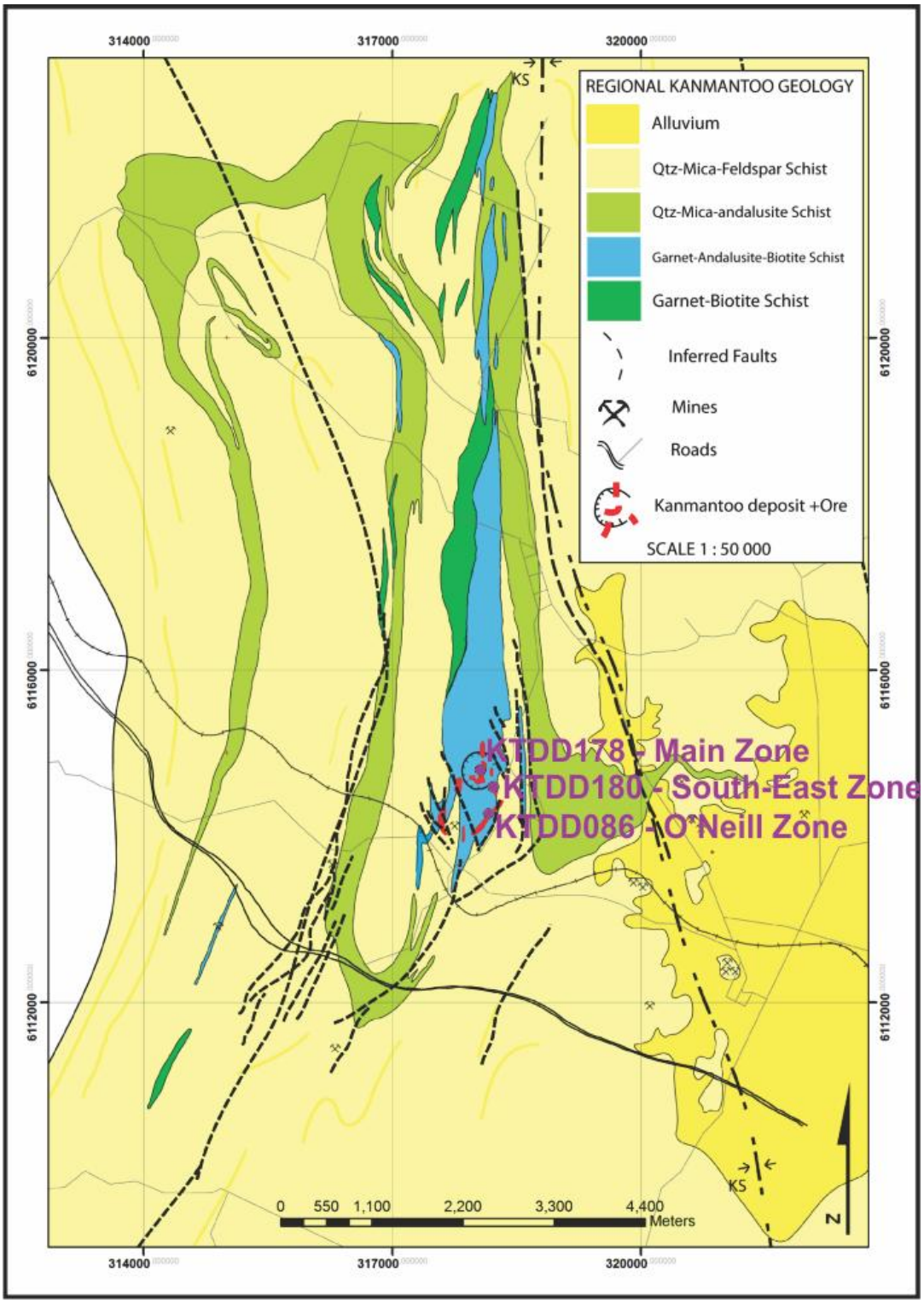
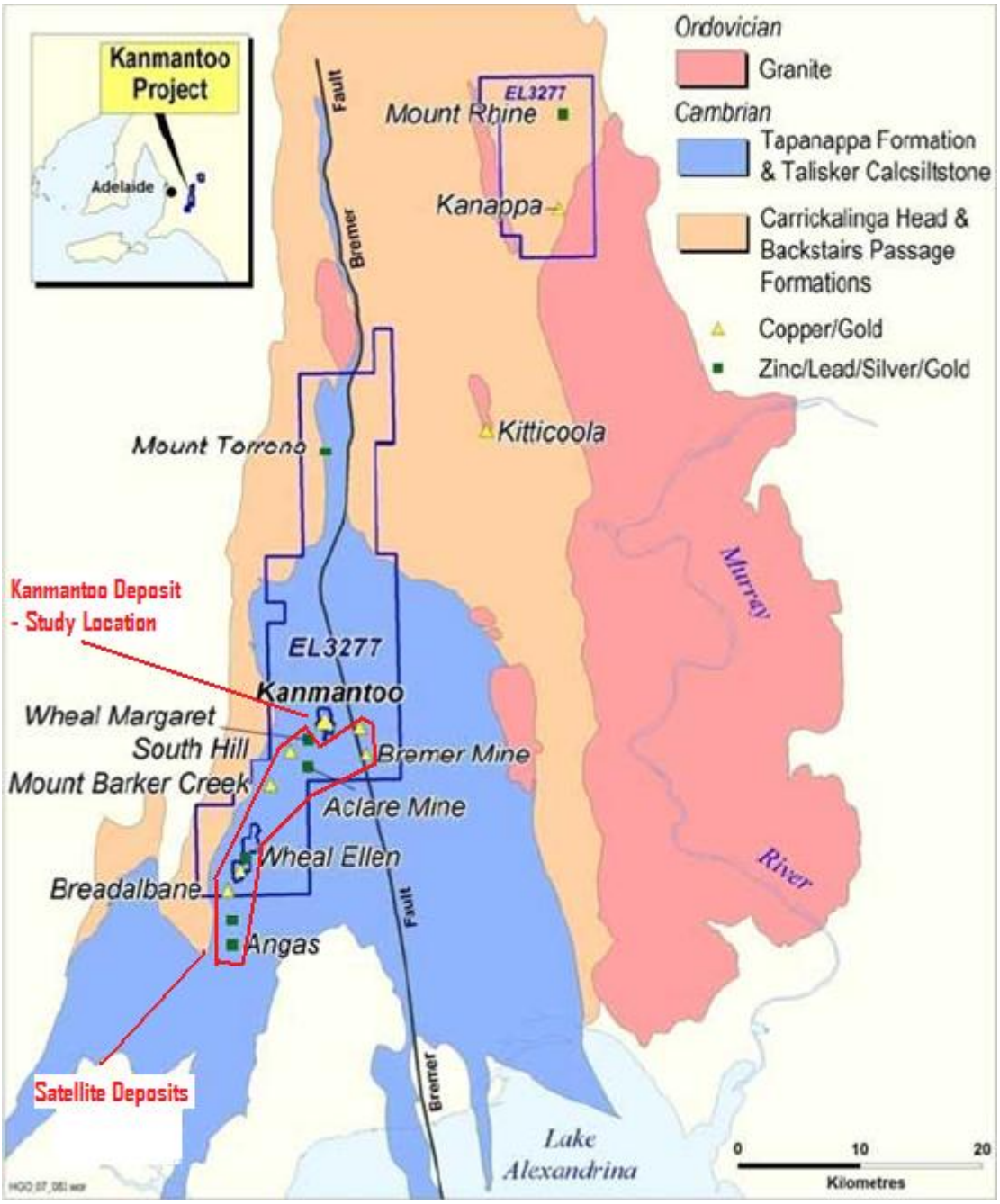


Figure 1a)


Kanmantoo Project
Adelaide
Ordovician
Granite
Cambrian
Tapanappa Formation & Talisker Calcsiltstone
Carrickalinga Head & Backstairs Passage Formations
Copper/Gold
Zinc/Lead/Silver/Gold
Fault
Bremer
EL3277
Mount Rhine
Kanappa
Kitticoola
Mount Torrens
Murray
River
Kanmantoo Deposit - Study Location
EL3277
Kanmantoo
Wheal Margaret
South Hill
Bremer Mine
Mount Barker Creek
Aclare Mine
Wheal Ellen
Breadalbane
Angas
Fault
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Satellite Deposits
Lake Alexandrina
0
10
20
Kilometres

Figure 1b)

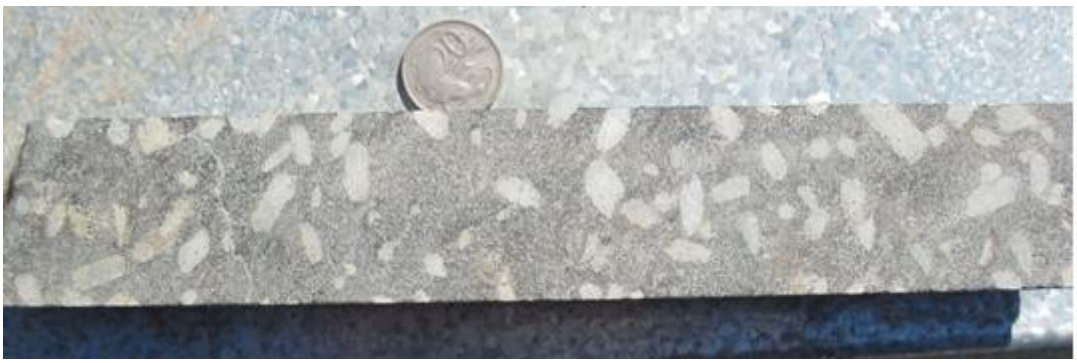
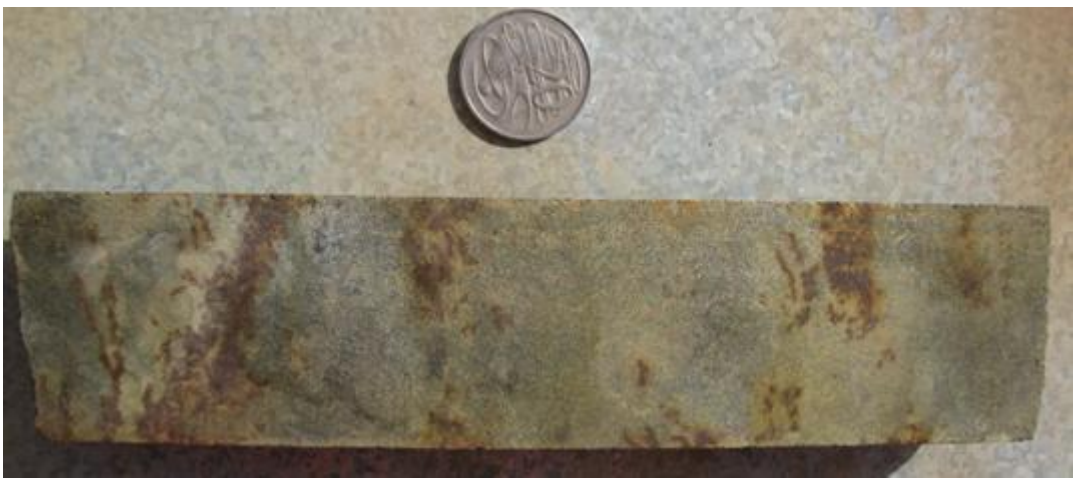


Figure 2a)

Figure 2b)



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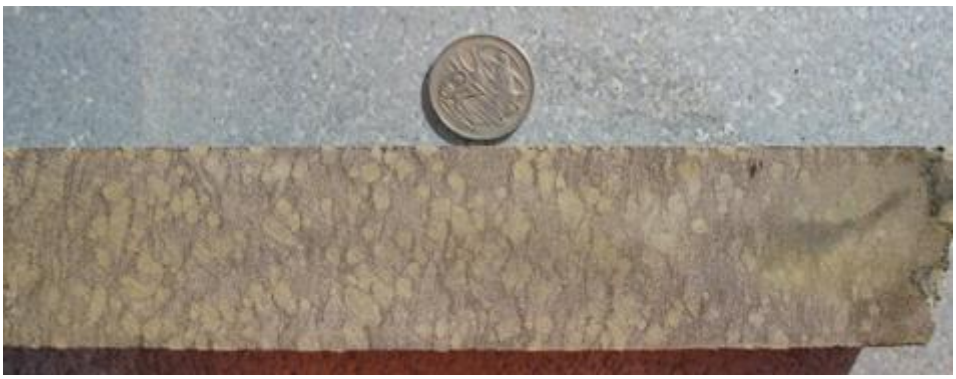


Figure 2d)

Figure 2e)

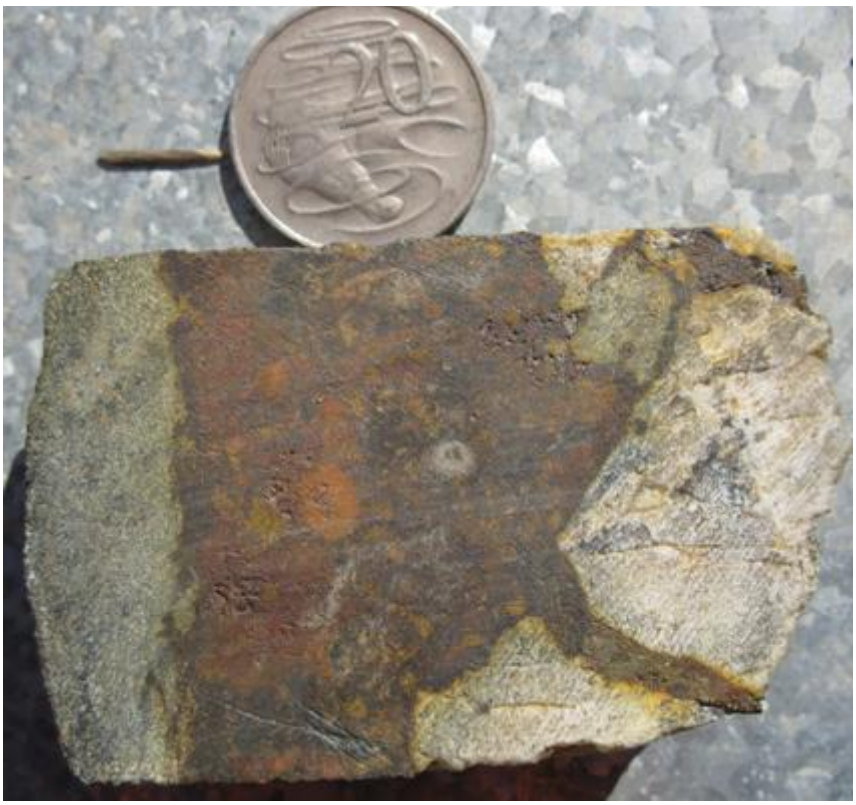
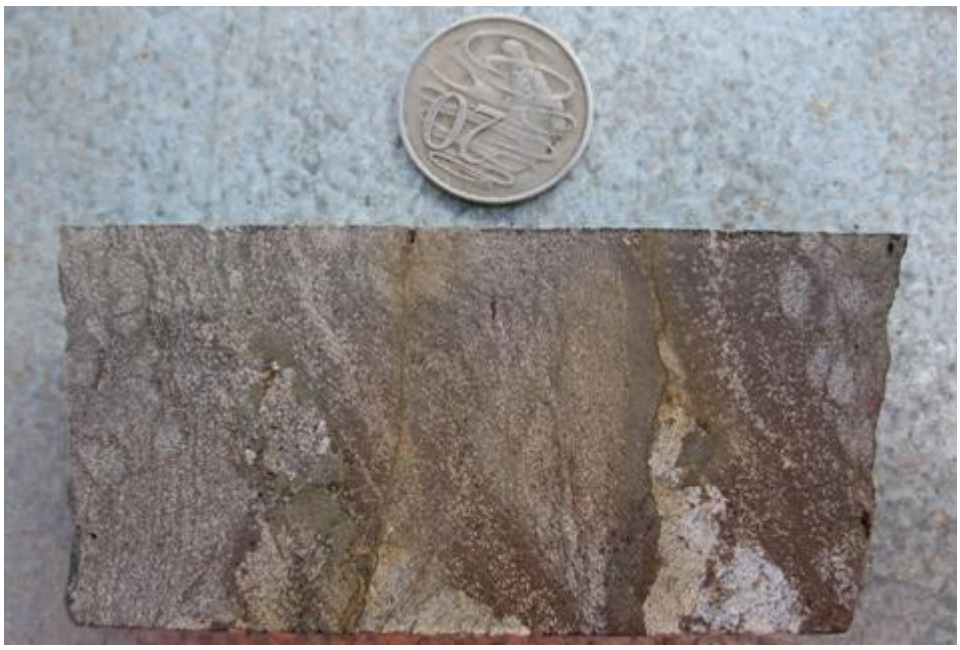


Figure 2f)

Figure 2g)



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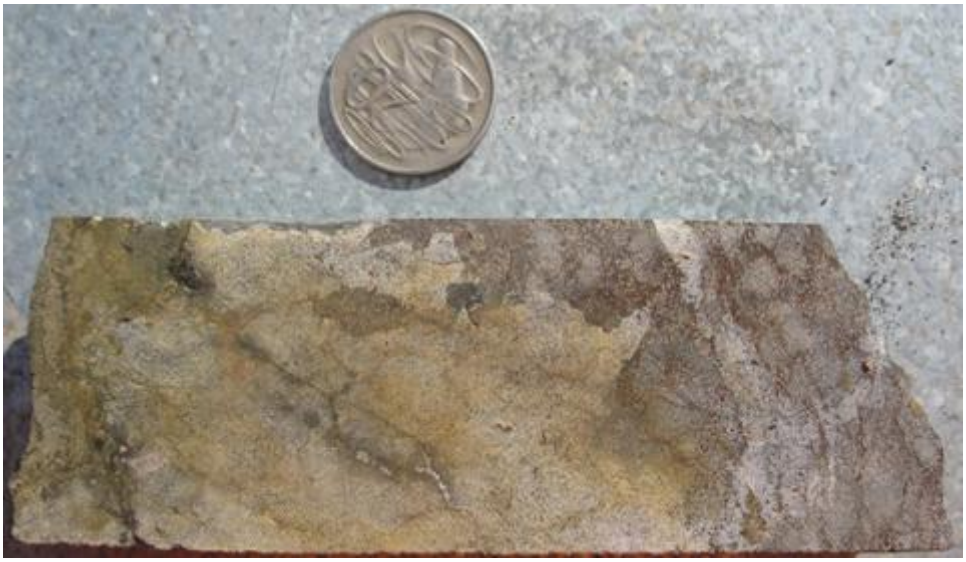
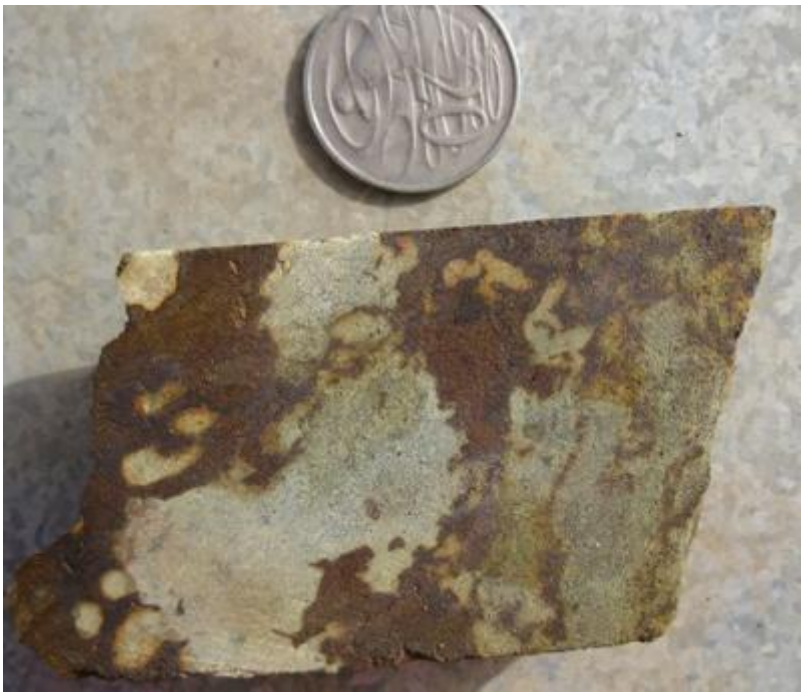


Figure 2i)

Figure 2j)



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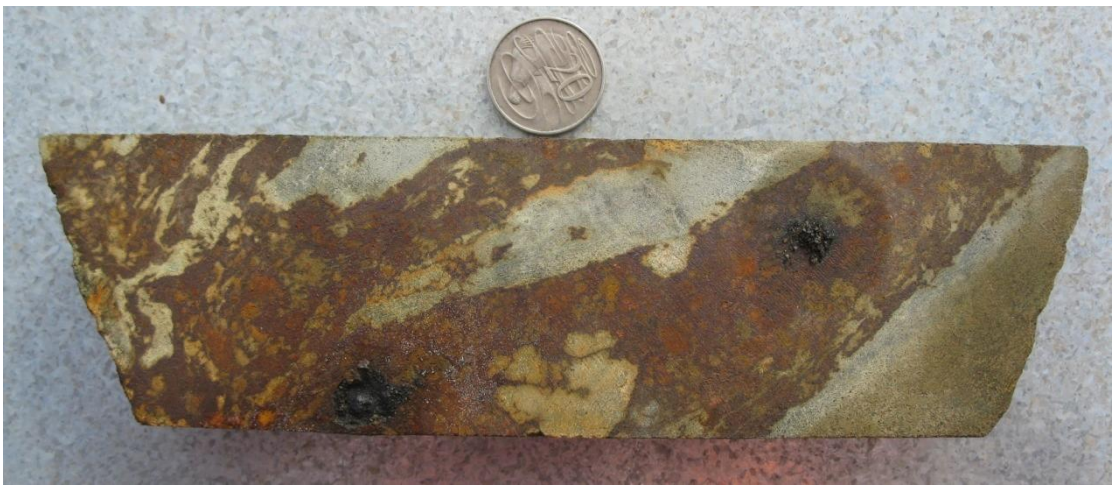

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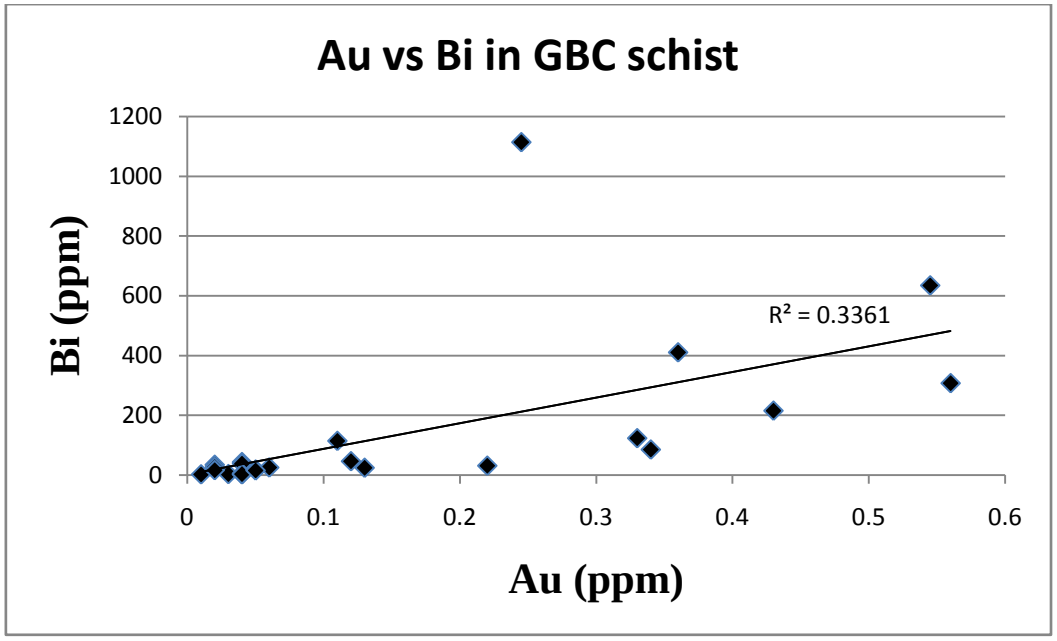

Figure 3a)

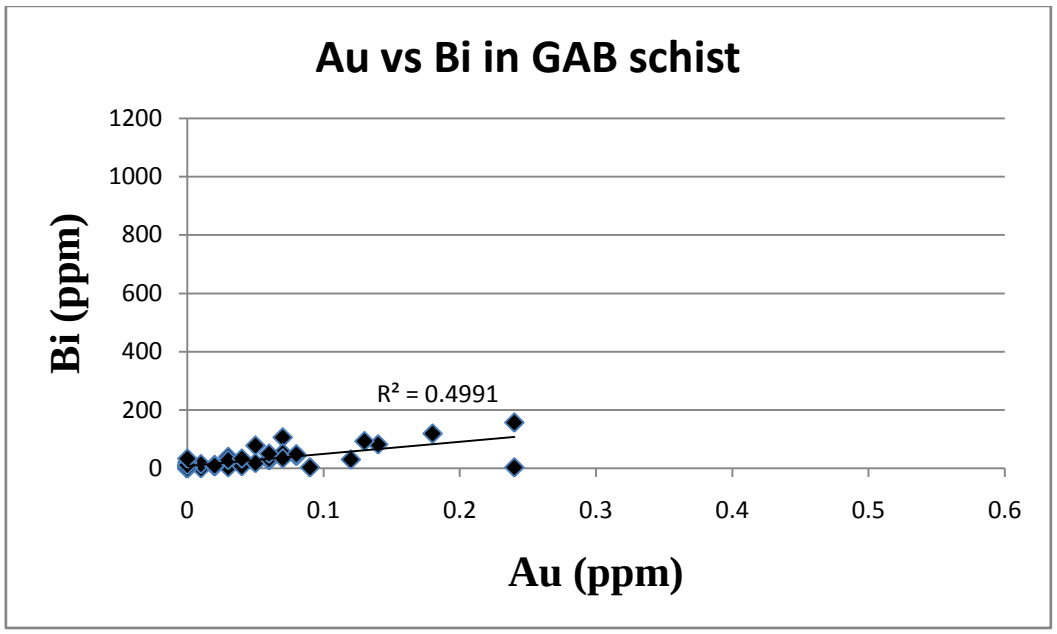

Figure 3b)

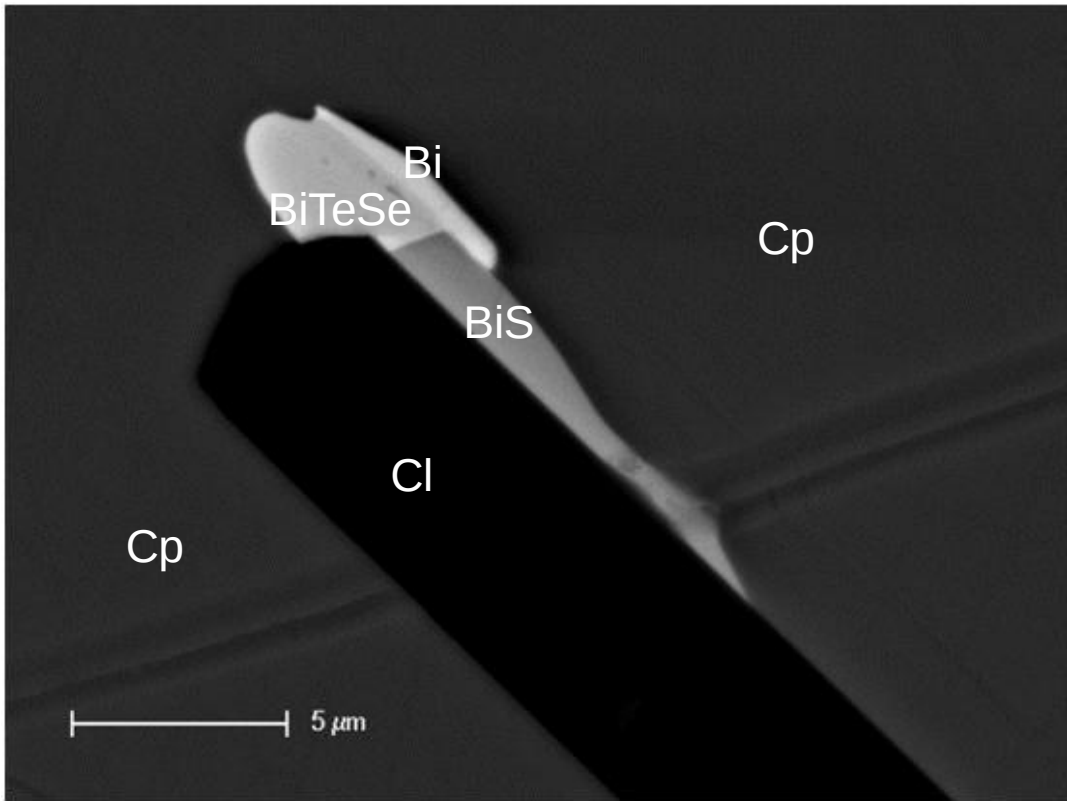

Figure 4a)

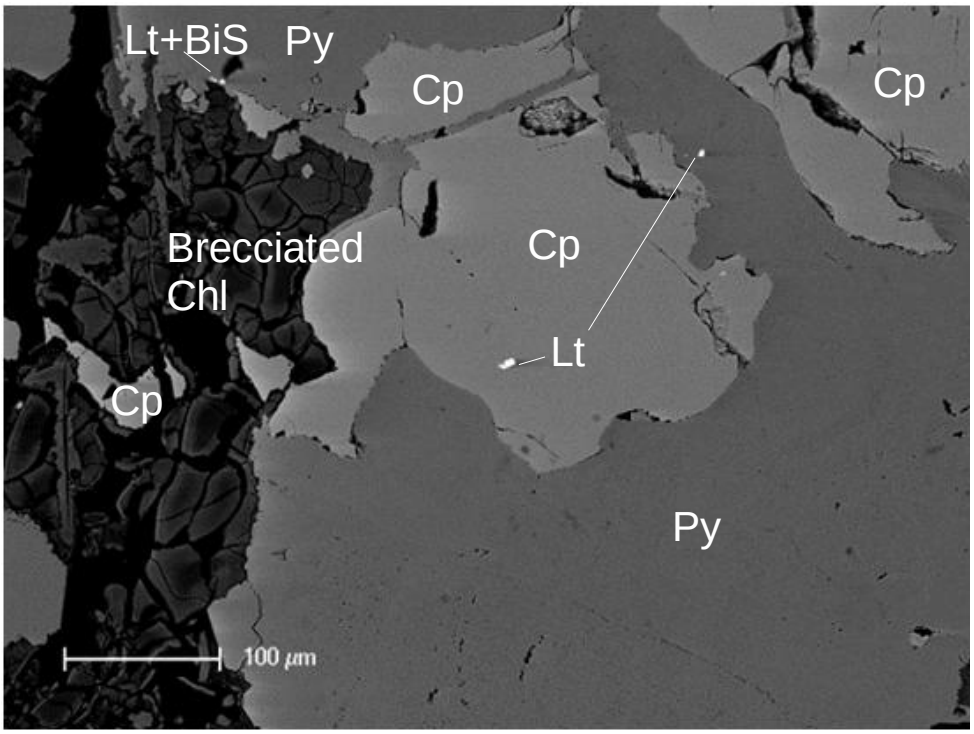

Figure 4b)

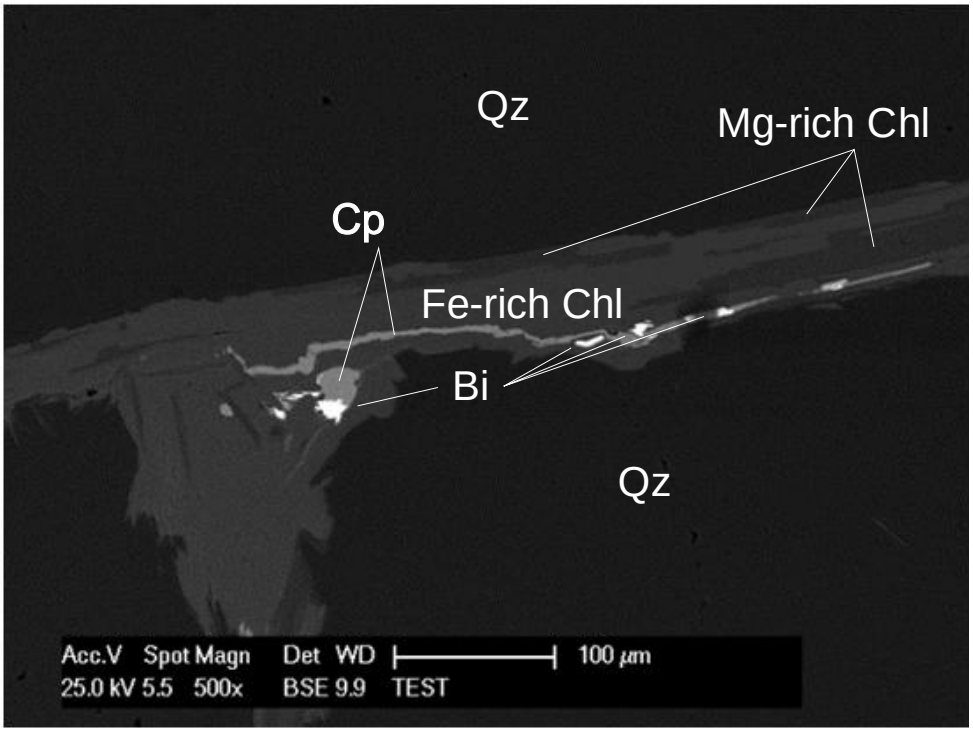

Figure 4c)

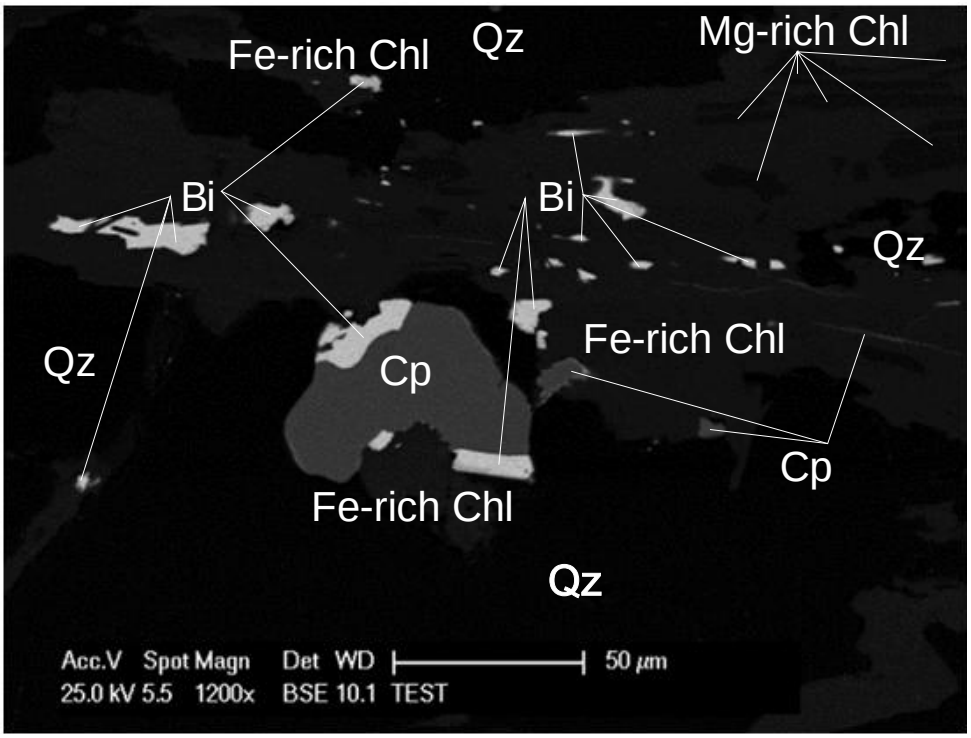

Figure 4d)

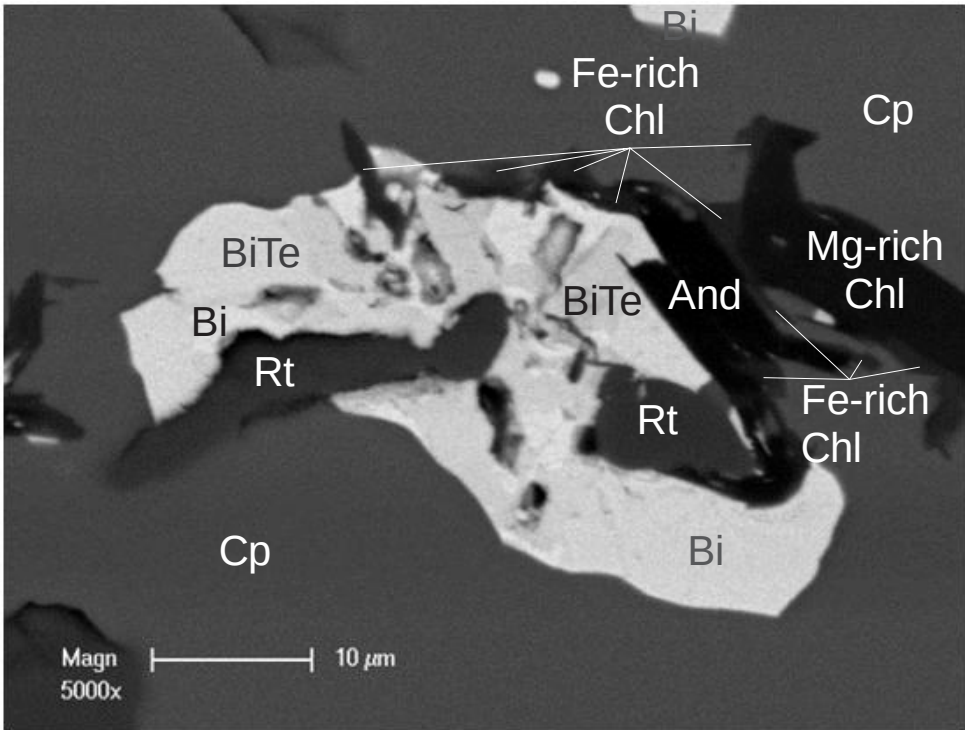

Figure 4e)

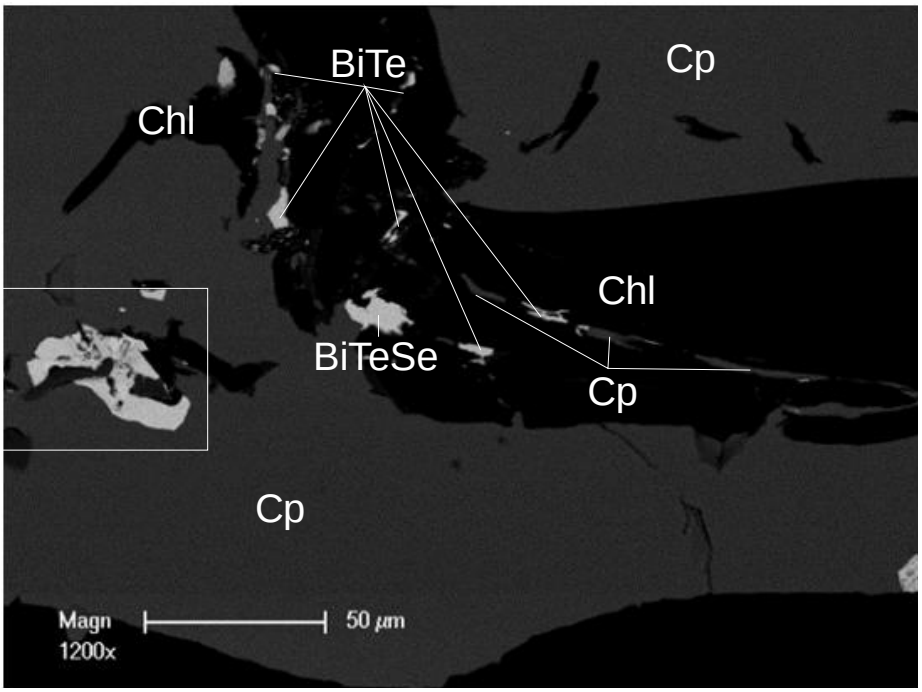

Figure 4f)

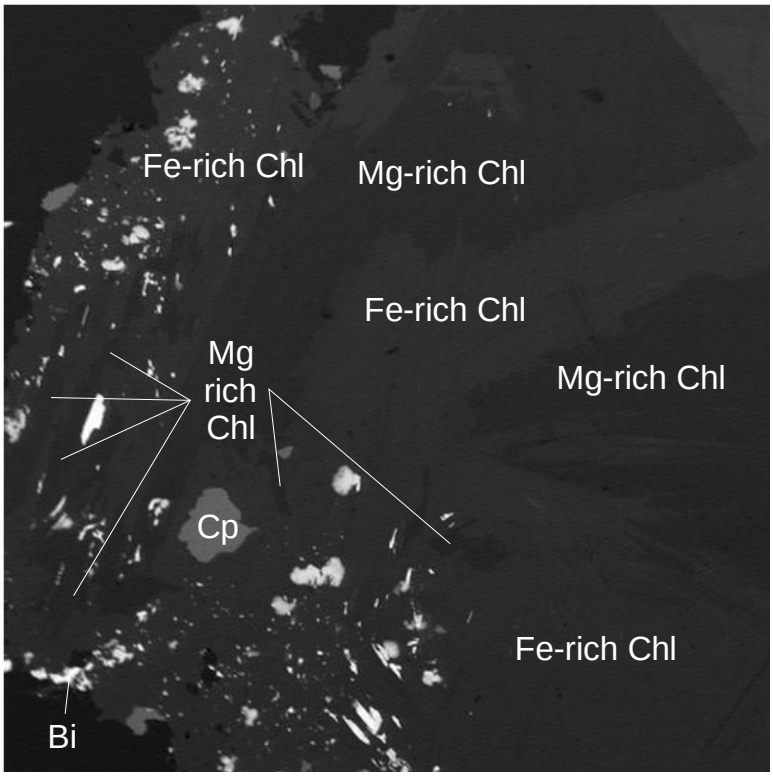

Figure 4g)

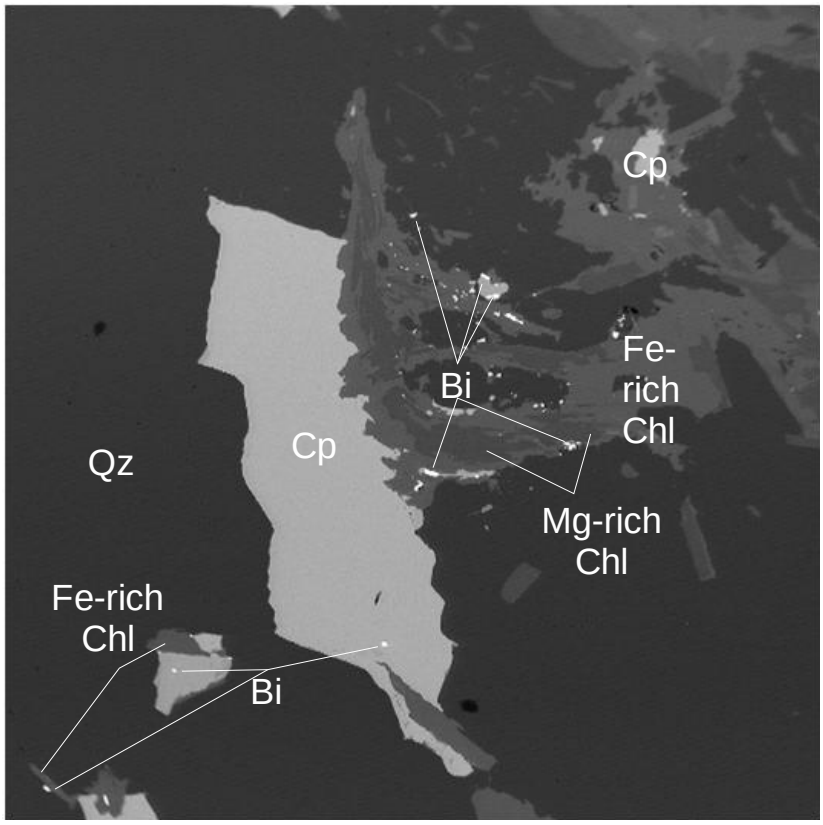

Figure 4h)

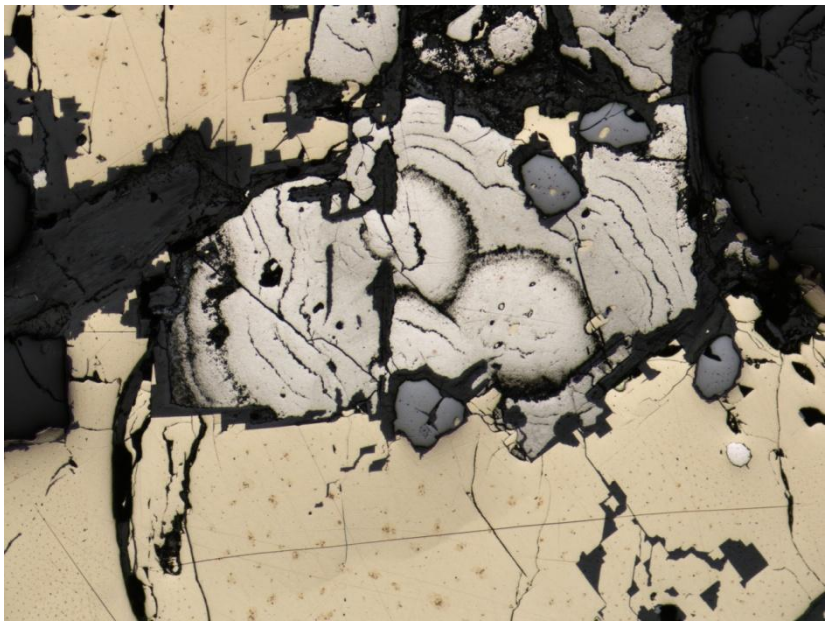

Figure 4i)

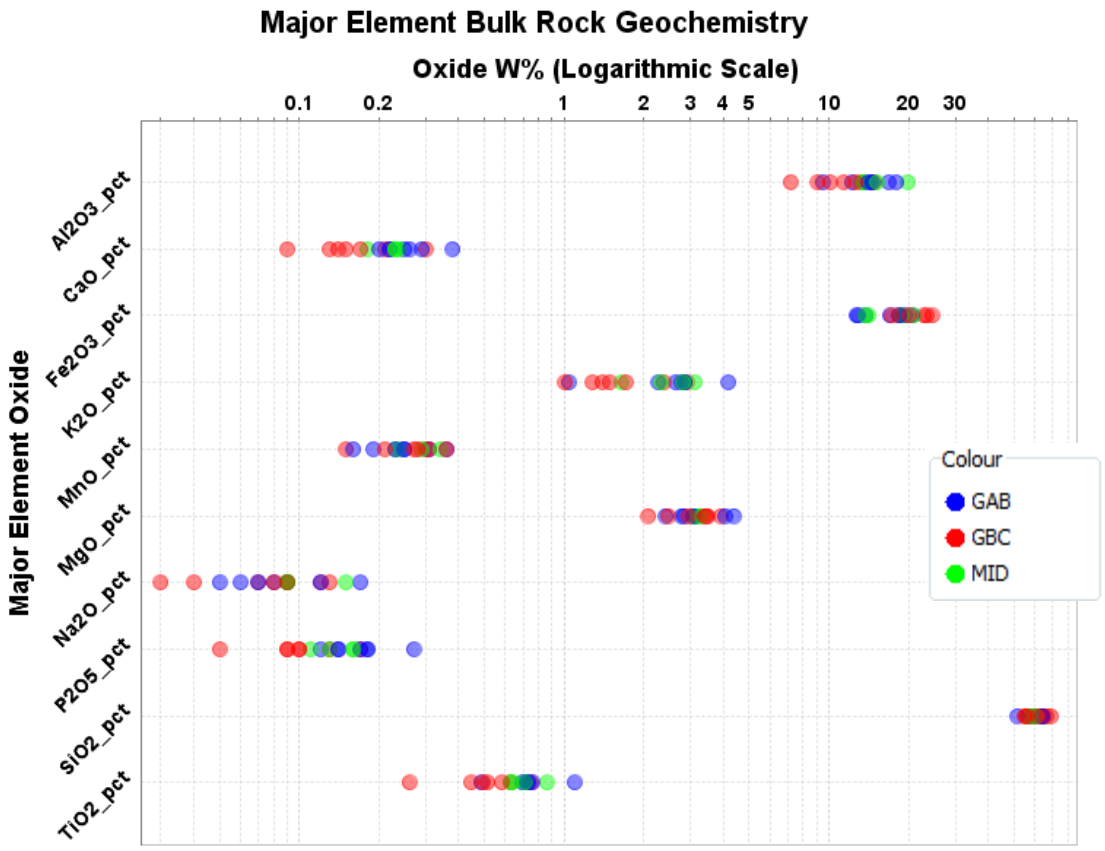
Major Element Bulk Rock Geochemistry
Oxide W% (Logarithmic Scale)
0.1
0.2
1
2
3
4
5
10
20
30
Major Element Oxide
Al2O3_Pct
CaO_Pct
Fe2O3_Pct
K2O_Pct
MnO_Pct
MgO_Pct
Na2O_Pct
P2O5_Pct
SiO2_Pct
TiO2_Pct
Colour
GAB
GBC
MID

Figure 5a)

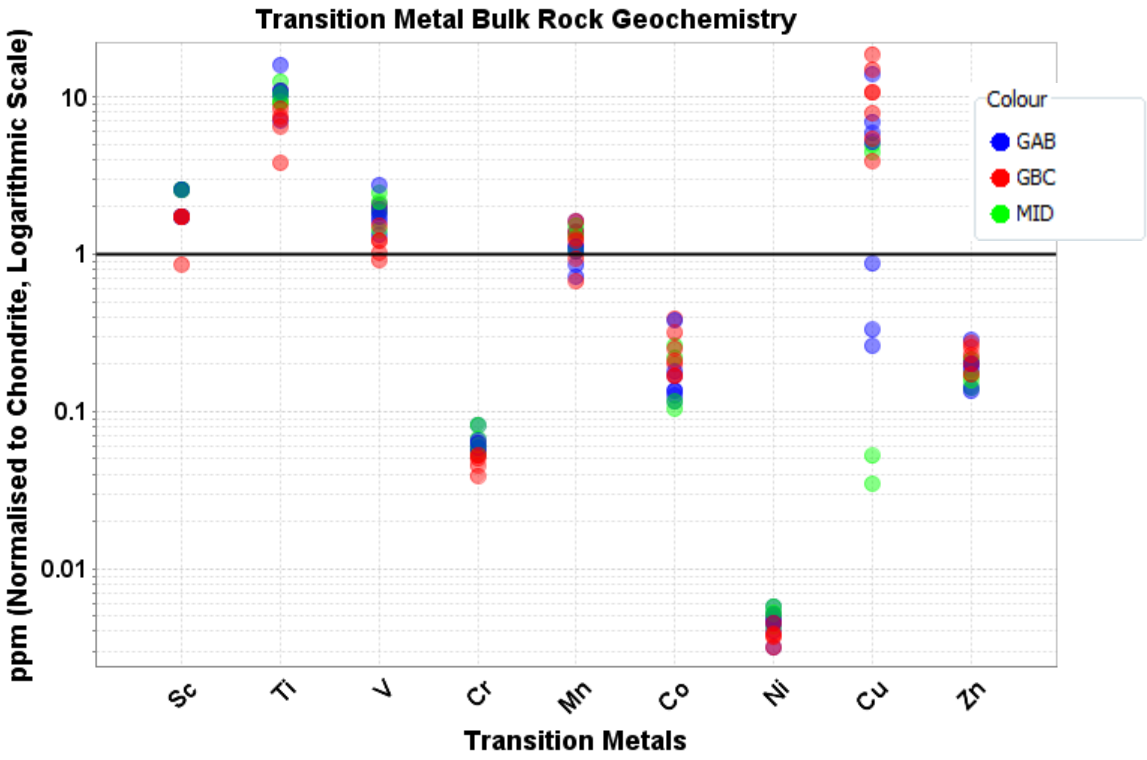

Figure 5b)

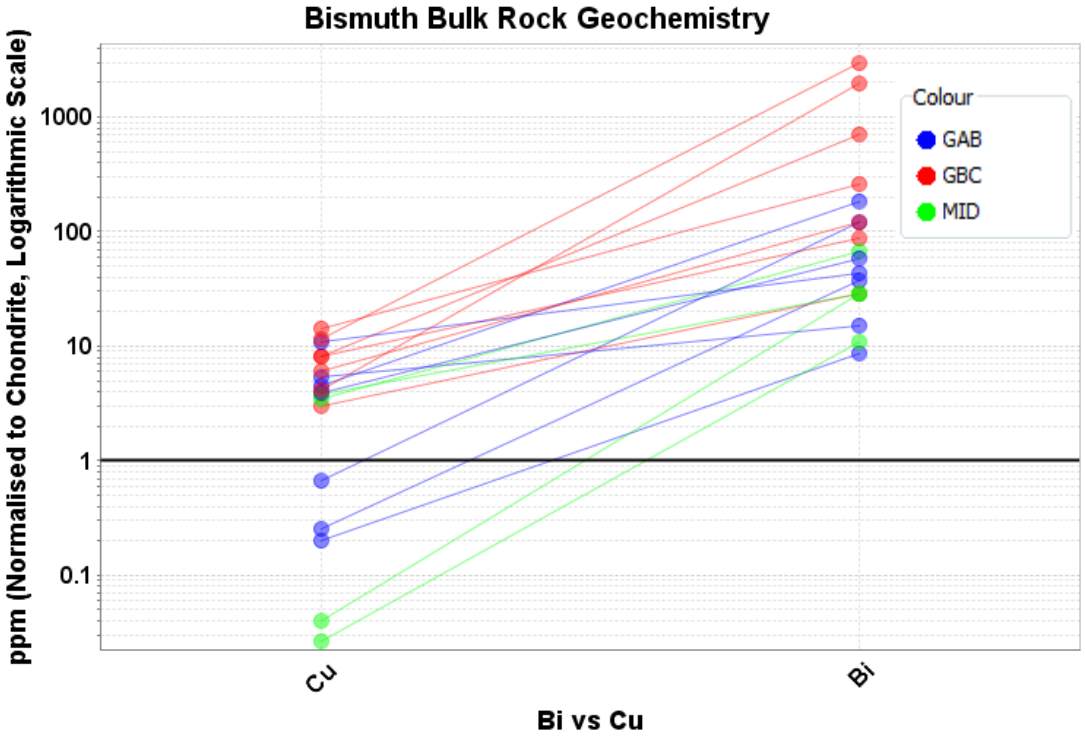

Figure 5c)

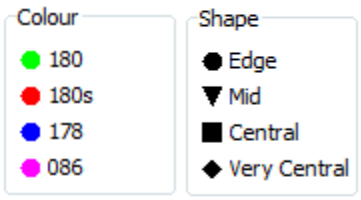

Figure 6a)

Garnet Composition Ternary Plot in wt%

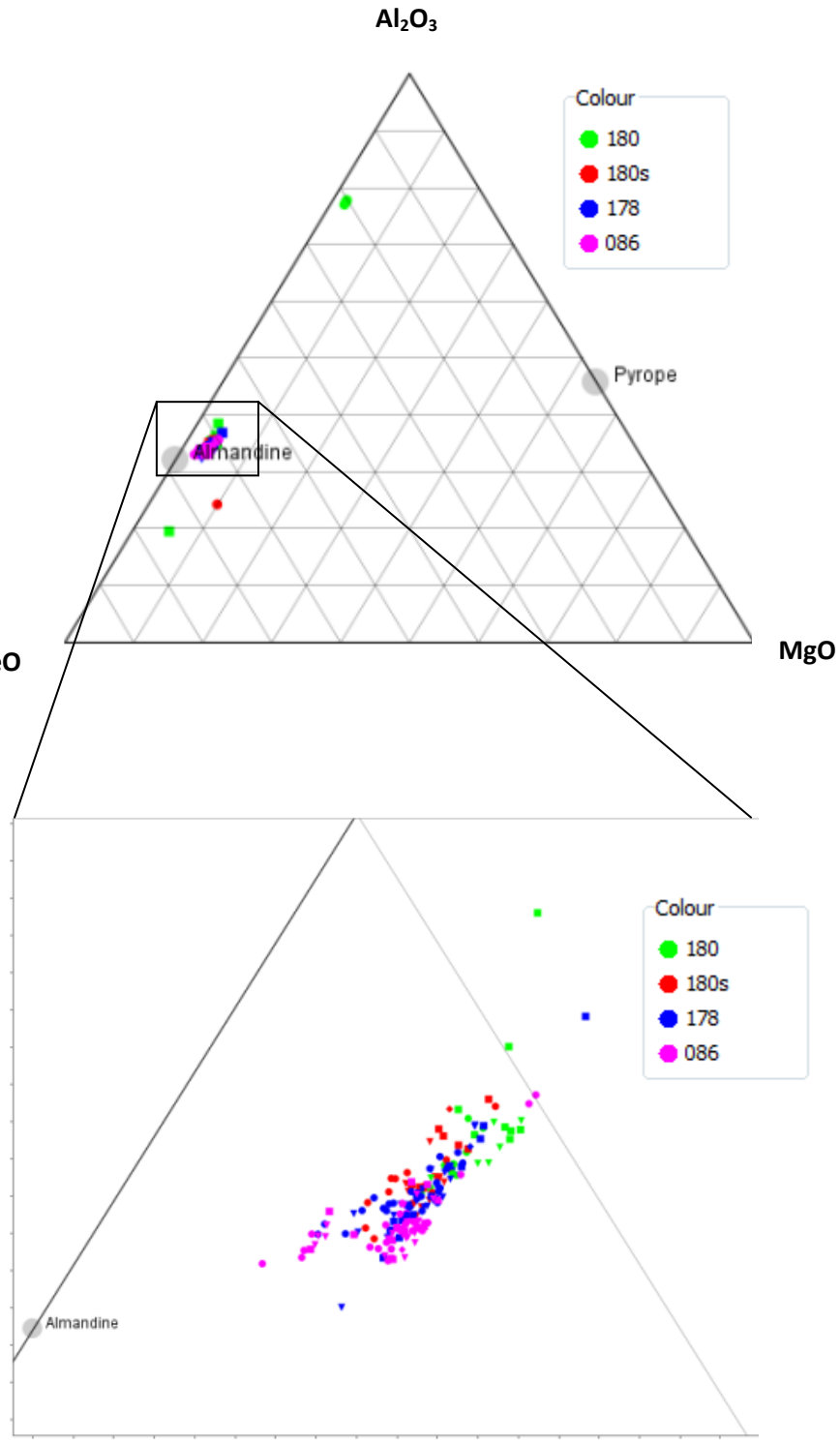

Figure 6b)

Figure 6c)

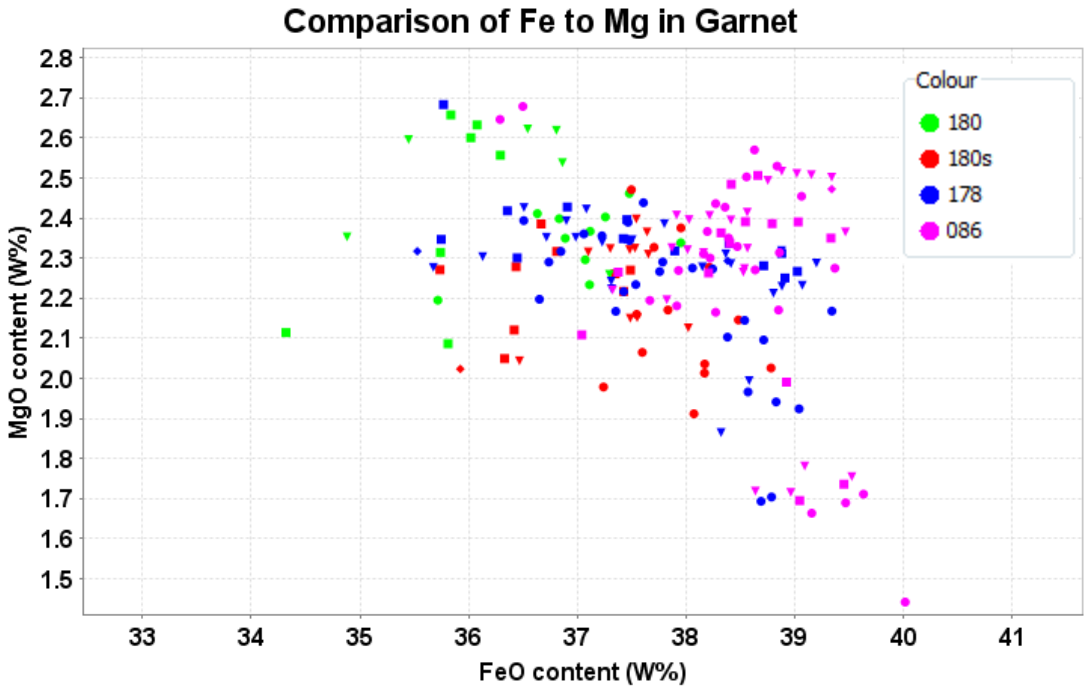

Figure 6d)

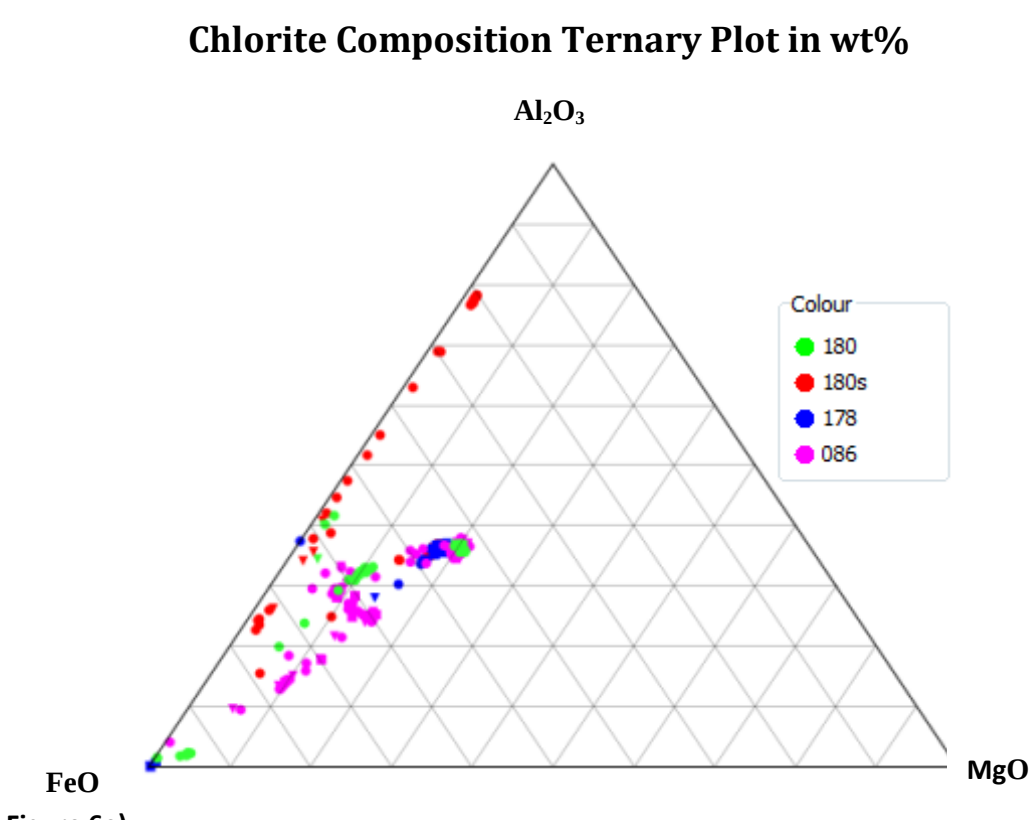

Figure 6e)

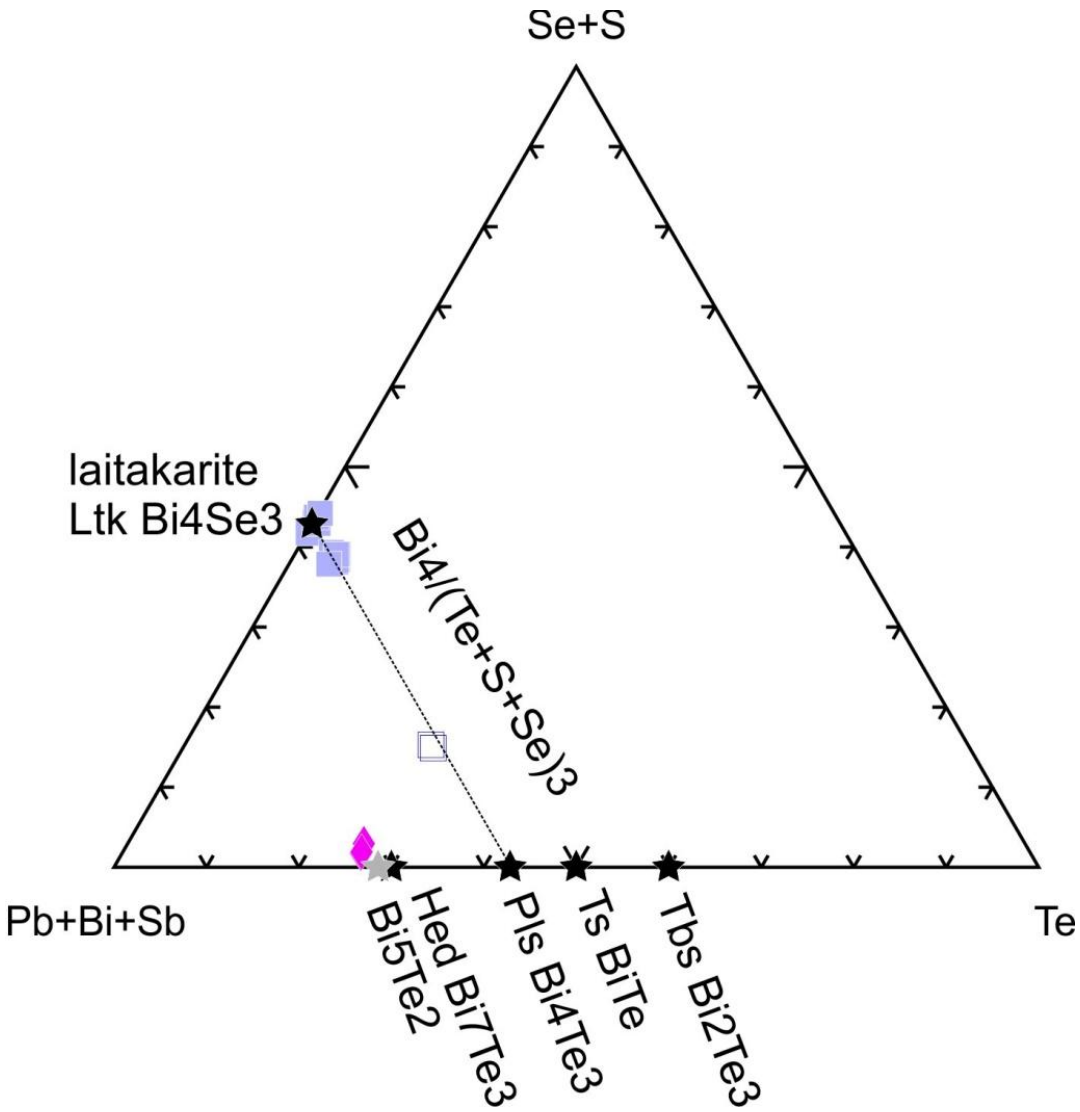
Se+S
laitakarite
Ltk Bi4Se3
Bi4/(Te+S+Se)3
Pb+Bi+Sb
Te
Hed Bi7Te3
Bi5Te2
Pls Bi4Te3
Ts BiTe
Tbs Bi2Te3

Figure 7)

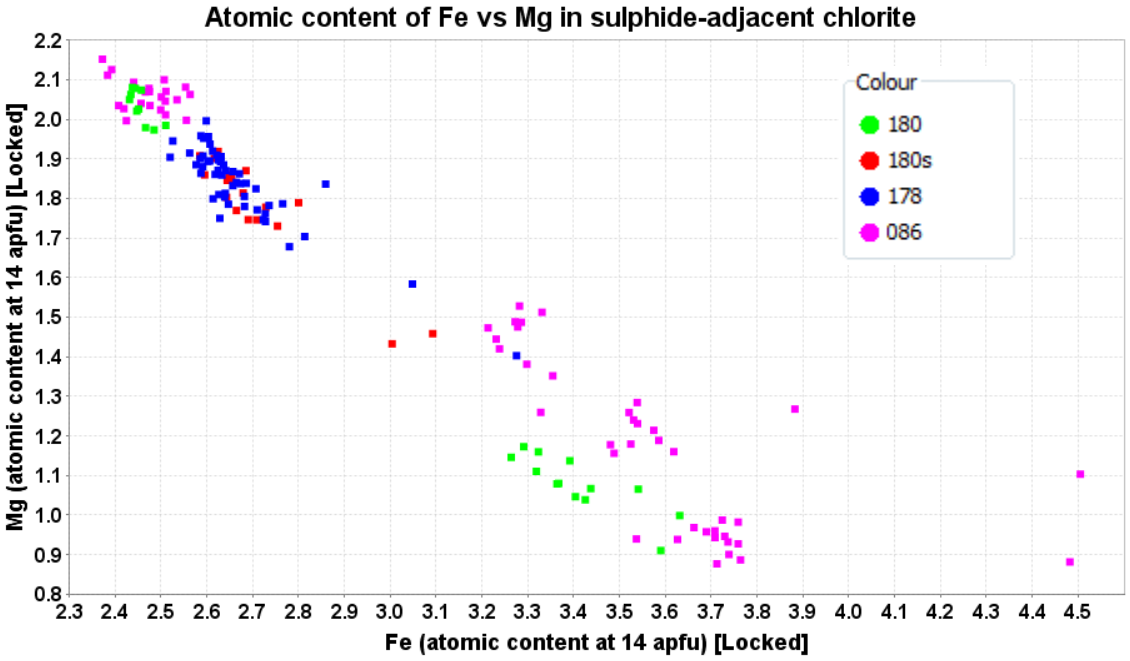

Figure 8a)

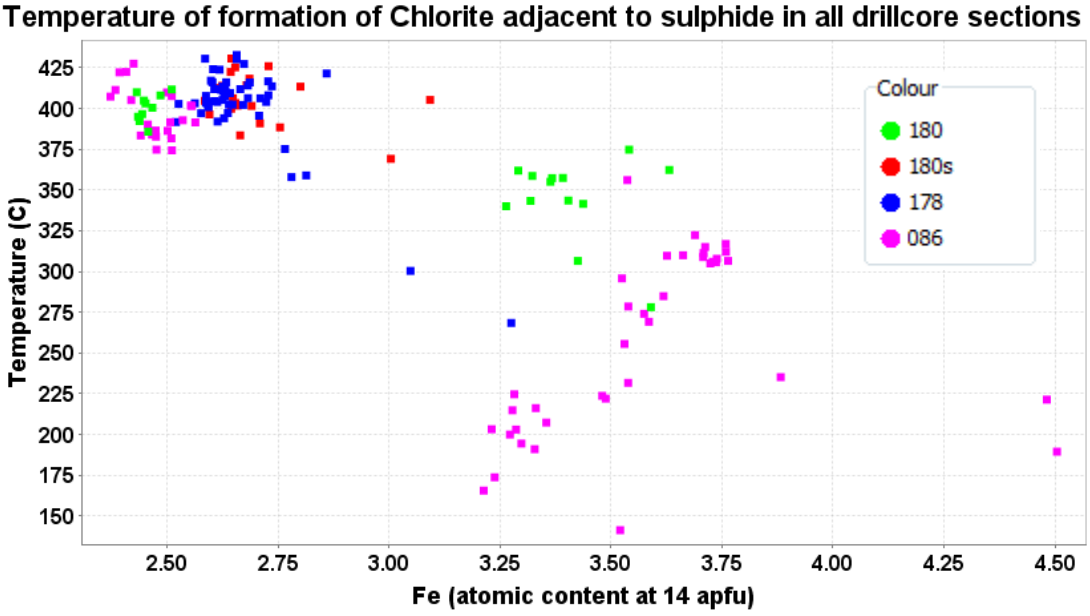

Figure 8b)

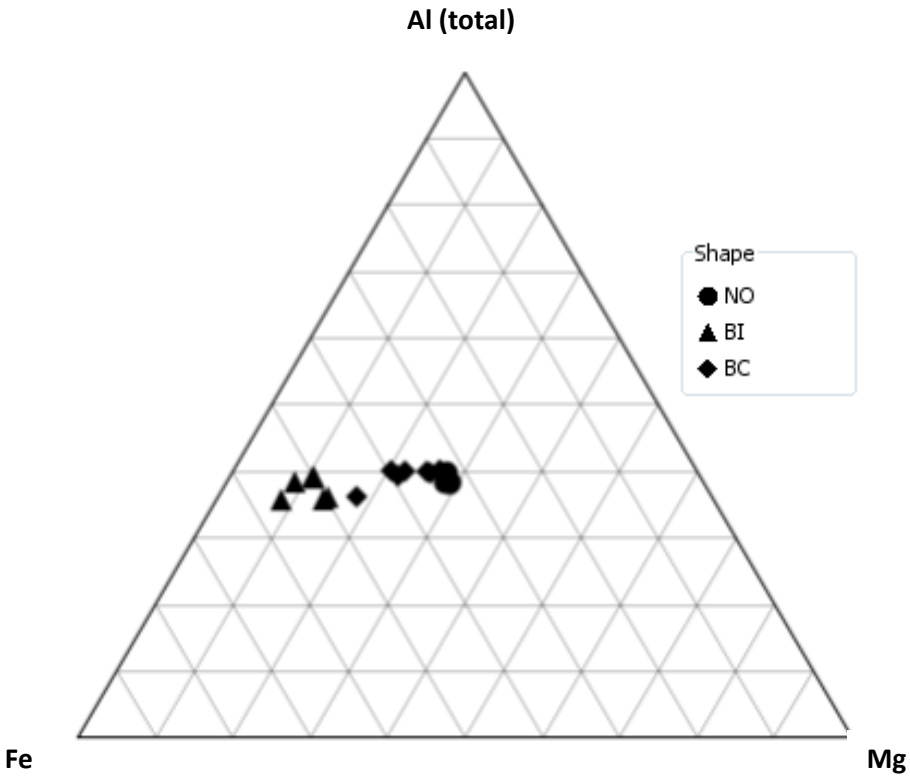

Figure 8c)

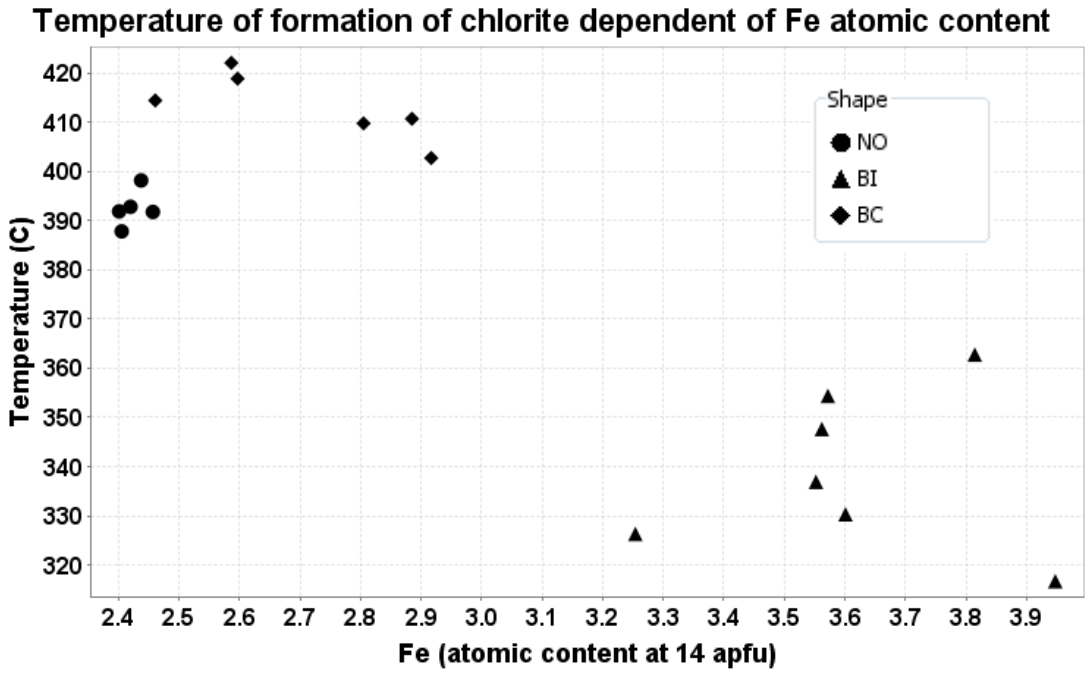

Figure 8d)

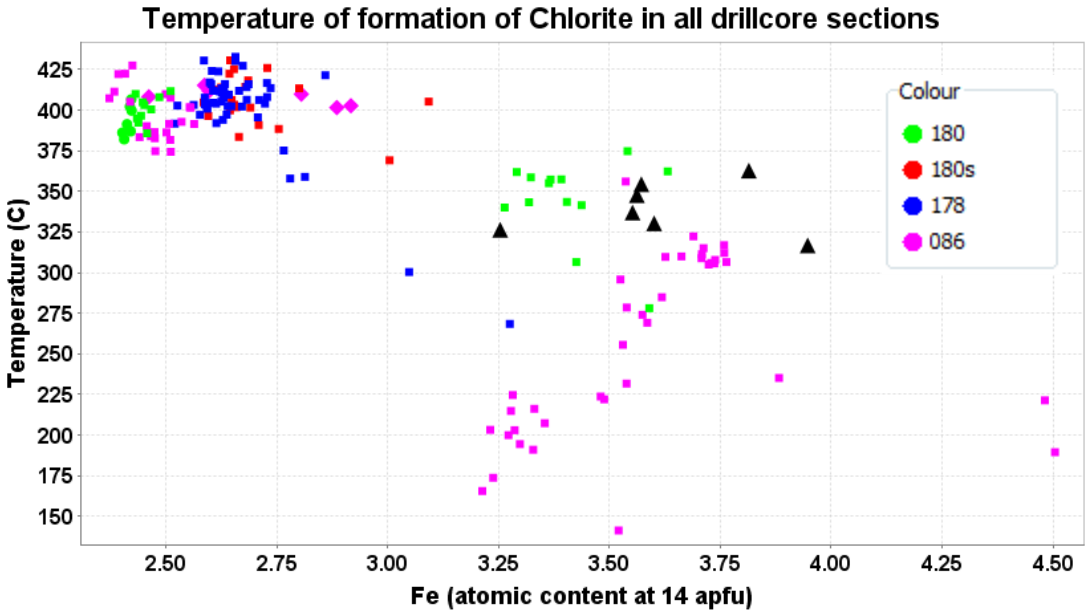

Figure 8e)

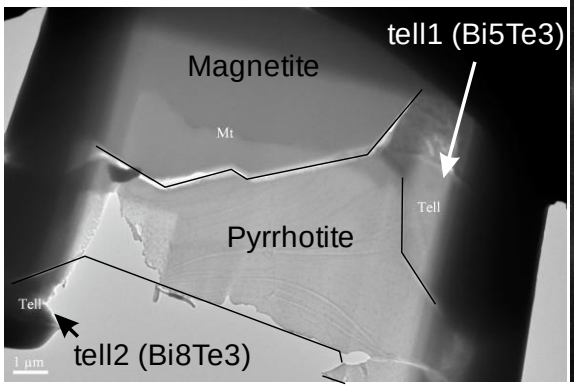

Figure 9a)

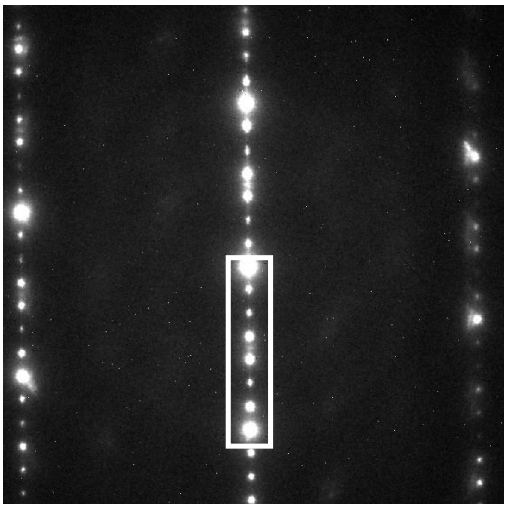

Figure 9b)

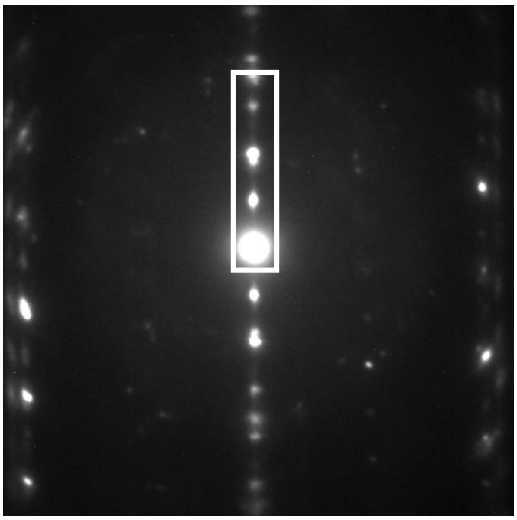

Figure 9c)

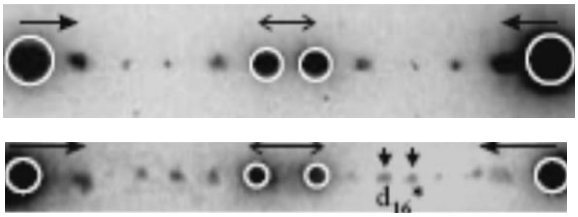

Figure 9d (top) and 9e (bottom)

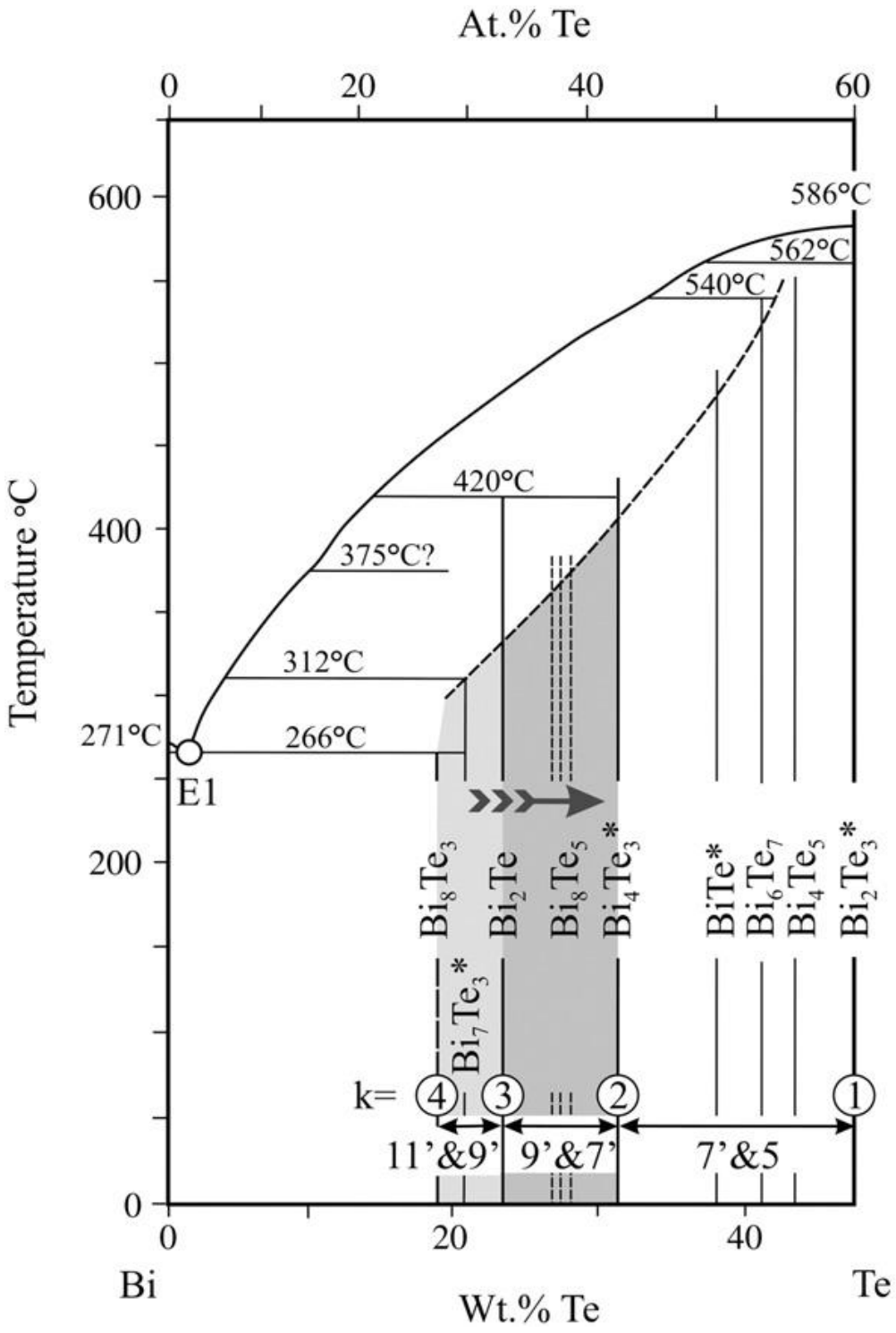
At.% Te
0
20
40
60
600
400
200
0
586°C
562°C
540°C
420°C
375°C?
312°C
271°C
266°C
E1
Temperature °C
Bi8Te3
Bi2Te
Bi8Te5
Bi4Te3*
BiTe*
Bi6Te7
Bi4Te5
Bi2Te3*
Bi7Te3*
k=
4
3
2
1
11'&9'
9'&7'
7'&5
0
20
40
Bi
Te
Wt.% Te

Figure 10)

Appendix A – Core Logging

Table #1 – Core Logging data for all four sections, showing depths, company assay results for Au, Ag, Cu and Bi, and core logging data and comments. Note that KTDD086 does not exhibit Bi compositional data.

KTDD180

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
224	225	-0.01	-0.1	0.0082	2	GAB	Gt 40% Bio 50% And 10% Staur <5% (?) Qz <5% (?)		
225	226	0.03	-0.1	0.0395	3	GAB/ GBC	Gt 30% Bio 35% And 5% Chl 25% Qz <5%		
226	227	0.04	0.2	0.0539	6	GBC	Gt 30% Bio 35% Chl 30% Qz 5%	Pyrite, Covellite (?) ± Chalcopyrite ± Pyrrhotite	
227	228	0.04	-0.1	0.0248	3	GBC	Gt 30% Bio 35% Chl 30% Mag <5%	Pyrrhotite, Chalcopyrite ± Pyrite	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Qz 5%		
228	229	0.04	-0.1	0.0534	4	GBC	Gt 30% Bio 35% Chl 30% Qz 5%		
229	230	-0.01	-0.1	0.0075	-2	GBC	Gt 30% Bio 30% And <5% Chl 30% Qz 5%	± Pyrrhotite ± Chalcopyrite	Relic andalusite blasts
230	231	-0.01	-0.1	0.0386	-2	GBC/ GAB	Gt 25% Bio 50% And 10% Chl 10% St <5%		
231	232	-0.01	0.8	0.2569	6	GAB	Gt 30% Bio 35% And 25% Chl 5% Staur 5%		
232	233	-0.01	-0.1	0.0703	6	GAB	Gt 30% Bio 35% And 25% Chl 5% Staur 5%		

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
233	234	0.13	0.1	0.0903	93	GAB	Gt 25% Bio 50% And 25% Chl <5%		Idiomorphic elongate andalusite blasts in no particular orientation => no stress. Heterogeneous.
234	235	-0.01	-0.1	0.0295	2	GAB	Gt 25% Bio 50% And 25% Chl <5%		
235	236	-0.01	-0.1	0.0473	2	GAB	Gt 25% Bio 50% And 25% Chl <5%		
236	237	-0.01	-0.1	0.0165	-2	GAB	Gt 25% Bio 50% And 25% Chl <5%		
237	238	-0.01	-0.1	0.0335	12	GAB	Gt 25% Bio 45% And 20% Chl <5% Qz 5%	Pyrrhottite, Pyrite ± Chalcopyrite ± Epidote	10cm wide pronounced qz vein. Minimal chlorite is proximal to veins.
238	239	0.03	0.1	0.0908	28	GAB	Gt 35% Bio 40% And 25%		
239	240	-0.01	-0.1	0.0225	6	GAB	Gt 35%		

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Bio 40% And 25%		
240	241	-0.01	-0.1	0.0184	-2	GAB	Gt 40% Bio 40% And 20% Chl <5%		
241	242	-0.01	-0.1	0.0865	3	GAB	Gt 40% Bio 40% And 15% Chl <5% Qz <5%	Pyrite	
242	243	0.02	-0.1	0.0524	6	GAB	Gt 30% Bio 40% And 20% Chl <5% Qz <5% Sulphides <5%	Pyrite ± Pyrrhotite	
243	244	0.04	-0.1	0.0688	7	GAB	Gt 35% Bio 35% And 20% Chl <5%% Qz 5% Sulphides <5%	Pyrite ± Chalcopyrite ± Pyrrhotite	
244	245	0.05	0.3	0.1979	18	GAB	Gt 30%	Pyrite,	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Bio 45% And 10% Chl 5% Qz 5% Sulphides <5%	Chalcopyrite	
245	246	0.08	0.3	0.1642	42	GAB	Gt 30% Bio 45% And 10% Chl 5% Qz 5% Sulphides <5%	Pyrite, Chalcopyrite ± Pyrrhotite	
246	247	0.02	0.3	0.1357	9	GAB	Gt 30% Bio 45% And 10% Chl 5% Qz 5% Sulphides <5%	Pyrite, Chalcopyrite	
247	248	0.06	0.2	0.1166	32	GAB	Gt 30% Bio 40% And 20% Qz 5% Sulphides <5%	Pyrite, Chalcopyrite	
248	249	0.12	0.2	0.112	30	GAB	Gt 30%	Pyrite,	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Bio 50% And 20%	Chalcopyrite	
249	250	0.36	0.8	0.2384	411	GBC	Gt 15% Bio 40% Chl 30% Qz 10% Sulphides <5%	Pyrite, Chalcopyrite ± Pyrrhotite/ Magnetite	Cross-core fracture changes orientation by 60°. Qz infill has red discolouration, implying ferruginous fluids.
250	251	0.07	0.5	0.1954	34	GAB	Gt 30% Bio 40% And 25% Qz 5%	Pyrite, Chalcopyrite	
251	252	0.06	1.2	0.5684	50	GAB	Gt 30% Bio 45% And 10% Chl <5% Qz 5% St <5% (?) Sulphides <5%	Pyrite, Chalcopyrite	Andalusite diffuse. Proximal chlorite alteration at veins, with minimal genetic chlorite grains.
252	253	0.08	1.1	0.3956	48	GAB	Gt 30% Bio 45% And 10% Chl <5% Qz 5% St <5% (?)	Pyrite, Chalcopyrite	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Sulphides <5%		
253	254	0.18	0.9	0.4375	119	GAB	Gt 30% Bio 40% And 25% Qz <5% Sulphides <5%	Pyrite, Chalcopyrite	
254	255	0.04	0.2	0.0545	33	GAB	Gt 30% Bio 40% And 25% Qz <5% Sulphides <5%	Pyrrhotite (?)	Conjugate fractures evident.
255	256	-0.01	-0.1	0.015	2	GAB	Gt 30% Bio 40% And 25% Qz <5% Sulphides <5%		
256	257	-0.01	-0.1	0.0291	-2	GAB	Gt 30% Bio 40% And 25% Qz <5% Sulphides <5%		
257	258	-0.01	-0.1	0.0302	-2	GAB	Gt 30%		Contains prismatic (almost needle-like) grains

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Bio 40% And 20% Chl 5% Staur <5%		protruding from andalusite boundaries, presumed to be staurolite
258	259	-0.01	-0.1	0.015	20	GAB	Gt 30% Bio 35% And 15% Chl <5% St 5% Qz 10%	Pyrite	Heterogeneous chlorite and ferrous alteration.
259	260	-0.01	1.3	0.3263	11	GAB	Gt 30% Bio 40% And 20% Chl 5% Staur <5%	Pyrite, Chalcopyrite ± Pyrrhotite	
260	260	-0.01	-0.1	0.0223	33	GAB	Gt 30% Bio 40% And 20% Chl 5% Staur <5%		

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Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
44	45	0.13	1.6	0.6438	25	GBC	Gt 20% Bio 10% Chl 40% Qz 10% Mag 10% St <5% (?) Sulphides <5%	Qz (blasts within magnetite veining) ± Pyrrhotite	Magnetite is exceptionally pervasive, with some veins being approx. 15cm in width.
45	46	0.05	1.1	0.5385	19	GBC	Gt 20% Bio 10% Chl 40% Qz 5% Mag 10% St <5% (?) Sulphides <5%	Sulfosalts (orange)	Orange sulfosalts spatially associated with magnetite veins)
46	47	0.06	1.2	0.6727	26	GBC	Gt 20% Bio 10% Chl 40% Qz 10% Mag 10% St <5% (?) Sulphides <5%	Chalcopyrite /Pyrite, Low T disseminated Pyrite, Sulfosalts (white, yellow)	
47	48	0.05	0.8	0.3954	16	GBC	Gt 20% Bio 10%	Sulfosalts (white, yellow)	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Chl 40% Qz 5% Mag 10% St <5% (?) Sulphides <5%		
48	49	0.12	2.1	1.0825	47	GBC	Gt 20% Bio 10% Chl 40% Qz 10% Mag 10% St <5% (?) Sulphides <5%	Chalcopyrite, Pyrite, Sulfosalts (white, yellow) ± Pyrrhotite ±Magnetite	Qz vein hosted mineralisation, despite ± magnetite infill.
49	50	0.34	2.5	1.1427	86	GBC	Gt 20% Bio 10% Chl 40% Qz 10% Mag 10% St <5% (?) Sulphides <5%	Chalcopyrite, Pyrite, Second Gen Garnet, Black tabular (0.5mm-1.5mm) grains (unidentified).	Unidentified mineral most likely magnetite.
50	51	0.33	12.3	4.3333	124	GBC	Gt 20% Bio 10% Chl 40% Qz 10%	Chalcopyrite (extensive aggregates), Pyrite, Sulfosalts (black, white, yellow, orange), ±	Staurolite is spatially associated with qz vein, thus does not infer a + staurolite lithological

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Mag 10% St 5% Sulphides <5%	pyrrhotite	change. Heavily fractured.
51	52	0.245	1.9	0.5243	1114	GBC	Gt 20% Bio 20% Chl 30% Qz 10% Mag 10% St 5% Sulphides <5%	Chalcopyrite, Pyrite, Sulfosalts (pervasive black, white, yellow) ±Pyrrhotite	Heavily fractured.
52	53	0.02	1.6	0.3433	17	GBC	Gt 20% Bio 20% Chl 30% Qz 10% Mag 10% St 5% Sulphides <5%	Chalcopyrite, Pyrite, Sulfosalts (black, white, yellow) ± Pyrrhotite	

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Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundance	Mineralisation	Comments

116	117	0.09	-0.1	0.0233	3	GAB	Gt 40% Bio 40% And 10% Chl <5% Mag <5% Py <5%	Pyrite (disseminated) ± Epidote	Proximal Chlorite alteration in parts. Magnetic vein cross-cuts fabric at 30°. Post-magnetite mineralisation orthogonal veining.
117	118	0.24	-0.1	0.0361	3	GAB	Gt 40% Bio 40% And 15% Mag 5% Chl <5%	Pyrite (disseminated) ± Epidote	Sulfosalts present.
118	119	0.01	-0.1	0.002	-2	GAB	Gt 30% Bio 40% And 30% Chl <5%	Pyrite (disseminated)	Homogeneous.
119	120	0.02	0.1	0.002	4	GABS/ GBC	Gt 30% Bio 30% And 10% Chl 15% Mag 5% St 10%	Pyrite (disseminated)	Boundary at 119.7m.
120	121	0.03	2.2	0.0351	4	GBC	Gt 25% Bio 35% And <5% Chl 20% Mag 5% St 10% (?)	Pyrite (disseminated), ± Pyrrhotite ± Chalcopyrite	Chlorite envelopes protruding from mag veins.
121	122	-0.01	0.1	0.0795	2	GBC	Gt 30% Bio 30%	Pyrrhotite, Pyrite (disseminated and	Chlorite alteration around mineralised veins.

							And <5% Chl 20% Mag <5% St 10% (?) Epidote <5% (?)	aggregated), Chalcopyrite	
122	123	0.01	0.2	0.1429	3	GBC	Gt 25% Bio 30% And <5% Chl 20% Mag 5% Sufides <5% St 10% (?)	Pyrrhotite, Pyrite (disseminated and aggregated), Chalcopyrite	Chlorite alteration around mineralised veins. Sulfosalts/carbonate infill present.
123	124	0.22	0.7	0.373	32	GBC	Gt 25% Bio 30% And <5% Chl 20% Mag 5% Sufides <5% St 10% (?)	Pyrrhotite, Pyrite, Chalcopyrite	Chlorite alteration around mineralised veins.
124	125	0.56	3.1	1.395	308	GBC	Gt 25% Bio 30% And <5% Chl 20% Mag 5% Sufides <5% St 10% (?)	Pyrrhotite, Pyrite (disseminated and aggregated), Chalcopyrite, ± Covellite ± Epidote	Chlorite alteration around mineralised veins.
124	125	0.43	3.2	1.5554	216	GBC	Gt 25%	Pyrrhotite, Pyrite	Chlorite alteration around

							Bio 30% And <5% Chl 20% Mag 5% Sufides <5% St 10% (?)	(disseminated and aggregated), Chalcopyrite, ± Covellite ± Epidote	mineralised veins.
125	126	0.545	3.8	1.4261	635	GBC/ GAB	Gt 35% Bio 30% And 5% Chl 20% Mag 10% St <5% (?)	Quartz, Chalcopyrite, ± Pyrite, ± Pyrrhotite ± Covellite ± Epidote	Chlorite alteration quite pervasive.
126	127	0.04	0.5	0.2941	44	GBC	Gt 35% Bio 30% And<5% Chl 25% Mag 5% St <5% (?)	Chalcopyrite, Pyrite (both disseminated and aggregated) ± Pyrrhotite	Heavy chlorite alteration.
127	128	0.02	0.7	0.4184	35	GBC	Gt 35% Bio 30% And<5% Chl 25% Mag 5% St <5% (?)	Chalcopyrite, Pyrite (disseminated and aggregated)	Heavy chlorite alteration.
128	129	0.02	0.2	0.1773	27	GBC	Gt 35% Bio 30% And<5% Chl 25%	Chalcopyrite, Pyrite (disseminated and aggregated), Sulfosalts	Heavy chlorite alteration.

							Mag 5% St <5% (?)		
129	130	-0.01	-0.1	0.0487	-2	GABS	Gt 15% Bio 25% And 25% Chl <5% Mag 5% Staur 25%	Pyrite (disseminated)	Andalusite diffuse. Slight discrete chlorite alteration zones around mag veins. Staurolite intergrown in and around andalusite.
130	131	-0.01	-0.1	0.0446	-2	GABS	Gt 15% Bio 25% And 25% Chl <5% Mag 5% Staur 25%	Pyrite (disseminated)	Andalusite diffuse. Slight discrete chlorite alteration zones around mag veins. Staurolite intergrown in and around andalusite.
131	132	-0.01	-0.1	0.132	9	GABS/ GBC	Gt 30% Bio 20% And 10% Chl 20% Mag <5% Staur 10% Qz 5%	Pyrite (disseminated)	Strong chlorite alteration.
132	133	-0.01	0.1	0.1391	5	GBC	Gt 30% Bio 35% Chl 25% Mag 5% Qz 5% (?)	Pyrite (disseminated)	Strong chlorite alteration.
133	134	0.11	-0.1	0.0593	115	GBC/ GAB	Gt 35% Bio 35% And 15%	Quartz, Chalcopyrite, Pyrite (disseminated and	Strong chlorite alteration.

							Chl 15% Mag <5% Qz <5%	aggregated)	
134	135	0.07	0.1	0.0387	106	GAB	Gt 30% Bio 35% And 30% Chl <5% Mag <5%	Quartz, Chalcopyrite, Pyrite (disseminated and aggregated), ± Pyrrhotite	
135	136	0.14	0.1	0.0827	82	GAB	Gt 30% Bio 45% And 20% Chl <5% Mag <5%	Pyrite (disseminated)	High strain zone indicated by elongate andalusite blasts.
136	137	0.01	-0.1	0.0639	14	GAB	Gt 30% Bio 45% And 20% Chl <5% Mag <5%	Pyrite (disseminated)	High strain zone indicated by elongate andalusite blasts.
137	138	0.04	0.1	0.0807	39	GBC	Gt 30% Bio 30% And 5% Chl 20% Mag 5% St 10%	Pyrite (disseminated)	Strong chlorite envelopes around mag veins. Sulfosalts present.
138	139	0.24	0.3	0.0828	157	GAB	Gt 25% Bio 45% And 25% Py <5%	Chalcopyrite, Pyrite (disseminated and aggregated), Pyrrhotite	
139	140	0.07	0.2	0.0835	52	GAB	Gt 25%	Pyrite	

							Bio 45% And 25% Py <5%	(disseminated)	
140	141	0.06	-0.1	0.0328	27	GAB	Gt 25% Bio 45% And 25% Py <5%	Pyrite (disseminated)	
141	142	0.02	-0.1	0.0344	8	GAB	Gt 25% Bio 45% And 25% Py <5%	Pyrite (disseminated) ± Chalcopyrite	
142	143	0.02	-0.1	0.0639	11	GAB	Gt 25% Bio 45% And 25% Py <5%	Pyrite (disseminated)	
143	144	0.05	0.2	0.0909	78	GAB	Gt 25% Bio 40% And 25% Chl <5% Mag <5% Py <5%	Pyrite (disseminated)	Sulfosalts/carbonates present.
144	145	0.03	-0.1	0.0137	39	GAB	Gt 25% Bio 45% And 25% Py <5%	Pyrite (disseminated)	

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Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
131	132	0.02	1	0.174		GBC	Gt 20% Bio 20% And 5% Chl 30% Qz 25%		
132	133	-0.01	-1	0.026		GAB	Gt 20% Bio 40% And 20% Chl 5% Qz 10% St <5% Musc <5% (?)		Diffuse Andalusite, possibly due to staurolite genesis.
133	134	-0.01	-1	0.0154		GAB	Gt 20% Bio 40% And 20% Chl 5% Qz 10% St <5% Musc <5% (?)		Diffuse Andalusite, possibly due to staurolite genesis.
134	135	-0.01	-1	0.0189		GAB	Gt 20% Bio 40%		Diffuse Andalusite, possibly due to staurolite genesis.

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							And 20% Chl 5% Qz 10% St <5% Musc <5% (?)		
135	136	0.01	-1	0.0758		GAB	Gt 25% Bio 35% And 15% Chl 15% Qz 10% St <5% (?)		Heavily chloritised, proximal to a fracture at 135.8m with a pervasive chlorite halo.
136	137	-0.01	-1	0.0061		GAB	Gt 30% Bio 20% And 15% Chl <5% Qz 25% Musc <5% (?)		Biotite not dominant. Andalusite now idiomorphic.
137	138	-0.01	-1	0.0036		GAB	Gt 30% Bio 20% And 15% Chl <5% Qz 25% Musc <5% (?)		

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
138	139	-0.01	-1	0.0049		GAB	Gt 25% Bio 20% And 15% Chl <5% Qz 30%	± Pyrrhotite	More qz rich than previous GAB schist.
139	140	-0.01	-1	0.0224		GAB	Gt 25% Bio 20% And 15% Chl <5% Qz 30%	± Pyrrhotite ± Epidote	Particularly elongate andalusite blasts.
140	141	-0.01	-1	0.0517		GABS	Gt 20% Bio 30% And 15% Chl 10% St 5% Qz 20%	Pyrite ± Pyrrhotite	Heavily chloritised zone around qz vein. Qz abundance includes qz in matrix and in vein. Andalusite diffuse, possibly due to staurolite genesis.
141	142	-0.01	-1	0.0755		GABS	Gt 20% Bi 30% And 20% St 5% Qz 20%		
142	143	0.03	-1	0.2564		GABS /GBC	Gt 20% Bi 30% And 20% St 5%	Pyrite, Pyrrhotite ± Chalcopyrite	Boundary at 142.8m. Mineralisation occurs in veins and also vesicles (amygdaloidal)

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Qz 20%		
143	144	0.06	1	0.4752		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrite, Pyrrhotite, ± Chalcopyrite ± Bornite/ Covellite ± Chalcocite	Discrete abundances of gt and chl vary as seen by heterogeneous colouring from red to green.
144	145	0.17	-1	0.3774		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrrhotite	
145	146	0.15	1	0.6686		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrite, Pyrrhotite, Chalcopyrite ± Bornite/ Covellite ± Chalcocite	Well formed garnet spheres formed immediately adjacent to vein.
146	147	0.3	3	1.5011		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrite, Pyrrhotite, Chalcopyrite ± Bornite/ Covellite ± Chalcocite ± Unidentified silver lustrous mineral (bismuthinite ?)	
147	148	1.245	2	1.267		GBC	Gt 30% Bio 15%	Pyrite, Pyrrhotite, Chalcopyrite ±	Mineralisation mostly hosted by qz vein as opposed to

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Chl 30% Qz 20% St 5% (?)	Bornite/ Covellite ± Chalcocite ± Unidentified silver lustrous mineral (bismuthinite ?)	more common mag/pyrr host.
148	149	3.16	3	1.5505		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrite, Pyrrhotite, Chalcopyrite ± Bornite/Covellite	
149	150	0.04	1	0.6542		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrite, Pyrrhotite, Chalcopyrite	
150	151	0.2	4	1.5131		GBC	Gt 30% Bio 15% Chl 30% Qz 20% St 5% (?)	Pyrite, Pyrrhotite, Chalcopyrite ± Bornite/ Covellite	More well formed gt associated with qz vein boundary.
151	152	0.77	5	2.1163		GBC	Gt 20% Bio 25% Chl 30% Qz 20% Sericite <5% (?)	Pyrite, Pyrrhotite, Chalcopyrite ± Bornite/Covellite ± Chalcocite	Both parallel to fabric veining and decussate veining.

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Sulphides <5%		
152	153	0.05	2	1.1004		GBC	Gt 20% Bio 25% Chl 30% Qz 20% Sulphides <5%	Pyrite, Pyrrhotite, Chalcopyrite	
153	154	0.06	4	2.5025		GBC	Gt 20% Bio 25% Chl 30% Qz 20% Sulphides <5%	Pyrite, Pyrrhotite, Chalcopyrite	
154	155	0.04	2	0.7288		GBC	Gt 20% Bio 25% Chl 30% Qz 20% Sulphides <5%	± Pyrrhotite	
155	156	0.03	1	0.5664		GBC	Gt 20% Bio 25% Chl 30% Qz 20% Sulphides <5%	± Pyrrhotite	
156	157	0.1	3	0.9455		GBC	Gt 20%	Pyrite, Chalcopyrite ±	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Bio 25% Chl 30% Qz 20% Sulphides <5%	Pyrrhotite	
157	158	0.07	1	0.5491		GBC	Gt 20% Bio 25% Chl 30% Qz 20% Sulphides <5%	± Pyrrhotite	
158	159	0.58	2	1.0377		GBC	Gt 25% Bio 20% Chl 30% Qz 20% Sulphides <5%	Pyrrhotite ± Pyrite ± Chalcopyrite	More complex veining, no particular orientation.
159	160	0.26	2	0.7268		GBC	Gt 25% Bio 20% Chl 30% Qz 20% Sulphides <5%	Pyrrhotite ± Pyrite ± Chalcopyrite	
160	161	0.1	2	1.3916		GBC	Gt 25% Bio 20% Chl 30%	Pyrrhotite ± Pyrite ± Chalcopyrite	

Depth from (m)	Depth to (m)	Au (ppm)	Ag (ppm)	Cu (ppm)	Bi (ppm)	Lithology	Abundances	Mineralisation	Comments
							Qz 20% Sulphides <5%		
161	162	0.02	-1	0.0759		GBC	Gt 25% Bio 20% Chl 30% Qz 20% Sulphides <5%		

APPENDIX B - Garnet Label	1807_1	1807_4	1807_5	1807_13	1807_14	1807_15	1807_16	1807_17	1807_30	1807_31	1807_32	17812_1
Ox%(Ca)	0.02	0.00	0.01	0.31	1.59	1.67	1.71	1.62	1.52	1.41	0.30	0.69
Ox%(Na)	0.00	0.04	0.02	0.05	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.06
Ox%(K)	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.02
Ox%(Fe)	13.91	14.38	13.58	37.12	34.32	31.34	35.81	35.72	34.88	35.74	37.11	30.89
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.51	0.52	0.56	0.00	0.02	0.00	0.04	0.05	0.01	0.02	0.02	0.03
Ox%(Mg)	1.34	1.38	1.33	2.37	2.11	1.61	2.09	2.20	2.35	2.31	2.23	1.85
Ox%(Si)	25.56	26.39	25.94	35.47	35.24	35.19	36.55	36.21	34.06	34.27	34.16	51.55
Ox%(Mn)	0.04	0.07	0.12	1.78	3.31	6.11	2.08	2.39	1.79	1.75	1.68	1.57
Ox%(Cr)	0.01	0.01	0.02	0.00	0.01	0.00	0.01	0.02	0.00	0.03	0.00	0.00
Ox%(Al)	52.88	52.90	52.37	20.83	20.84	20.59	20.77	20.65	20.23	20.50	20.38	16.20
Total	**94.27**	**95.67**	**93.95**	**97.92**	**97.45**	**96.56**	**99.07**	**98.87**	**94.85**	**96.07**	**95.92**	**102.86**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.30	0.31	0.30	0.59	0.53	0.40	0.51	0.54	0.60	0.59	0.57	0.41
Fe	1.76	1.79	1.72	5.16	4.79	4.42	4.90	4.91	5.01	5.08	5.30	3.81
Mn	0.01	0.01	0.02	0.25	0.47	0.87	0.29	0.33	0.26	0.25	0.24	0.20
Ca	0.00	0.00	0.00	0.06	0.28	0.30	0.30	0.29	0.28	0.26	0.06	0.11
Total	**2.06**	**2.10**	**2.03**	**6.06**	**6.07**	**5.99**	**6.00**	**6.07**	**6.15**	**6.17**	**6.17**	**4.53**
Al (total)	**9.40**	**9.28**	**9.33**	**4.09**	**4.10**	**4.09**	**4.01**	**4.00**	**4.10**	**4.11**	**4.10**	**2.82**
Si	3.86	3.93	3.92	5.90	5.88	5.93	5.99	5.96	5.85	5.83	5.84	7.61
Al		2.07				0.07		0.04		0.17	0.16	-1.61
Total	**3.86**	**6.00**	**3.92**	**5.90**	**5.88**	**6.00**	**5.99**	**6.00**	**5.85**	**6.00**	**6.00**	**6.00**
Al	9.40	7.21	9.33	4.09	4.10	4.02	4.01	3.96	4.10	3.93	3.94	4.43
Ti	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**9.46**	**7.27**	**9.39**	**4.09**	**4.10**	**4.02**	**4.02**	**3.97**	**4.10**	**3.94**	**3.94**	**4.44**
Na	0.00	0.01	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.02
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**15.38**	**15.37**	**15.35**	**16.05**	**16.06**	**16.02**	**16.00**	**16.03**	**16.10**	**16.11**	**16.11**	**14.96**
Mol.% end-members												
Almandine	85.03	85.09	84.46	85.26	78.93	73.67	81.70	80.94	81.43	82.26	85.95	84.26
Pyrope	14.56	14.52	14.73	9.69	8.66	6.75	8.48	8.86	9.79	9.49	9.22	8.99
Spessartine	0.26	0.39	0.76	4.14	7.72	14.56	4.81	5.48	4.23	4.08	3.93	4.33
Grossular	0.15	0.00	0.04	0.92	4.69	5.02	5.01	4.72	4.56	4.17	0.90	2.42

APPENDIX B - Garnet Label	17812_2	17812_3	17812_8	17812_9	17812_11	1787_1	1787_4	1787_5	1787_6	1787_7	0869_10	0869_11
Ox%(Ca)	0.41	1.00	0.20	0.23	0.27	0.20	0.20	0.29	0.21	0.26	0.29	0.24
Ox%(Na)	0.04	0.00	0.00	0.04	0.04	0.04	0.07	0.07	0.00	0.00	0.02	0.06
Ox%(K)	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ox%(Fe)	37.61	37.32	37.46	37.23	36.72	39.04	38.79	38.32	38.69	38.58	39.47	39.16
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.07	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.02
Ox%(Mg)	2.44	2.22	2.40	2.36	2.35	1.92	1.70	1.86	1.69	1.99	1.69	1.66
Ox%(Si)	36.10	36.42	36.48	36.37	33.73	36.07	36.04	35.77	35.66	35.55	35.51	35.61
Ox%(Mn)	1.85	1.83	1.78	1.94	1.65	1.32	1.61	1.44	1.53	1.31	0.67	0.69
Ox%(Cr)	0.01	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Ox%(Al)	20.59	20.80	20.96	21.07	20.15	20.62	20.51	20.51	20.31	20.44	20.47	20.54
Total	**99.06**	**99.69**	**99.29**	**99.27**	**94.93**	**99.22**	**98.93**	**98.26**	**98.11**	**98.13**	**98.16**	**98.00**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.60	0.54	0.58	0.57	0.60	0.47	0.42	0.46	0.42	0.50	0.42	0.41
Fe	5.18	5.10	5.13	5.10	5.30	5.39	5.37	5.33	5.41	5.38	5.51	5.47
Mn	0.26	0.25	0.25	0.27	0.24	0.18	0.23	0.20	0.22	0.18	0.09	0.10
Ca	0.07	0.17	0.04	0.04	0.05	0.04	0.03	0.05	0.04	0.05	0.05	0.04
Total	**6.11**	**6.07**	**5.99**	**5.98**	**6.19**	**6.08**	**6.05**	**6.05**	**6.08**	**6.11**	**6.08**	**6.02**
Al (total)	**4.00**	**4.01**	**4.04**	**4.06**	**4.10**	**4.01**	**4.00**	**4.02**	**4.00**	**4.02**	**4.03**	**4.04**
Si	5.95	5.95	5.97	5.95	5.82	5.95	5.97	5.95	5.96	5.93	5.93	5.95
Al	0.05	0.05	0.03	0.05	0.18	0.05	0.03	0.05	0.04	0.07	0.07	0.05
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.94	3.96	4.01	4.02	3.92	3.96	3.97	3.97	3.96	3.95	3.96	3.99
Ti	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.94**	**3.97**	**4.01**	**4.02**	**3.93**	**3.96**	**3.97**	**3.98**	**3.96**	**3.95**	**3.97**	**4.00**
Na	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.02
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.05**	**16.04**	**16.01**	**16.00**	**16.12**	**16.04**	**16.02**	**16.02**	**16.04**	**16.06**	**16.05**	**16.02**
Mol.% end-members												
Almandine	84.78	84.02	85.55	85.22	85.55	88.61	88.74	88.15	88.89	88.11	90.67	90.79
Pyrope	9.79	8.92	9.75	9.61	9.77	7.78	6.95	7.64	6.93	8.12	6.92	6.87
Spessartine	4.23	4.18	4.11	4.50	3.89	3.03	3.74	3.35	3.57	3.02	1.56	1.62
Grossular	1.19	2.88	0.60	0.67	0.80	0.58	0.57	0.86	0.61	0.75	0.85	0.72

APPENDIX B - Garnet Label	0869_12	0869_13	0869_14	0869_15	0869_16	0869_17	0869_18	0869_19	0869_20	180s4_19	180s4_20	180s4_21
Ox%(Ca)	0.30	0.26	0.26	0.22	0.32	0.24	0.25	0.22	0.21	0.32	0.22	0.64
Ox%(Na)	0.08	0.09	0.02	0.00	0.04	0.03	0.03	0.06	0.05	0.04	0.00	0.02
Ox%(K)	0.01	0.00	0.00	0.01	0.02	0.00	0.01	0.00	0.01	0.01	0.02	0.02
Ox%(Fe)	39.09	38.64	39.45	38.92	39.05	38.96	39.53	39.63	40.02	38.17	37.60	37.55
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.02	0.01	0.03	0.00	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00
Ox%(Mg)	1.78	1.72	1.74	1.99	1.70	1.72	1.75	1.71	1.44	2.04	2.06	2.15
Ox%(Si)	35.64	35.27	35.39	34.35	35.58	35.63	35.87	35.82	35.77	36.35	36.04	36.29
Ox%(Mn)	0.77	0.69	0.62	0.60	0.64	0.58	0.78	0.73	0.81	1.86	1.77	1.98
Ox%(Cr)	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Ox%(Al)	20.53	20.43	20.50	20.58	20.82	20.44	20.61	20.46	20.43	20.83	20.82	20.63
Total	**98.22**	**97.11**	**98.02**	**96.70**	**98.20**	**97.64**	**98.85**	**98.65**	**98.73**	**99.63**	**98.54**	**99.28**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.44	0.43	0.43	0.50	0.42	0.43	0.43	0.42	0.36	0.50	0.51	0.53
Fe	5.45	5.44	5.52	5.52	5.44	5.45	5.48	5.51	5.57	5.23	5.20	5.16
Mn	0.11	0.10	0.09	0.09	0.09	0.08	0.11	0.10	0.11	0.26	0.25	0.28
Ca	0.05	0.05	0.05	0.04	0.06	0.04	0.05	0.04	0.04	0.06	0.04	0.11
Total	**6.05**	**6.02**	**6.09**	**6.15**	**6.00**	**6.01**	**6.06**	**6.07**	**6.08**	**6.04**	**5.99**	**6.07**
Al (total)	**4.03**	**4.06**	**4.04**	**4.12**	**4.09**	**4.03**	**4.03**	**4.01**	**4.01**	**4.02**	**4.06**	**4.00**
Si	5.94	5.94	5.92	5.83	5.92	5.97	5.94	5.95	5.95	5.96	5.96	5.96
Al	0.06	0.06	0.08	0.17	0.08	0.03	0.06	0.05	0.05	0.04	0.04	0.04
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.97	4.00	3.96	3.95	4.01	4.00	3.97	3.96	3.96	3.98	4.02	3.96
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.98**	**4.00**	**3.97**	**3.95**	**4.02**	**4.00**	**3.97**	**3.96**	**3.96**	**3.98**	**4.02**	**3.96**
Na	0.02	0.03	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.01
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.03**	**16.02**	**16.05**	**16.11**	**16.02**	**16.01**	**16.04**	**16.03**	**16.04**	**16.02**	**16.01**	**16.03**
Mol.% end-members												
Almandine	90.02	90.41	90.67	89.76	90.54	90.80	90.31	90.68	91.63	86.56	86.72	84.93
Pyrope	7.31	7.17	7.11	8.18	7.00	7.12	7.14	6.98	5.88	8.23	8.49	8.67
Spessartine	1.79	1.64	1.45	1.40	1.49	1.38	1.81	1.69	1.88	4.28	4.14	4.54
Grossular	0.88	0.78	0.77	0.66	0.96	0.70	0.74	0.66	0.61	0.94	0.65	1.86

APPENDIX B - Garnet Label	180s4_22	180s4_23	180s4_24	180s4_25	180s5_1_1	180s5_1_3	180s5_1_4	180s5_1_5	180s5_1_6	180s5_1_7	180s5_1_1	180s5_1_1
Ox%(Ca)	1.60	0.60	0.27	0.26	0.01	0.26	0.28	0.33	0.54	0.49	0.25	0.24
Ox%(Na)	0.04	0.01	0.03	0.07	0.00	0.07	0.00	0.02	0.03	0.06	0.05	0.04
Ox%(K)	0.01	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Ox%(Fe)	36.33	37.49	37.55	38.07	39.78	38.21	37.65	37.30	37.49	37.43	38.78	37.83
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.02	0.01	0.02	0.03	0.08	0.06	0.02	0.04	0.00	0.02	0.03	0.05
Ox%(Mg)	2.05	2.15	2.16	1.91	6.04	2.28	2.31	2.32	2.27	2.22	2.03	2.17
Ox%(Si)	36.38	36.24	36.07	36.11	26.61	36.34	36.09	36.22	36.25	35.78	36.76	35.84
Ox%(Mn)	2.14	2.15	1.87	1.80	0.17	1.98	2.14	2.29	2.28	2.28	1.73	1.66
Ox%(Cr)	0.00	0.00	0.02	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.00	0.00
Ox%(Al)	20.76	20.54	20.66	20.56	14.64	20.81	20.92	20.74	20.66	20.60	21.34	20.82
Total	**99.33**	**99.19**	**98.64**	**98.83**	**87.41**	**100.04**	**99.40**	**99.30**	**99.53**	**98.91**	**100.97**	**98.65**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.50	0.53	0.53	0.47	1.78	0.55	0.56	0.57	0.55	0.55	0.49	0.53
Fe	4.98	5.16	5.19	5.26	6.56	5.22	5.17	5.12	5.14	5.17	5.24	5.23
Mn	0.30	0.30	0.26	0.25	0.03	0.27	0.30	0.32	0.32	0.32	0.24	0.23
Ca	0.28	0.11	0.05	0.05	0.00	0.05	0.05	0.06	0.09	0.09	0.04	0.04
Total	**6.05**	**6.09**	**6.03**	**6.03**	**8.37**	**6.09**	**6.08**	**6.07**	**6.11**	**6.13**	**6.01**	**6.04**
Al (total)	**4.01**	**3.98**	**4.02**	**4.01**	**3.40**	**4.01**	**4.05**	**4.01**	**3.99**	**4.01**	**4.06**	**4.06**
Si	5.96	5.96	5.96	5.97	5.25	5.93	5.92	5.95	5.95	5.92	5.94	5.93
Al	0.04	0.04	0.04	0.03	0.75	0.07	0.08	0.05	0.05	0.08	0.06	0.07
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.97	3.95	3.98	3.98	2.65	3.94	3.97	3.96	3.94	3.93	4.00	3.99
Ti	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.97**	**3.95**	**3.99**	**3.98**	**2.67**	**3.95**	**3.97**	**3.97**	**3.94**	**3.94**	**4.01**	**3.99**
Na	0.01	0.00	0.01	0.02	0.00	0.02	0.00	0.01	0.01	0.02	0.02	0.01
K	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.03**	**16.04**	**16.02**	**16.01**	**17.03**	**16.04**	**16.05**	**16.04**	**16.05**	**16.06**	**16.02**	**16.03**
Mol.% end-members												
Almandine	82.19	84.70	86.04	87.24	78.41	85.66	85.02	84.43	84.19	84.45	87.21	86.61
Pyrope	8.26	8.66	8.82	7.81	21.22	9.10	9.29	9.37	9.09	8.91	8.12	8.86
Spessartine	4.90	4.91	4.34	4.19	0.35	4.50	4.89	5.24	5.18	5.21	3.94	3.84
Grossular	4.65	1.74	0.80	0.77	0.02	0.74	0.80	0.96	1.54	1.43	0.73	0.69

APPENDIX B - Garnet Label	180s5_1_15	180s5_1_16	180s5_1_17	180s5_1_18	180s5_1_19	180s5_1_20	18013_1_1	18013_1_2	18013_1_4	18013_1_5	18013_1_6	18013_1_7
Ox%(Ca)	0.42	0.60	1.45	1.54	1.24	0.27	0.24	1.29	0.03	1.03	0.60	0.40
Ox%(Na)	0.03	0.04	0.07	0.04	0.00	0.02	0.04	0.00	0.21	0.16	0.07	0.17
Ox%(K)	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.03	0.01	0.01	0.02
Ox%(Fe)	38.02	37.35	36.42	36.47	37.24	38.17	37.95	36.63	1.34	35.84	36.55	37.26
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.02	0.06	0.11	0.02	0.03	0.00	0.06	0.00	0.03	0.02	0.02
Ox%(Mg)	2.13	2.26	2.12	2.04	1.98	2.01	2.34	2.41	0.10	2.66	2.62	2.40
Ox%(Si)	35.71	35.45	35.35	35.19	35.18	34.79	36.34	36.22	98.18	36.42	36.50	36.35
Ox%(Mn)	1.57	1.49	1.52	1.46	1.60	1.57	1.49	1.48	0.00	1.59	1.41	1.50
Ox%(Cr)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ox%(Al)	20.92	20.60	20.75	20.65	20.50	20.30	20.93	21.13	0.35	20.81	20.92	20.81
Total	**98.81**	**97.82**	**97.75**	**97.50**	**97.76**	**97.18**	**99.34**	**99.23**	**100.23**	**98.55**	**98.71**	**98.95**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.52	0.56	0.53	0.51	0.49	0.51	0.57	0.59	0.02	0.65	0.64	0.59
Fe	5.26	5.21	5.08	5.10	5.21	5.39	5.20	5.01	0.14	4.92	5.01	5.12
Mn	0.22	0.21	0.21	0.21	0.23	0.23	0.21	0.21	0.00	0.22	0.20	0.21
Ca	0.07	0.11	0.26	0.28	0.22	0.05	0.04	0.23	0.00	0.18	0.11	0.07
Total	**6.07**	**6.09**	**6.08**	**6.09**	**6.15**	**6.17**	**6.02**	**6.03**	**0.16**	**5.97**	**5.95**	**5.98**
Al (total)	**4.08**	**4.05**	**4.08**	**4.07**	**4.04**	**4.04**	**4.04**	**4.07**	**0.05**	**4.03**	**4.04**	**4.03**
Si	5.90	5.91	5.89	5.88	5.89	5.88	5.95	5.92	11.87	5.98	5.98	5.97
Al	0.10	0.09	0.11	0.12	0.11	0.12	0.05	0.08	-5.87	0.02	0.02	0.03
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.98	3.96	3.97	3.96	3.93	3.92	4.00	4.00	5.92	4.00	4.03	4.00
Ti	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.98**	**3.96**	**3.97**	**3.97**	**3.93**	**3.92**	**4.00**	**4.00**	**5.92**	**4.01**	**4.03**	**4.00**
Na	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.05	0.05	0.02	0.05
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
TOTAL CATIONS	**16.05**	**16.05**	**16.05**	**16.06**	**16.09**	**16.09**	**16.02**	**16.03**	**12.08**	**15.98**	**15.98**	**15.98**
Mol.% end-members												
Almandine	86.53	85.55	83.55	83.71	84.69	87.35	86.38	83.10	86.04	82.40	84.17	85.51
Pyrope	8.62	9.23	8.67	8.36	8.02	8.21	9.48	9.75	10.97	10.89	10.76	9.83
Spessartine	3.63	3.45	3.52	3.39	3.68	3.65	3.42	3.40	0.29	3.69	3.30	3.49
Grossular	1.22	1.78	4.26	4.54	3.61	0.79	0.71	3.75	2.70	3.03	1.78	1.17

APPENDIX B - Garnet Label	18013_1_9	18013_1_1	18013_1_1	18013_1_1	18013_1_1	18013_1_1	18013_1_1	18013_1_1	18013_1_1	18013_1_1	18013_1_2	17810_3_1
Ox%(Ca)	0.59	1.12	1.34	1.29	0.35	0.23	0.29	0.41	1.35	0.34	0.21	0.24
Ox%(Na)	0.05	0.00	0.01	0.02	0.02	0.03	0.29	0.06	0.06	0.06	0.05	0.06
Ox%(K)	0.02	0.00	0.02	0.00	0.02	0.00	0.04	0.03	0.00	0.00	0.01	0.02
Ox%(Fe)	36.83	35.45	36.29	36.02	36.86	37.48	36.89	36.81	36.08	37.30	37.07	38.83
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.02	0.00	0.10	0.02	0.00	0.01	0.00	0.03	0.38	0.06	0.00
Ox%(Mg)	2.40	2.60	2.56	2.60	2.54	2.46	2.35	2.62	2.63	2.26	2.30	1.94
Ox%(Si)	36.46	36.25	36.47	36.52	36.44	36.31	36.03	36.12	36.18	35.71	36.38	36.70
Ox%(Mn)	1.41	1.48	1.51	1.43	1.43	1.38	1.36	1.22	1.21	1.37	1.26	1.43
Ox%(Cr)	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.03	0.00	0.00
Ox%(Al)	20.89	20.70	21.04	20.86	20.82	20.93	20.72	20.83	20.79	20.69	20.77	20.85
Total	**98.64**	**97.62**	**99.23**	**98.85**	**98.48**	**98.82**	**97.98**	**98.12**	**98.33**	**98.13**	**98.12**	**100.07**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.59	0.64	0.62	0.63	0.62	0.60	0.58	0.64	0.65	0.56	0.56	0.47
Fe	5.06	4.90	4.95	4.93	5.07	5.15	5.11	5.08	4.97	5.17	5.12	5.29
Mn	0.20	0.21	0.21	0.20	0.20	0.19	0.19	0.17	0.17	0.19	0.18	0.20
Ca	0.10	0.20	0.23	0.23	0.06	0.04	0.05	0.07	0.24	0.06	0.04	0.04
Total	**5.95**	**5.95**	**6.02**	**5.99**	**5.95**	**5.98**	**5.93**	**5.97**	**6.02**	**5.98**	**5.90**	**6.01**
Al (total)	**4.04**	**4.03**	**4.05**	**4.02**	**4.04**	**4.05**	**4.05**	**4.06**	**4.03**	**4.04**	**4.04**	**4.01**
Si	5.99	6.00	5.95	5.98	5.99	5.97	5.97	5.96	5.96	5.92	6.01	5.99
Al	0.01	0.00	0.05	0.02	0.01	0.03	0.03	0.04	0.04	0.08	-0.01	0.01
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	4.03	4.03	4.00	4.00	4.03	4.02	4.02	4.02	3.99	3.97	4.05	3.99
Ti	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**4.03**	**4.03**	**4.00**	**4.01**	**4.03**	**4.02**	**4.02**	**4.02**	**4.00**	**4.02**	**4.06**	**3.99**
Na	0.01	0.00	0.00	0.01	0.01	0.01	0.09	0.02	0.02	0.02	0.02	0.02
K	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
TOTAL CATIONS	**15.98**	**15.98**	**16.02**	**16.00**	**15.98**	**16.00**	**15.95**	**15.99**	**16.01**	**16.00**	**15.95**	**16.00**
Mol.% end-members												
Almandine	85.09	82.43	82.33	82.32	85.18	86.04	86.15	85.13	82.52	86.45	86.80	88.15
Pyrope	9.87	10.76	10.33	10.59	10.45	10.07	9.78	10.79	10.73	9.33	9.58	7.85
Spessartine	3.30	3.48	3.46	3.32	3.34	3.22	3.22	2.87	2.81	3.21	3.00	3.28
Grossular	1.73	3.34	3.88	3.78	1.03	0.67	0.86	1.21	3.94	1.00	0.62	0.71

APPENDIX B - Garnet Label	17810_3_2	17810_3_3	17810_3_4	17810_3_5	17810_3_6	17810_3_7	17810_3_8	17810_3_9	17810_3_1	17810_3_1	17810_3_1	17810_3_1
Ox%(Ca)	0.21	0.22	0.23	0.24	0.27	0.22	0.24	0.21	0.23	0.26	0.25	0.22
Ox%(Na)	0.10	0.13	1.95	0.04	0.09	0.09	0.04	0.02	0.00	0.06	0.04	0.00
Ox%(K)	0.00	0.01	1.23	0.01	0.02	0.06	0.00	0.01	0.00	0.00	0.02	0.02
Ox%(Fe)	38.71	38.88	37.31	39.20	38.91	39.02	38.38	38.71	38.88	38.37	38.88	39.07
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.02	0.04	0.00	0.01	0.00	0.02	0.01	0.02	0.00	0.01	0.00
Ox%(Mg)	2.10	2.23	2.24	2.29	2.25	2.27	2.29	2.28	2.31	2.31	2.32	2.23
Ox%(Si)	37.24	36.77	35.86	36.87	36.84	36.50	36.84	36.89	36.91	36.90	36.70	36.56
Ox%(Mn)	1.41	1.25	1.25	1.12	1.36	1.29	1.36	1.26	1.32	1.27	1.30	1.37
Ox%(Cr)	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03
Ox%(Al)	20.90	21.11	20.53	20.82	20.89	20.83	20.85	21.05	20.92	20.94	21.07	21.05
Total	**100.68**	**100.63**	**100.63**	**100.59**	**100.65**	**100.30**	**100.05**	**100.45**	**100.60**	**100.10**	**100.59**	**100.55**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.50	0.54	0.55	0.55	0.54	0.55	0.56	0.55	0.56	0.56	0.56	0.54
Fe	5.23	5.27	5.11	5.32	5.27	5.32	5.22	5.25	5.27	5.21	5.27	5.31
Mn	0.19	0.17	0.17	0.15	0.19	0.18	0.19	0.17	0.18	0.17	0.18	0.19
Ca	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.05	0.04	0.04
Total	**5.97**	**6.01**	**5.87**	**6.06**	**6.05**	**6.08**	**6.00**	**6.01**	**6.05**	**5.99**	**6.05**	**6.07**
Al (total)	**3.98**	**4.03**	**3.96**	**3.98**	**3.99**	**4.00**	**4.00**	**4.02**	**3.99**	**4.01**	**4.03**	**4.03**
Si	6.02	5.96	5.87	5.98	5.97	5.95	5.99	5.98	5.98	5.99	5.95	5.94
Al	-0.02	0.04	0.13	0.02	0.03	0.05	0.01	0.02	0.02	0.01	0.05	0.06
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	4.00	3.99	3.83	3.96	3.96	3.95	3.99	4.00	3.97	4.00	3.98	3.97
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**4.00**	**3.99**	**3.84**	**3.96**	**3.96**	**3.95**	**3.99**	**4.00**	**3.98**	**4.00**	**3.98**	**3.97**
Na	0.03	0.04	0.62	0.01	0.03	0.03	0.01	0.01	0.00	0.02	0.01	0.00
K	0.00	0.00	0.26	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**15.97**	**16.00**	**15.71**	**16.02**	**16.01**	**16.03**	**16.00**	**16.01**	**16.02**	**15.99**	**16.03**	**16.04**
Mol.% end-members												
Almandine	87.69	87.57	87.06	87.65	87.15	87.39	86.93	87.35	87.11	86.99	87.08	87.39
Pyrope	8.46	8.95	9.32	9.11	8.98	9.05	9.25	9.17	9.23	9.34	9.25	8.90
Spessartine	3.23	2.85	2.94	2.53	3.08	2.93	3.13	2.87	3.01	2.91	2.96	3.09
Grossular	0.62	0.63	0.67	0.70	0.79	0.64	0.68	0.61	0.66	0.76	0.71	0.62

APPENDIX B - Garnet Label	17810_3_1	17810_3_1	180s7_3_1	180s7_3_2	180s7_3_3	180s7_3_4	180s7_3_5	180s7_3_6	180s7_3_7	180s7_3_8	180s7_3_9	180s7_3_1
Ox%(Ca)	0.23	0.20	0.19	0.25	0.27	0.35	0.40	0.51	1.32	1.38	1.30	0.56
Ox%(Na)	0.00	0.10	0.07	0.10	0.02	0.04	0.02	0.03	0.04	0.05	0.00	0.03
Ox%(K)	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01
Ox%(Fe)	39.34	38.57	38.48	37.95	37.53	37.64	37.10	36.81	36.44	35.92	35.74	36.67
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.00	0.04	0.05	0.03	0.01	0.04	0.01	0.03	0.04	0.00	0.00
Ox%(Mg)	2.17	1.97	2.15	2.38	2.32	2.37	2.32	2.32	2.28	2.02	2.27	2.39
Ox%(Si)	36.43	36.38	35.91	36.44	36.40	36.47	36.03	36.33	36.54	36.58	36.74	36.57
Ox%(Mn)	1.32	1.38	2.01	2.06	2.24	2.49	2.74	2.75	2.77	3.07	2.94	2.88
Ox%(Cr)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00
Ox%(Al)	21.22	20.91	20.38	20.88	20.43	20.61	20.60	20.62	20.71	20.81	20.98	20.84
Total	**100.72**	**99.51**	**99.23**	**100.11**	**99.27**	**99.98**	**99.24**	**99.40**	**100.13**	**99.88**	**100.02**	**99.95**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.52	0.48	0.53	0.58	0.57	0.58	0.57	0.57	0.55	0.49	0.55	0.58
Fe	5.34	5.29	5.32	5.17	5.16	5.14	5.11	5.05	4.96	4.90	4.85	5.00
Mn	0.18	0.19	0.28	0.28	0.31	0.34	0.38	0.38	0.38	0.42	0.40	0.40
Ca	0.04	0.03	0.03	0.04	0.05	0.06	0.07	0.09	0.23	0.24	0.23	0.10
Total	**6.08**	**5.99**	**6.16**	**6.08**	**6.08**	**6.12**	**6.13**	**6.09**	**6.12**	**6.05**	**6.03**	**6.07**
Al (total)	**4.06**	**4.04**	**3.97**	**4.01**	**3.96**	**3.97**	**4.00**	**3.99**	**3.97**	**4.00**	**4.02**	**4.00**
Si	5.91	5.96	5.93	5.94	5.98	5.96	5.93	5.96	5.95	5.96	5.97	5.96
Al	0.09	0.04	0.07	0.06	0.02	0.04	0.07	0.04	0.05	0.04	0.03	0.04
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.97	4.01	3.90	3.95	3.94	3.93	3.93	3.95	3.92	3.96	3.98	3.96
Ti	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.97**	**4.01**	**3.91**	**3.96**	**3.95**	**3.93**	**3.93**	**3.95**	**3.93**	**3.97**	**3.99**	**3.96**
Na	0.00	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.01
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.06**	**16.00**	**16.07**	**16.03**	**16.03**	**16.05**	**16.06**	**16.04**	**16.05**	**16.02**	**16.02**	**16.03**
Mol.% end-members												
Almandine	87.75	88.22	86.32	85.12	84.75	83.98	83.36	82.93	80.98	80.90	80.44	82.30
Pyrope	8.62	8.01	8.58	9.49	9.36	9.40	9.27	9.30	9.02	8.12	9.11	9.54
Spessartine	2.97	3.19	4.56	4.68	5.11	5.62	6.23	6.29	6.24	7.00	6.71	6.55
Grossular	0.66	0.58	0.54	0.71	0.78	1.00	1.14	1.48	3.75	3.98	3.74	1.61

APPENDIX B - Garnet Label	180s7_3_1	180s7_3_1	180s7_3_1	180s7_3_1	0866_1_1	0866_1_2	0866_1_4	0866_1_5	0866_1_6	0866_1_7	0866_1_8	0866_1_9
Ox%(Ca)	0.32	0.28	0.30	0.24	0.25	0.25	0.27	0.29	0.29	0.35	0.46	0.37
Ox%(Na)	0.22	0.04	0.06	0.02	0.00	0.06	0.06	0.10	0.00	0.04	0.01	0.03
Ox%(K)	1.15	0.00	0.02	0.02	0.02	0.00	0.01	0.01	0.03	0.00	0.00	0.03
Ox%(Fe)	37.48	37.54	37.71	37.50	38.86	38.84	39.15	39.02	39.33	39.03	39.34	38.42
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.03	0.00	0.00	0.02	0.00	0.01	0.15	0.09	0.09	0.04	0.01	0.00
Ox%(Mg)	2.32	2.40	2.33	2.47	2.31	2.53	2.51	2.51	2.35	2.39	2.47	2.48
Ox%(Si)	37.62	36.86	36.49	38.92	36.61	36.79	36.48	35.96	36.57	36.68	36.20	36.32
Ox%(Mn)	2.29	2.61	2.22	1.77	0.84	0.82	0.99	0.88	1.10	1.11	1.00	1.00
Ox%(Cr)	0.02	0.02	0.00	0.00	0.03	0.03	0.01	0.02	0.00	0.00	0.00	0.01
Ox%(Al)	20.28	20.83	21.20	21.95	21.01	20.98	21.02	20.55	20.88	21.08	20.81	21.07
Total	**101.74**	**100.58**	**100.32**	**102.89**	**99.95**	**100.29**	**100.65**	**99.43**	**100.65**	**100.71**	**100.30**	**99.73**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.56	0.58	0.56	0.58	0.56	0.61	0.61	0.62	0.57	0.58	0.60	0.60
Fe	5.04	5.09	5.12	4.90	5.29	5.27	5.31	5.37	5.34	5.28	5.37	5.24
Mn	0.31	0.36	0.31	0.23	0.12	0.11	0.14	0.12	0.15	0.15	0.14	0.14
Ca	0.06	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.08	0.06
Total	**5.97**	**6.07**	**6.04**	**5.75**	**6.01**	**6.03**	**6.10**	**6.15**	**6.11**	**6.07**	**6.18**	**6.05**
Al (total)	**3.85**	**3.98**	**4.06**	**4.05**	**4.03**	**4.01**	**4.02**	**3.98**	**4.00**	**4.02**	**4.00**	**4.05**
Si	6.05	5.97	5.93	6.09	5.96	5.97	5.91	5.91	5.94	5.94	5.91	5.93
Al	-0.05	0.03	0.07	-0.09	0.04	0.03	0.09	0.09	0.06	0.06	0.09	0.07
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.90	3.95	3.99	4.13	4.00	3.98	3.93	3.90	3.93	3.96	3.91	3.98
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.90**	**3.96**	**3.99**	**4.13**	**4.00**	**3.98**	**3.95**	**3.91**	**3.94**	**3.97**	**3.91**	**3.99**
Na	0.07	0.01	0.02	0.01	0.00	0.02	0.02	0.03	0.00	0.01	0.00	0.01
K	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
TOTAL CATIONS	**15.87**	**16.03**	**16.03**	**15.89**	**16.02**	**16.02**	**16.05**	**16.06**	**16.05**	**16.04**	**16.09**	**16.04**
Mol.% end-members												
Almandine	84.50	83.78	84.75	85.24	88.00	87.29	87.06	87.19	87.38	87.01	86.77	86.67
Pyrope	9.33	9.53	9.32	10.01	9.34	10.13	9.94	10.00	9.30	9.50	9.72	9.99
Spessartine	5.24	5.90	5.06	4.07	1.93	1.87	2.24	2.00	2.48	2.50	2.23	2.28
Grossular	0.93	0.79	0.87	0.69	0.73	0.71	0.76	0.82	0.84	1.00	1.29	1.06

APPENDIX B - Garnet Label	0866_1_10	0866_1_11	0866_1_12	0866_1_13	0866_1_14	0866_1_15	1788_3_1	1788_3_2	1788_3_3	1788_3_4	1788_3_5	1788_3_6
Ox%(Ca)	0.32	0.29	0.23	0.21	0.25	0.23	0.21	0.22	0.21	0.23	0.21	0.26
Ox%(Na)	0.03	0.01	0.06	0.00	0.04	0.03	0.12	0.02	0.01	0.09	0.04	0.01
Ox%(K)	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01
Ox%(Fe)	38.66	38.75	39.34	38.88	39.06	39.37	38.54	38.38	37.79	38.15	38.80	38.41
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.03	0.03	0.07	0.07	0.04	0.07	0.02	0.00	0.01	0.00	0.02	0.00
Ox%(Mg)	2.51	2.49	2.50	2.52	2.45	2.28	2.14	2.10	2.29	2.28	2.21	2.29
Ox%(Si)	36.23	36.20	36.37	36.45	36.65	36.13	36.72	36.60	36.64	35.33	35.19	36.05
Ox%(Mn)	0.88	0.99	0.95	0.86	0.86	0.99	1.71	1.47	1.54	1.59	1.36	1.49
Ox%(Cr)	0.02	0.01	0.01	0.04	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.00
Ox%(Al)	20.82	20.91	21.06	20.70	20.94	20.74	20.91	20.80	20.70	20.93	19.60	20.68
Total	**99.51**	**99.70**	**100.60**	**99.72**	**100.32**	**99.86**	**100.40**	**99.60**	**99.20**	**98.59**	**97.46**	**99.20**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.61	0.61	0.61	0.61	0.59	0.56	0.52	0.51	0.56	0.56	0.56	0.56
Fe	5.29	5.30	5.34	5.31	5.31	5.39	5.24	5.25	5.18	5.29	5.47	5.29
Mn	0.12	0.14	0.13	0.12	0.12	0.14	0.24	0.20	0.21	0.22	0.19	0.21
Ca	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
Total	**6.08**	**6.10**	**6.12**	**6.08**	**6.06**	**6.13**	**6.03**	**6.00**	**5.99**	**6.12**	**6.26**	**6.10**
Al (total)	**4.02**	**4.03**	**4.03**	**3.99**	**4.01**	**4.01**	**4.01**	**4.01**	**4.00**	**4.09**	**3.90**	**4.01**
Si	5.93	5.92	5.90	5.96	5.95	5.92	5.97	5.99	6.00	5.86	5.94	5.94
Al	0.07	0.08	0.10	0.04	0.05	0.08	0.03	0.01	0.00	0.14	0.06	0.06
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.95	3.95	3.94	3.94	3.96	3.92	3.97	4.00	4.00	3.96	3.84	3.95
Ti	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.96**	**3.96**	**3.94**	**3.96**	**3.97**	**3.94**	**3.98**	**4.00**	**4.00**	**3.96**	**3.84**	**3.95**
Na	0.01	0.00	0.02	0.00	0.01	0.01	0.04	0.01	0.00	0.03	0.01	0.00
K	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 CATIONS	**16.05**	**16.05**	**16.06**	**16.04**	**16.03**	**16.06**	**16.01**	**16.00**	**15.99**	**16.08**	**16.10**	**16.05**
Mol.% end-members												
Almandine	87.01	86.95	87.30	87.37	87.53	88.03	86.86	87.44	86.47	86.49	87.41	86.66
Pyrope	10.05	9.97	9.89	10.08	9.80	9.07	8.61	8.54	9.34	9.20	8.88	9.19
Spessartine	2.00	2.25	2.14	1.95	1.96	2.24	3.91	3.38	3.57	3.65	3.11	3.40
Grossular	0.93	0.83	0.66	0.60	0.71	0.67	0.62	0.64	0.61	0.66	0.59	0.75

APPENDIX B - Garnet Label	1788_3_7	1788_3_8	1788_3_9	1788_3_10	1788_3_11	1788_3_12	1788_3_13	1788_3_14	1788_3_15	1788_4_1	1788_4_2	1788_4_3
Ox%(Ca)	0.26	0.23	0.23	0.20	0.30	0.31	0.21	0.15	0.21	0.26	0.23	0.35
Ox%(Na)	0.07	0.01	0.00	0.07	0.00	0.01	0.03	0.03	0.09	0.00	0.01	0.02
Ox%(K)	0.01	0.00	0.01	0.02	0.02	0.02	0.04	0.00	0.00	0.01	0.00	0.01
Ox%(Fe)	37.42	37.90	38.40	37.43	37.80	37.50	37.48	37.54	38.25	38.06	37.47	36.99
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.01	0.04	0.01	0.00	0.06	0.03	0.04	0.01	0.01	0.03	0.00	0.00
Ox%(Mg)	2.35	2.32	2.34	2.35	2.39	2.35	2.34	2.23	2.27	2.28	2.39	2.35
Ox%(Si)	35.88	35.76	35.99	35.88	35.90	35.26	36.17	35.75	35.96	35.74	35.35	35.92
Ox%(Mn)	1.39	1.28	1.40	1.39	1.51	1.40	1.55	1.37	1.46	1.69	1.92	1.94
Ox%(Cr)	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Ox%(Al)	20.54	20.51	20.44	20.69	20.61	20.43	20.36	20.56	20.61	20.56	20.66	20.26
Total	**97.94**	**98.03**	**98.83**	**98.04**	**98.58**	**97.30**	**98.23**	**97.64**	**98.85**	**98.64**	**98.01**	**97.82**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.58	0.57	0.58	0.58	0.59	0.59	0.58	0.55	0.56	0.56	0.59	0.58
Fe	5.20	5.27	5.31	5.19	5.23	5.26	5.19	5.23	5.28	5.27	5.22	5.15
Mn	0.20	0.18	0.20	0.20	0.21	0.20	0.22	0.19	0.20	0.24	0.27	0.27
Ca	0.05	0.04	0.04	0.04	0.05	0.06	0.04	0.03	0.04	0.05	0.04	0.06
Total	**6.02**	**6.07**	**6.12**	**6.01**	**6.08**	**6.10**	**6.03**	**6.01**	**6.08**	**6.12**	**6.13**	**6.07**
Al (total)	**4.02**	**4.02**	**3.98**	**4.05**	**4.02**	**4.04**	**3.98**	**4.04**	**4.01**	**4.02**	**4.06**	**3.98**
Si	5.96	5.95	5.95	5.96	5.94	5.92	5.99	5.96	5.94	5.92	5.89	5.98
Al	0.04	0.05	0.05	0.04	0.06	0.08	0.01	0.04	0.06	0.08	0.11	0.02
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.99	3.97	3.93	4.00	3.96	3.95	3.97	4.00	3.95	3.94	3.95	3.96
Ti	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.99**	**3.97**	**3.94**	**4.00**	**3.96**	**3.96**	**3.98**	**4.00**	**3.95**	**3.94**	**3.95**	**3.96**
Na	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.03	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.01**	**16.04**	**16.06**	**16.01**	**16.04**	**16.06**	**16.00**	**16.01**	**16.04**	**16.06**	**16.08**	**16.03**
Mol.% end-members												
Almandine	86.33	86.89	86.74	86.48	85.97	86.23	86.16	87.09	86.85	86.18	85.23	84.85
Pyrope	9.66	9.47	9.41	9.66	9.67	9.61	9.60	9.24	9.20	9.18	9.69	9.62
Spessartine	3.24	2.96	3.19	3.26	3.49	3.25	3.62	3.23	3.35	3.87	4.41	4.51
Grossular	0.77	0.68	0.66	0.60	0.87	0.91	0.62	0.45	0.60	0.77	0.67	1.02

APPENDIX B - Garnet Label	1788_4_4	1788_4_5	1788_4_6	1788_4_7	1788_4_8	1788_4_9	1788_4_10	1789_3_1	1789_3_2	1789_3_3	1789_3_4	1789_3_5
Ox%(Ca)	0.32	0.46	0.49	0.37	0.32	0.25	0.21	0.20	0.33	0.39	0.45	0.66
Ox%(Na)	0.01	0.02	0.00	0.07	0.00	0.00	0.02	0.02	0.03	0.00	0.02	0.04
Ox%(K)	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00
Ox%(Fe)	36.91	36.36	35.77	36.51	37.23	37.76	37.43	36.74	36.51	36.85	37.08	36.13
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.00	0.01	0.01	0.00	0.01	0.02	0.04	0.06	0.00	0.00	0.01
Ox%(Mg)	2.43	2.42	2.68	2.43	2.34	2.27	2.22	2.29	2.39	2.32	2.42	2.30
Ox%(Si)	35.92	36.08	38.71	36.14	35.96	36.14	36.15	35.94	35.72	35.68	35.99	36.03
Ox%(Mn)	2.22	2.52	2.72	2.49	2.24	1.86	1.73	1.81	1.74	1.77	1.61	1.75
Ox%(Cr)	0.02	0.00	0.01	0.03	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Ox%(Al)	20.73	20.83	22.44	20.40	20.77	20.64	20.87	20.35	20.56	20.62	20.39	20.84
Total	**98.56**	**98.69**	**102.84**	**98.47**	**98.88**	**98.93**	**98.65**	**97.42**	**97.37**	**97.63**	**97.97**	**97.77**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.60	0.59	0.62	0.60	0.57	0.56	0.54	0.57	0.60	0.58	0.60	0.57
Fe	5.10	5.01	4.67	5.05	5.13	5.20	5.16	5.13	5.09	5.13	5.15	5.01
Mn	0.31	0.35	0.36	0.35	0.31	0.26	0.24	0.26	0.25	0.25	0.23	0.25
Ca	0.06	0.08	0.08	0.06	0.06	0.04	0.04	0.04	0.06	0.07	0.08	0.12
Total	**6.06**	**6.04**	**5.73**	**6.06**	**6.08**	**6.07**	**5.99**	**5.99**	**5.99**	**6.03**	**6.05**	**5.94**
Al (total)	**4.04**	**4.05**	**4.13**	**3.98**	**4.04**	**4.01**	**4.06**	**4.00**	**4.04**	**4.05**	**3.99**	**4.07**
Si	5.94	5.95	6.04	5.98	5.93	5.96	5.96	6.00	5.96	5.95	5.98	5.97
Al	0.06	0.05	-0.04	0.02	0.07	0.04	0.04	0.00	0.04	0.05	0.02	0.03
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.97	3.99	4.16	3.95	3.97	3.97	4.02	4.00	4.00	4.00	3.97	4.04
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.98**	**3.99**	**4.17**	**3.96**	**3.97**	**3.97**	**4.02**	**4.01**	**4.01**	**4.00**	**3.97**	**4.05**
Na	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01
K	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 CATIONS	**16.04**	**16.03**	**15.90**	**16.02**	**16.05**	**16.04**	**16.00**	**15.99**	**16.00**	**16.03**	**16.02**	**15.98**
Mol.% end-members												
Almandine	84.10	82.99	81.41	83.31	84.45	85.80	86.22	85.61	84.98	85.16	85.04	84.33
Pyrope	9.86	9.84	10.88	9.87	9.46	9.18	9.10	9.51	9.93	9.54	9.90	9.58
Spessartine	5.11	5.82	6.28	5.75	5.15	4.29	4.05	4.28	4.11	4.14	3.73	4.13
Grossular	0.94	1.35	1.42	1.07	0.94	0.73	0.63	0.60	0.98	1.16	1.32	1.96

APPENDIX B - Garnet Label	1789_3_8	1789_3_9	1789_3_10	1789_3_11	1789_3_12	1789_3_13	1789_3_14	1789_3_15	08611_1_1	08611_1_2	08611_1_3	08611_1_4
Ox%(Ca)	1.25	0.88	0.60	0.47	0.39	0.38	0.32	0.22	0.88	0.95	0.98	1.01
Ox%(Na)	0.00	0.03	0.00	0.00	0.02	0.02	0.08	0.00	0.00	0.03	0.00	0.01
Ox%(K)	0.01	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Ox%(Fe)	35.53	35.75	36.45	35.68	36.90	37.06	36.65	37.35	38.27	37.67	37.93	37.82
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.03	0.07	0.06	0.02	0.00	0.07	0.04	0.05	0.05	0.01	0.07	0.01
Ox%(Mg)	2.32	2.35	2.30	2.28	2.39	2.36	2.20	2.17	2.16	2.19	2.27	2.20
Ox%(Si)	35.78	35.65	35.81	35.90	35.81	35.62	35.80	35.79	36.49	36.65	36.13	36.45
Ox%(Mn)	1.76	1.91	1.75	1.94	1.99	1.83	1.83	1.94	0.71	0.79	0.80	0.85
Ox%(Cr)	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.04	0.02
Ox%(Al)	20.23	20.65	20.44	20.56	20.53	20.48	20.62	20.48	20.47	20.34	20.29	20.54
Total	**96.91**	**97.31**	**97.42**	**96.85**	**98.05**	**97.82**	**97.54**	**97.99**	**99.04**	**98.65**	**98.51**	**98.92**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.58	0.58	0.57	0.57	0.59	0.59	0.55	0.54	0.53	0.54	0.56	0.54
Fe	4.97	4.98	5.08	4.99	5.13	5.16	5.11	5.20	5.26	5.19	5.25	5.20
Mn	0.25	0.27	0.25	0.27	0.28	0.26	0.26	0.27	0.10	0.11	0.11	0.12
Ca	0.22	0.16	0.11	0.08	0.07	0.07	0.06	0.04	0.15	0.17	0.17	0.18
Total	**6.02**	**5.99**	**6.01**	**5.91**	**6.07**	**6.07**	**5.97**	**6.05**	**6.04**	**6.00**	**6.09**	**6.03**
Al (total)	**3.99**	**4.06**	**4.02**	**4.05**	**4.02**	**4.02**	**4.05**	**4.02**	**3.97**	**3.95**	**3.96**	**3.98**
Si	5.99	5.94	5.97	6.00	5.95	5.94	5.97	5.96	6.00	6.03	5.98	5.99
Al	0.01	0.06	0.03	0.00	0.05	0.06	0.03	0.04	0.00	-0.03	0.02	0.01
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.98	4.00	3.99	4.05	3.97	3.96	4.02	3.97	3.96	3.98	3.93	3.97
Ti	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Total	**3.99**	**4.02**	**4.00**	**4.06**	**3.97**	**3.97**	**4.02**	**3.98**	**3.97**	**3.99**	**3.94**	**3.98**
Na	0.00	0.01	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.01	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.01**	**16.01**	**16.01**	**15.97**	**16.04**	**16.04**	**15.99**	**16.03**	**16.01**	**15.99**	**16.04**	**16.01**
Mol.% end-members												
Almandine	82.55	83.15	84.59	84.34	84.47	84.99	85.59	85.95	87.03	86.42	86.12	86.18
Pyrope	9.59	9.73	9.52	9.59	9.76	9.65	9.14	8.89	8.77	8.97	9.18	8.92
Spessartine	4.13	4.49	4.12	4.64	4.61	4.25	4.32	4.51	1.64	1.83	1.83	1.96
Grossular	3.72	2.63	1.78	1.43	1.15	1.11	0.95	0.65	2.55	2.78	2.86	2.95

APPENDIX B - Garnet Label	08611_1_5	08611_1_6	08611_1_7	08611_1_8	08611_1_9	08611_1_1	08611_1_1	08611_1_1	08611_1_1	08611_1_1	08611_1_1	0868_1_1
Ox%(Ca)	0.57	0.58	0.54	0.38	0.30	0.25	0.23	0.22	0.19	0.16	0.22	0.22
Ox%(Na)	0.00	0.00	0.00	0.04	0.00	0.02	0.02	0.01	0.03	0.00	0.02	0.00
Ox%(K)	0.00	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.00	0.00	0.00	0.00
Ox%(Fe)	38.22	38.53	38.21	38.40	38.55	38.41	39.47	38.54	38.64	38.85	37.92	38.20
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.00	0.06	0.03	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.04	0.02
Ox%(Mg)	2.41	2.26	2.26	2.34	2.39	2.40	2.37	2.27	2.27	2.17	2.18	2.37
Ox%(Si)	36.12	36.45	36.41	36.31	36.04	36.09	35.99	36.46	36.25	36.13	36.62	36.32
Ox%(Mn)	0.89	0.80	0.79	0.81	0.86	0.77	0.73	0.81	0.68	0.74	0.73	0.66
Ox%(Cr)	0.00	0.00	0.00	0.03	0.01	0.02	0.02	0.00	0.01	0.00	0.01	0.00
Ox%(Al)	20.62	20.46	20.46	20.54	20.24	20.47	20.73	20.54	20.46	20.45	20.61	20.58
Total	**98.83**	**99.15**	**98.69**	**98.87**	**98.42**	**98.47**	**99.55**	**98.87**	**98.53**	**98.51**	**98.34**	**98.36**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.59	0.55	0.56	0.57	0.59	0.59	0.58	0.56	0.56	0.54	0.54	0.58
Fe	5.27	5.29	5.27	5.29	5.34	5.31	5.42	5.30	5.34	5.38	5.23	5.27
Mn	0.12	0.11	0.11	0.11	0.12	0.11	0.10	0.11	0.10	0.10	0.10	0.09
Ca	0.10	0.10	0.09	0.07	0.05	0.04	0.04	0.04	0.03	0.03	0.04	0.04
Total	**6.08**	**6.06**	**6.03**	**6.04**	**6.11**	**6.06**	**6.14**	**6.01**	**6.03**	**6.05**	**5.90**	**5.99**
Al (total)	**4.01**	**3.96**	**3.97**	**3.99**	**3.95**	**3.99**	**4.01**	**3.99**	**3.99**	**3.99**	**4.00**	**4.01**
Si	5.95	5.99	6.00	5.98	5.97	5.97	5.91	6.00	5.99	5.98	6.04	6.00
Al	0.05	0.01	0.00	0.02	0.03	0.03	0.09	0.00	0.01	0.02	-0.04	0.00
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.96	3.95	3.98	3.97	3.93	3.96	3.93	3.99	3.98	3.97	4.04	4.01
Ti	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.96**	**3.96**	**3.98**	**3.97**	**3.93**	**3.97**	**3.93**	**3.99**	**3.98**	**3.97**	**4.05**	**4.01**
Na	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.04**	**16.02**	**16.01**	**16.01**	**16.04**	**16.02**	**16.07**	**16.00**	**16.01**	**16.02**	**15.95**	**16.00**
Mol.% end-members												
Almandine	86.59	87.34	87.37	87.53	87.47	87.74	88.28	88.20	88.58	88.96	88.54	88.10
Pyrope	9.71	9.15	9.22	9.49	9.67	9.75	9.43	9.27	9.28	8.86	9.07	9.73
Spessartine	2.03	1.83	1.84	1.87	1.98	1.79	1.65	1.88	1.58	1.73	1.74	1.54
Grossular	1.66	1.69	1.57	1.11	0.89	0.72	0.65	0.64	0.57	0.46	0.65	0.64

APPENDIX B - Garnet Label	0868_1_2	0868_1_3	0868_1_4	0868_1_5	0868_1_6	0868_1_7	0868_1_8	0868_1_9	0868_1_10	0868_1_11	0868_1_12	0868_1_13
Ox%(Ca)	0.21	0.26	0.41	0.68	1.26	0.87	0.45	0.35	0.31	0.22	0.21	0.24
Ox%(Na)	0.01	0.02	0.00	0.02	0.00	0.06	0.00	0.07	0.04	0.02	0.01	0.01
Ox%(K)	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00
Ox%(Fe)	38.16	37.91	38.01	37.38	37.04	37.32	37.87	38.22	38.47	38.39	38.36	38.03
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.04	0.04	0.06	0.00	0.03	0.04	0.00	0.00	0.03	0.04	0.02	0.03
Ox%(Mg)	2.31	2.41	2.32	2.26	2.11	2.22	2.33	2.30	2.33	2.35	2.43	2.40
Ox%(Si)	36.04	35.78	36.43	36.21	36.53	36.07	35.93	36.54	35.71	35.91	36.16	36.27
Ox%(Mn)	0.72	0.89	0.84	0.81	0.80	0.73	0.81	0.79	0.89	0.74	0.72	0.81
Ox%(Cr)	0.01	0.00	0.02	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.01
Ox%(Al)	20.51	20.79	20.45	20.64	20.42	20.45	20.26	20.46	20.32	20.12	20.62	20.47
Total	**98.02**	**98.11**	**98.58**	**98.00**	**98.19**	**97.75**	**97.67**	**98.74**	**98.13**	**97.79**	**98.53**	**98.26**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.57	0.59	0.57	0.56	0.52	0.55	0.58	0.56	0.58	0.58	0.60	0.59
Fe	5.30	5.26	5.24	5.17	5.11	5.18	5.28	5.26	5.35	5.35	5.30	5.26
Mn	0.10	0.12	0.12	0.11	0.11	0.10	0.11	0.11	0.13	0.10	0.10	0.11
Ca	0.04	0.05	0.07	0.12	0.22	0.15	0.08	0.06	0.06	0.04	0.04	0.04
Total	**6.01**	**6.02**	**6.00**	**5.97**	**5.97**	**5.99**	**6.05**	**6.00**	**6.11**	**6.08**	**6.03**	**6.01**
Al (total)	**4.01**	**4.06**	**3.98**	**4.03**	**3.97**	**4.00**	**3.98**	**3.97**	**3.99**	**3.95**	**4.01**	**3.99**
Si	5.98	5.93	6.01	6.00	6.03	5.99	5.99	6.02	5.95	5.99	5.97	6.00
Al	0.02	0.07	-0.01	0.00	-0.03	0.01	0.01	-0.02	0.05	0.01	0.03	0.00
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.99	4.00	3.98	4.02	4.01	4.00	3.97	3.99	3.93	3.94	3.98	3.99
Ti	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**4.00**	**4.00**	**3.99**	**4.02**	**4.01**	**4.00**	**3.97**	**3.99**	**3.93**	**3.95**	**3.99**	**3.99**
Na	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.01	0.01	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
TOTAL CATIONS	**16.00**	**16.02**	**15.99**	**15.99**	**15.98**	**15.99**	**16.02**	**15.99**	**16.05**	**16.03**	**16.02**	**16.00**
Mol.% end-members												
Almandine	88.19	87.29	87.34	86.72	85.70	86.55	87.23	87.73	87.58	88.03	87.81	87.58
Pyrope	9.52	9.88	9.50	9.36	8.69	9.18	9.55	9.41	9.45	9.60	9.90	9.83
Spessartine	1.68	2.07	1.96	1.90	1.86	1.70	1.89	1.83	2.06	1.71	1.66	1.88
Grossular	0.62	0.76	1.20	2.02	3.74	2.58	1.33	1.04	0.92	0.66	0.63	0.71

APPENDIX B - Garnet Label	0868_1_14	0868_1_15	0868_1_16	0868_1_17	0868_1_18	0868_1_19	0868_1_20	0868_2_21	0868_2_22	0868_2_24	1807_29	17812_14
Ox%(Ca)	0.27	0.26	0.23	0.25	0.29	0.24	0.26	0.25	0.32	0.28	0.25	1.15
Ox%(Na)	0.08	0.04	0.03	0.01	0.06	0.03	0.03	0.07	0.07	0.11	0.00	0.04
Ox%(K)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.03	0.00
Ox%(Fe)	38.57	38.79	38.32	38.56	38.16	38.27	38.56	36.29	36.50	38.63	36.70	35.06
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.02	0.01	0.05	0.06	0.00	0.05	0.00	0.01	0.06	0.02	0.01	0.04
Ox%(Mg)	2.32	2.39	2.36	2.41	2.31	2.44	2.50	2.65	2.68	2.57	2.34	2.19
Ox%(Si)	36.39	36.22	36.28	36.07	36.20	36.00	36.15	36.43	36.58	37.74	33.30	32.78
Ox%(Mn)	0.82	0.84	0.82	0.75	0.81	0.74	0.63	1.13	1.10	0.93	1.38	1.59
Ox%(Cr)	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.02	0.00	0.02	0.01	0.00
Ox%(Al)	20.65	20.37	20.47	20.57	20.54	20.58	20.71	21.42	21.69	21.60	20.09	19.83
Total	**99.14**	**98.94**	**98.58**	**98.72**	**98.39**	**98.35**	**98.83**	**98.28**	**99.02**	**101.91**	**94.12**	**92.68**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.57	0.59	0.58	0.59	0.57	0.60	0.61	0.65	0.65	0.61	0.61	0.58
Fe	5.30	5.35	5.29	5.32	5.28	5.30	5.31	4.98	4.97	5.13	5.34	5.18
Mn	0.11	0.12	0.12	0.10	0.11	0.10	0.09	0.16	0.15	0.13	0.20	0.24
Ca	0.05	0.05	0.04	0.04	0.05	0.04	0.05	0.04	0.06	0.05	0.05	0.22
Total	**6.03**	**6.10**	**6.03**	**6.07**	**6.01**	**6.04**	**6.06**	**5.82**	**5.82**	**5.91**	**6.20**	**6.21**
Al (total)	**4.00**	**3.96**	**3.98**	**4.00**	**4.00**	**4.01**	**4.02**	**4.14**	**4.16**	**4.05**	**4.13**	**4.13**
Si	5.98	5.97	5.99	5.95	5.99	5.96	5.95	5.97	5.95	6.00	5.80	5.79
Al	0.02	0.03	0.01	0.05	0.01	0.04	0.05	0.03	0.05	0.00	0.20	0.21
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.97	3.93	3.97	3.96	3.99	3.97	3.97	4.11	4.11	4.04	3.93	3.92
Ti	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.98**	**3.94**	**3.98**	**3.97**	**3.99**	**3.98**	**3.97**	**4.12**	**4.12**	**4.05**	**3.93**	**3.92**
Na	0.02	0.01	0.01	0.00	0.02	0.01	0.01	0.02	0.02	0.03	0.00	0.01
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
TOTAL CATIONS	**16.01**	**16.04**	**16.01**	**16.03**	**16.00**	**16.02**	**16.03**	**15.94**	**15.94**	**15.96**	**16.13**	**16.13**
Mol.% end-members												
Almandine	87.89	87.70	87.77	87.74	87.77	87.63	87.66	85.44	85.29	86.78	86.17	83.38
Pyrope	9.44	9.61	9.64	9.79	9.48	9.94	10.14	11.10	11.15	10.29	9.79	9.27
Spessartine	1.89	1.93	1.91	1.73	1.89	1.72	1.45	2.70	2.59	2.12	3.29	3.83
Grossular	0.78	0.77	0.67	0.74	0.86	0.72	0.75	0.76	0.96	0.81	0.76	3.52

APPENDIX B - Garnet Label	180s5_1_2	180s5_1_8	180s5_1_9	180s5_1_1(	180s5_1_1:	18013_1_3	17810_2_1	17810_2_2	17810_2_3	17810_2_4	17810_2_5	17810_2_6
Ox%(Ca)	0.01	0.00	0.01	0.00	0.19	1.07	0.01	0.00	0.00	0.00	0.00	0.00
Ox%(Na)	0.01	0.02	0.03	0.06	0.03	0.00	0.03	0.01	0.03	0.01	0.03	0.03
Ox%(K)	0.10	0.09	0.04	0.09	0.08	0.03	0.01	0.00	0.00	0.01	0.00	0.00
Ox%(Fe)	40.00	39.82	41.20	39.73	37.76	36.76	30.06	30.05	29.96	29.06	30.24	29.69
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.07	0.06	0.00	0.01	0.01	0.00	0.06	0.04	0.03	0.10	0.08	0.06
Ox%(Mg)	5.23	5.30	4.27	5.20	3.39	2.76	11.47	11.38	11.35	11.53	11.24	11.22
Ox%(Si)	27.58	25.96	26.19	27.06	31.93	32.15	22.91	22.65	22.75	22.70	22.45	22.44
Ox%(Mn)	0.18	0.09	0.17	0.18	0.76	1.03	0.02	0.07	0.05	0.08	0.04	0.07
Ox%(Cr)	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.02
Ox%(Al)	15.00	14.73	14.52	14.81	17.01	20.30	22.92	22.78	22.75	23.06	22.75	22.49
Total	**88.20**	**86.06**	**86.44**	**87.13**	**91.17**	**94.12**	**87.50**	**87.00**	**86.92**	**86.55**	**86.83**	**86.02**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	1.52	1.59	1.28	1.53	0.92	0.72	3.19	3.19	3.18	3.22	3.16	3.17
Fe	6.51	6.69	6.94	6.56	5.76	5.38	4.69	4.72	4.70	4.56	4.77	4.71
Mn	0.03	0.01	0.03	0.03	0.12	0.15	0.00	0.01	0.01	0.01	0.01	0.01
Ca	0.00	0.00	0.00	0.00	0.04	0.20	0.00	0.00	0.00	0.00	0.00	0.00
Total	**8.06**	**8.29**	**8.26**	**8.12**	**6.84**	**6.46**	**7.88**	**7.92**	**7.89**	**7.80**	**7.93**	**7.90**
Al (total)	**3.44**	**3.49**	**3.45**	**3.45**	**3.66**	**4.19**	**5.04**	**5.04**	**5.04**	**5.10**	**5.05**	**5.03**
Si	5.37	5.22	5.28	5.34	5.83	5.63	4.27	4.25	4.27	4.26	4.23	4.26
Al	0.63	0.78	0.72	0.66	0.17	0.37	1.73	1.75	1.73	1.74	1.77	1.74
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	2.81	2.71	2.73	2.79	3.49	3.82	3.31	3.29	3.31	3.36	3.28	3.29
Ti	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**2.82**	**2.72**	**2.73**	**2.79**	**3.49**	**3.82**	**3.32**	**3.30**	**3.31**	**3.38**	**3.30**	**3.31**
Na	0.00	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
K	0.03	0.02	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL CATIONS	**16.88**	**17.01**	**16.99**	**16.91**	**16.33**	**16.27**	**17.20**	**17.22**	**17.20**	**17.17**	**17.22**	**17.21**
Mol.% end-members												
Almandine	80.77	80.69	84.09	80.79	84.26	83.36	59.48	59.61	59.64	58.49	60.11	59.68
Pyrope	18.83	19.13	15.54	18.84	13.47	11.16	40.45	40.24	40.26	41.36	39.81	40.18
Spessartine	0.36	0.18	0.35	0.37	1.72	2.36	0.05	0.13	0.10	0.16	0.08	0.14
Grossular	0.04	0.00	0.02	0.00	0.55	3.12	0.02	0.01	0.00	0.00	0.00	0.00

APPENDIX B - Garnet Label	17810_2_7	17810_2_8	17810_2_9	17810_2_1	180s7_3_1	0866_1_3	1789_3_6	1789_3_7	0868_2_1	0868_2_2	0868_2_3	0868_2_4
Ox%(Ca)	0.02	0.02	0.02	0.02	0.01	0.17	1.09	1.31	0.18	0.63	0.53	0.39
Ox%(Na)	0.07	0.00	0.00	0.02	0.00	0.05	0.04	0.05	0.07	0.58	0.04	0.17
Ox%(K)	0.04	0.00	0.00	0.02	0.05	2.70	0.02	0.00	0.02	0.22	0.04	0.00
Ox%(Fe)	29.98	29.29	30.23	29.87	45.59	30.27	34.16	34.89	34.99	13.20	34.29	36.46
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.08	0.09	0.06	0.08	0.00	0.04	0.00	0.04	0.00	0.13	0.08	0.07
Ox%(Mg)	11.19	11.55	11.37	11.35	1.20	2.17	2.05	2.14	2.10	0.88	0.45	1.63
Ox%(Si)	22.70	22.98	22.54	22.59	26.40	36.31	32.36	33.93	29.17	19.37	7.48	31.50
Ox%(Mn)	0.06	0.06	0.05	0.03	0.19	0.68	1.87	1.90	0.69	0.17	0.82	0.86
Ox%(Cr)	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.03	0.00	0.00
Ox%(Al)	22.72	22.77	22.73	22.64	14.30	20.34	18.25	19.60	16.97	9.30	4.36	18.27
Total	**86.86**	**86.76**	**87.00**	**86.62**	**87.73**	**92.74**	**89.82**	**93.86**	**84.24**	**44.51**	**48.10**	**89.35**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	3.14	3.22	3.19	3.19	0.36	0.56	0.56	0.55	0.62	0.46	0.30	0.45
Fe	4.71	4.59	4.75	4.71	7.74	4.35	5.22	5.07	5.77	3.82	12.87	5.64
Mn	0.01	0.01	0.01	0.00	0.03	0.10	0.29	0.28	0.12	0.05	0.31	0.13
Ca	0.00	0.00	0.00	0.00	0.00	0.03	0.21	0.24	0.04	0.23	0.25	0.08
Total	**7.86**	**7.83**	**7.95**	**7.91**	**8.14**	**5.03**	**6.28**	**6.15**	**6.55**	**4.56**	**13.74**	**6.30**
Al (total)	**5.04**	**5.03**	**5.04**	**5.03**	**3.42**	**4.12**	**3.93**	**4.02**	**3.95**	**3.80**	**2.31**	**3.99**
Si	4.27	4.30	4.24	4.26	5.36	6.24	5.91	5.90	5.76	6.71	3.36	5.83
Al	1.73	1.70	1.76	1.74	0.64	-0.24	0.09	0.10	0.24	-0.71	2.64	0.17
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.31	3.33	3.28	3.29	2.78	4.35	3.84	3.92	3.70	4.51	-0.33	3.82
Ti	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.03	0.03	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Total	**3.32**	**3.34**	**3.28**	**3.30**	**2.78**	**4.36**	**3.84**	**3.92**	**3.71**	**4.55**	**-0.31**	**3.83**
Na	0.02	0.00	0.00	0.01	0.00	0.02	0.01	0.02	0.03	0.39	0.04	0.06
K	0.01	0.00	0.00	0.00	0.01	0.59	0.00	0.00	0.00	0.10	0.03	0.00
TOTAL CATIONS	**17.18**	**17.17**	**17.23**	**17.21**	**16.92**	**15.39**	**16.12**	**16.08**	**16.25**	**15.11**	**19.43**	**16.13**
Mol.% end-members												
Almandine	59.94	58.62	59.77	59.56	95.12	86.38	83.13	82.48	88.19	83.79	93.68	89.51
Pyrope	39.87	41.21	40.07	40.34	4.45	11.04	8.88	9.00	9.45	10.00	2.21	7.14
Spessartine	0.13	0.12	0.11	0.06	0.40	1.97	4.60	4.55	1.77	1.10	2.26	2.14
Grossular	0.05	0.05	0.05	0.04	0.04	0.62	3.39	3.97	0.59	5.11	1.84	1.21

APPENDIX B - Garnet Label	0868_2_5	0868_2_6	0868_2_7	0868_2_8	0868_2_9	0868_2_10	0868_2_11	0868_2_12	0868_2_13	0868_2_14	0868_2_15	0868_2_16
Ox%(Ca)	0.35	0.88	1.35	1.23	0.91	0.45	0.20	0.27	0.24	0.40	0.46	30.71
Ox%(Na)	0.13	0.39	0.09	0.11	0.13	0.08	0.31	0.06	0.01	0.04	0.16	0.07
Ox%(K)	0.06	0.11	0.05	0.01	0.09	0.01	0.24	0.00	0.03	0.04	0.01	0.02
Ox%(Fe)	6.99	19.51	34.88	28.72	28.49	35.95	25.97	37.91	37.54	35.33	34.08	2.37
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.04	0.00	0.07	0.04	0.06	0.06	0.09	0.02	0.04	0.02	0.03	0.03
Ox%(Mg)	0.24	0.95	1.97	0.52	1.10	0.99	10.50	1.55	1.85	1.36	2.04	0.10
Ox%(Si)	67.75	17.14	33.45	10.89	16.23	14.61	22.97	26.35	29.33	21.70	33.46	0.79
Ox%(Mn)	0.14	0.49	1.19	0.97	0.84	0.89	0.13	0.97	1.15	1.20	1.46	0.28
Ox%(Cr)	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.00	0.00
Ox%(Al)	2.28	9.64	18.89	5.42	9.61	8.99	20.22	15.38	16.54	12.92	18.63	0.52
Total	**77.98**	**49.11**	**91.94**	**47.92**	**57.46**	**62.03**	**80.64**	**82.53**	**86.74**	**73.03**	**90.33**	**34.89**
Garnet (Fe,Mg,Mn)6Al4Si6O24												
Mg	0.06	0.48	0.52	0.32	0.51	0.45	3.13	0.48	0.54	0.49	0.55	0.09
Fe	0.96	5.53	5.18	9.86	7.44	9.24	4.34	6.61	6.11	7.14	5.13	1.25
Mn	0.02	0.14	0.18	0.34	0.22	0.23	0.02	0.17	0.19	0.24	0.22	0.15
Ca	0.06	0.32	0.26	0.54	0.30	0.15	0.04	0.06	0.05	0.10	0.09	20.83
Total	**1.10**	**6.46**	**6.14**	**11.05**	**8.47**	**10.07**	**7.54**	**7.32**	**6.88**	**7.97**	**5.99**	**22.33**
Al (total)	**0.44**	**3.85**	**3.96**	**2.62**	**3.54**	**3.26**	**4.77**	**3.78**	**3.79**	**3.68**	**3.95**	**0.39**
Si	11.10	5.81	5.94	4.47	5.07	4.49	4.60	5.49	5.71	5.24	6.02	0.50
Al	-5.10	0.19	0.06	1.53	0.93	1.51	1.40	0.51	0.29	0.76	-0.02	5.50
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	5.54	3.65	3.90	1.09	2.60	1.75	3.36	3.27	3.50	2.92	3.98	-5.11
Ti	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**5.55**	**3.65**	**3.91**	**1.11**	**2.62**	**1.77**	**3.38**	**3.28**	**3.51**	**2.93**	**3.98**	**-5.09**
Na	0.04	0.26	0.03	0.09	0.08	0.05	0.12	0.03	0.00	0.02	0.06	0.09
K	0.01	0.05	0.01	0.00	0.03	0.00	0.06	0.00	0.01	0.01	0.00	0.02
TOTAL CATIONS	**12.65**	**16.12**	**16.05**	**18.16**	**17.09**	**17.84**	**16.92**	**16.60**	**16.39**	**16.90**	**15.97**	**23.24**
Mol.% end-members												
Almandine	87.22	85.49	84.43	89.18	87.78	91.77	57.63	90.27	88.75	89.51	85.67	5.61
Pyrope	5.32	7.41	8.49	2.86	6.02	4.48	41.50	6.57	7.79	6.13	9.13	0.42
Spessartine	1.83	2.18	2.91	3.06	2.62	2.29	0.29	2.33	2.75	3.07	3.72	0.67
Grossular	5.63	4.92	4.17	4.90	3.57	1.46	0.58	0.82	0.72	1.29	1.49	93.30

APPENDIX B - Garnet Label	0868_2_17	0868_2_18	0868_2_19	0868_2_20	0868_2_23	0868_2_25
Ox%(Ca)	1.72	0.49	0.50	0.29	0.24	0.27
Ox%(Na)	0.10	0.12	0.12	0.09	0.08	0.12
Ox%(K)	0.01	0.02	0.06	0.00	0.00	0.04
Ox%(Fe)	34.12	36.00	35.45	35.00	36.71	35.57
Ox%(Y)	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ti)	0.01	0.05	0.04	0.02	0.06	0.05
Ox%(Mg)	1.77	1.81	1.71	2.37	1.95	1.66
Ox%(Si)	24.37	32.50	28.39	34.83	29.82	26.93
Ox%(Mn)	1.06	1.86	1.75	1.24	0.92	0.87
Ox%(Cr)	0.00	0.00	0.01	0.00	0.00	0.02
Ox%(Al)	15.80	18.34	16.35	19.74	16.72	15.35
Total	**78.96**	**91.19**	**84.39**	**93.56**	**86.51**	**80.89**
Garnet (Fe,Mg,Mn)6Al4Si6O24						
Mg	0.57	0.49	0.51	0.61	0.56	0.52
Fe	6.19	5.45	5.92	5.06	5.94	6.23
Mn	0.19	0.29	0.30	0.18	0.15	0.15
Ca	0.40	0.09	0.11	0.05	0.05	0.06
Total	**7.35**	**6.32**	**6.84**	**5.90**	**6.70**	**6.97**
Al (total)	**4.04**	**3.91**	**3.85**	**4.02**	**3.81**	**3.79**
Si	5.28	5.89	5.67	6.02	5.77	5.64
Al	0.72	0.11	0.33	-0.02	0.23	0.36
Total	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Al	3.32	3.80	3.52	4.04	3.59	3.44
Ti	0.00	0.01	0.01	0.00	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.32**	**3.81**	**3.53**	**4.05**	**3.59**	**3.45**
Na	0.04	0.04	0.05	0.03	0.03	0.05
K	0.00	0.00	0.02	0.00	0.00	0.01
TOTAL CATIONS	**16.67**	**16.13**	**16.37**	**15.95**	**16.30**	**16.42**
Mol.% end-members						
Almandine	84.14	86.25	86.65	85.71	88.62	89.48
Pyrope	7.80	7.73	7.47	10.32	8.39	7.44
Spessartine	2.64	4.52	4.34	3.07	2.25	2.21
Grossular	5.42	1.50	1.55	0.91	0.75	0.88

APPENDIX B - Chlorite Label	1807_25	180s7_1_3	180s7_1_4	180s7_1_9	180s7_1_11	180s7_1_21	180s7_1_22	180s7_1_23	180s7_2_4	180s7_2_5	180s7_2_6	180s7_2_11
W%(F)	0.27	0.25	0.18	0.21	0.23	0.06	0.27	0.16	0.18	0.24	0.16	0.16
Ox%(Na)	0.00	0.00	0.00	0.01	0.03	0.05	0.02	0.04	0.04	0.02	0.01	0.02
Ox%(Mg)	2.17	1.16	1.04	0.92	0.95	0.99	1.00	1.02	1.05	1.04	1.15	1.02
Ox%(Al)	20.50	47.43	55.21	49.64	54.13	54.48	54.57	54.42	53.09	53.84	54.07	53.38
Ox%(Si)	35.41	28.12	27.18	25.32	27.22	27.53	27.26	27.72	26.61	26.56	27.49	27.70
Ox%(P)	0.08	0.02	0.02	0.00	0.02	0.01	0.03	0.02	0.00	0.08	0.01	0.00
Ox%(Cl)	0.01	0.19	0.00	0.04	0.02	0.00	0.02	0.00	0.00	0.01	0.00	0.00
W%(Cl)	0.01	0.15	0.00	0.03	0.02	0.00	0.02	0.00	0.00	0.01	0.00	0.00
Ox%(K)	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00
Ox%(Ca)	0.38	0.03	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Ox%(Ti)	0.01	0.25	0.30	0.22	0.36	0.23	0.29	0.24	0.41	0.43	0.36	0.38
Ox%(Cr)	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.03	0.01	0.00
Ox%(Mn)	1.68	0.10	0.12	0.12	0.15	0.09	0.14	0.16	0.13	0.15	0.09	0.08
Ox%(Fe)	36.85	20.29	14.54	21.50	14.73	14.27	14.13	14.43	15.10	15.00	14.97	14.08
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	4.73	9.82	10.96	10.35	10.85	10.88	10.92	10.83	10.81	10.87	10.78	10.76
Si	6.93	4.94	4.58	4.48	4.63	4.66	4.63	4.68	4.60	4.55	4.65	4.74
Al	1.07	3.06	3.42	3.52	3.37	3.34	3.37	3.32	3.40	3.45	3.35	3.26
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	3.65	6.76	7.53	6.84	7.48	7.54	7.54	7.51	7.41	7.42	7.44	7.49
Mg	0.63	0.30	0.26	0.24	0.24	0.25	0.25	0.26	0.27	0.26	0.29	0.26
Fe	6.03	2.98	2.05	3.18	2.09	2.02	2.01	2.04	2.18	2.15	2.12	2.01
Mn	0.28	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.01
Ti	0.00	0.03	0.04	0.03	0.05	0.03	0.04	0.03	0.05	0.06	0.05	0.05
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00
K	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Total	10.67	10.11	9.90	10.31	9.90	9.87	9.87	9.88	9.95	9.93	9.91	9.84
F	0.17	0.14	0.09	0.11	0.13	0.03	0.14	0.09	0.10	0.13	0.09	0.09
Cl	0.00	0.05	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
(OH)	15.83	15.81	15.91	15.88	15.87	15.97	15.85	15.91	15.90	15.87	15.91	15.91
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.87	0.90	0.88	0.92	0.89	0.88	0.88	0.88	0.88	0.88	0.87	0.88
% clinochlore	9.12	9.22	11.24	7.03	10.24	10.97	11.14	11.12	10.95	10.87	11.97	11.33
% chamosite	86.86	90.33	88.01	92.46	88.82	88.48	88.01	87.90	88.27	88.22	87.48	88.15
% pennantite	4.02	0.45	0.76	0.50	0.94	0.55	0.85	0.98	0.79	0.91	0.55	0.52

APPENDIX B - Chlorite Label	180s7_1_1	180s7_1_2	180s7_1_5	180s7_1_6	180s7_1_7	180s7_1_8	180s7_1_10	180s7_1_12	180s7_1_14	180s7_1_15	180s7_1_16	180s7_1_17
W%(F)	0.34	0.31	0.30	0.34	0.19	0.32	0.39	0.31	0.24	0.34	0.35	0.35
Ox%(Na)	0.04	0.03	0.01	0.00	0.02	0.00	0.00	0.07	0.02	0.01	0.00	0.07
Ox%(Mg)	0.85	0.82	1.17	0.70	0.83	0.63	0.95	2.04	8.84	6.82	1.68	1.37
Ox%(Al)	14.70	14.93	16.06	28.24	44.54	28.94	25.27	25.47	22.10	16.73	23.72	16.02
Ox%(Si)	27.90	26.68	26.19	18.30	22.88	17.67	20.28	21.11	23.03	19.01	22.40	26.96
Ox%(P)	0.04	0.03	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.10	0.00	0.03
Ox%(Cl)	0.82	0.98	0.42	0.06	0.04	0.05	0.02	0.32	0.32	0.30	0.27	0.27
W%(Cl)	0.67	0.80	0.34	0.05	0.03	0.04	0.02	0.26	0.26	0.24	0.22	0.22
Ox%(K)	0.07	0.09	0.25	0.01	0.01	0.00	0.02	1.10	0.11	0.04	0.43	0.17
Ox%(Ca)	0.04	0.06	0.03	0.01	0.00	0.00	0.00	0.01	0.04	0.00	0.02	0.03
Ox%(Ti)	0.04	0.12	0.08	0.07	0.22	0.03	0.00	0.29	0.04	0.00	0.17	0.07
Ox%(Cr)	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
Ox%(Mn)	0.27	0.22	0.23	0.11	0.13	0.17	0.15	0.12	0.08	0.06	0.15	0.10
Ox%(Fe)	44.46	45.74	44.62	40.14	25.40	39.19	40.57	38.14	33.42	43.69	41.15	43.63
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	4.02	4.11	4.40	7.68	9.97	7.93	6.91	6.80	5.76	4.82	6.30	4.36
Si	6.47	6.23	6.09	4.22	4.34	4.11	4.70	4.79	5.10	4.64	5.04	6.23
Al	1.53	1.77	1.91	3.78	3.66	3.89	3.30	3.21	2.90	3.36	2.96	1.77
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.49	2.35	2.49	3.90	6.31	4.04	3.61	3.59	2.86	1.46	3.34	2.59
Mg	0.29	0.29	0.41	0.24	0.24	0.22	0.33	0.69	2.92	2.48	0.56	0.47
Fe	8.62	8.94	8.68	7.74	4.03	7.62	7.87	7.23	6.18	8.93	7.75	8.43
Mn	0.05	0.04	0.05	0.02	0.02	0.03	0.03	0.02	0.02	0.01	0.03	0.02
Ti	0.01	0.02	0.01	0.01	0.03	0.01	0.00	0.05	0.01	0.00	0.03	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
Na	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.03	0.01	0.01	0.00	0.03
K	0.02	0.03	0.07	0.00	0.00	0.00	0.01	0.32	0.03	0.01	0.12	0.05
Total	11.51	11.69	11.72	11.93	10.64	11.92	11.84	11.93	12.03	12.90	11.84	11.61
F	0.25	0.23	0.22	0.25	0.11	0.24	0.29	0.22	0.16	0.26	0.25	0.26
Cl	0.26	0.32	0.13	0.02	0.01	0.02	0.01	0.10	0.10	0.10	0.08	0.09
(OH)	15.49	15.46	15.65	15.74	15.88	15.75	15.71	15.68	15.74	15.64	15.67	15.66
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.96	0.96	0.95	0.97	0.94	0.97	0.96	0.91	0.68	0.78	0.93	0.94
% clinochlore	3.26	3.09	4.44	3.02	5.51	2.79	3.99	8.69	31.99	21.75	6.76	5.30
% chamosite	96.16	96.44	95.06	96.71	94.00	96.78	95.66	91.02	67.85	78.14	92.89	94.48
% pennantite	0.58	0.47	0.50	0.27	0.49	0.43	0.35	0.29	0.17	0.11	0.35	0.21

APPENDIX B - Chlorite Label	180s7_1_18	180s7_1_19	180s7_1_20	180s7_1_24	180s7_1_25	180s7_2_2	180s7_2_3	180s7_2_7	180s7_2_15	180s4_8	180s4_9	180s4_10
W%(F)	0.38	0.29	0.30	0.21	0.36	0.34	0.16	0.35	0.32	0.23	0.29	0.20
Ox%(Na)	0.02	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Ox%(Mg)	1.23	0.63	0.74	1.14	1.15	0.61	1.02	0.85	8.58	10.91	10.95	10.83
Ox%(Al)	21.01	31.25	38.07	14.37	13.81	34.88	52.89	37.42	21.19	23.26	22.51	22.67
Ox%(Si)	26.12	17.44	20.96	26.37	27.06	16.56	26.14	21.36	23.76	23.84	24.13	23.97
Ox%(P)	0.05	0.00	0.03	0.02	0.02	0.01	0.03	0.05	0.04	0.01	0.03	0.03
Ox%(Cl)	0.23	0.03	0.01	0.34	0.39	0.04	0.01	0.06	0.19	0.01	0.00	0.00
W%(Cl)	0.18	0.02	0.01	0.28	0.32	0.03	0.01	0.05	0.15	0.01	0.00	0.00
Ox%(K)	0.21	0.01	0.01	0.03	0.06	0.00	0.02	0.04	0.22	0.01	0.00	0.01
Ox%(Ca)	0.04	0.03	0.00	0.01	0.00	0.02	0.02	0.02	0.04	0.00	0.00	0.00
Ox%(Ti)	0.14	0.14	0.12	0.03	0.04	0.13	0.42	0.13	0.10	0.11	0.06	0.07
Ox%(Cr)	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.00
Ox%(Mn)	0.17	0.10	0.12	0.13	0.16	0.14	0.14	0.09	0.07	0.06	0.08	0.10
Ox%(Fe)	39.31	38.07	30.37	45.52	45.94	38.03	15.11	34.14	32.08	29.95	29.39	29.94
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.56	8.37	9.23	4.01	3.83	9.00	10.85	8.88	5.59	5.89	5.75	5.78
Si	5.86	3.96	4.31	6.25	6.37	3.63	4.55	4.30	5.32	5.12	5.23	5.19
Al	2.14	4.04	3.69	1.75	1.63	4.37	3.45	3.70	2.68	2.88	2.77	2.81
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	3.42	4.33	5.55	2.26	2.20	4.63	7.41	5.18	2.91	3.01	2.98	2.97
Mg	0.41	0.21	0.23	0.40	0.40	0.20	0.26	0.25	2.86	3.49	3.54	3.49
Fe	7.38	7.23	5.22	9.02	9.04	6.96	2.20	5.75	6.00	5.38	5.33	5.42
Mn	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.02
Ti	0.02	0.02	0.02	0.01	0.01	0.02	0.06	0.02	0.02	0.02	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
Na	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
K	0.06	0.00	0.00	0.01	0.02	0.00	0.01	0.01	0.06	0.00	0.00	0.00
Total	11.35	11.83	11.04	11.75	11.71	11.85	9.96	11.23	11.88	11.92	11.87	11.90
F	0.27	0.21	0.19	0.16	0.26	0.23	0.09	0.22	0.23	0.16	0.20	0.14
Cl	0.07	0.01	0.00	0.11	0.13	0.01	0.00	0.02	0.06	0.00	0.00	0.00
(OH)	15.66	15.78	15.80	15.73	15.61	15.75	15.91	15.76	15.71	15.84	15.80	15.86
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.94	0.97	0.95	0.95	0.95	0.97	0.89	0.96	0.68	0.61	0.60	0.61
% clinochlore	5.26	2.86	4.16	4.27	4.26	2.77	10.61	4.22	32.23	39.31	39.84	39.11
% chamosite	94.32	96.88	95.45	95.46	95.40	96.87	88.54	95.53	67.61	60.57	60.00	60.69
% pennantite	0.42	0.26	0.40	0.27	0.34	0.35	0.85	0.25	0.16	0.12	0.16	0.20

APPENDIX B - Chlorite Label	180s4_11	180s5_2_1	180s5_2_2	180s5_2_3	180s5_2_4	180s5_2_5	180s5_2_6	180s5_2_7	180s5_2_8	180s5_2_9	180s5_2_10	180s5_2_11
W%(F)	0.25	0.27	0.26	0.30	0.30	0.34	0.29	0.31	0.29	0.17	0.24	0.24
Ox%(Na)	0.04	0.03	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.01
Ox%(Mg)	10.74	11.39	11.43	11.34	11.69	11.84	11.78	10.82	11.09	11.45	10.88	11.53
Ox%(Al)	22.25	22.66	22.61	22.69	22.82	22.93	22.71	22.11	23.52	23.81	23.16	22.82
Ox%(Si)	24.05	23.59	23.46	23.52	23.15	23.59	23.08	22.73	22.89	22.84	22.66	23.05
Ox%(P)	0.04	0.00	0.01	0.02	0.06	0.02	0.00	0.05	0.01	0.00	0.09	0.02
Ox%(Cl)	0.09	0.00	0.01	0.02	0.01	0.01	0.01	0.00	0.02	0.02	0.01	0.02
W%(Cl)	0.08	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.02	0.01	0.01	0.01
Ox%(K)	0.28	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.02	0.02
Ox%(Ca)	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.03	0.00	0.02	0.04
Ox%(Ti)	0.12	0.07	0.10	0.06	0.10	0.12	0.10	0.09	0.06	0.08	0.13	0.12
Ox%(Cr)	0.02	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.03	0.02
Ox%(Mn)	0.15	0.05	0.06	0.03	0.10	0.02	0.06	0.07	0.11	0.03	0.06	0.09
Ox%(Fe)	30.45	29.07	29.14	29.21	28.68	28.59	28.73	30.17	28.99	29.25	29.75	29.51
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.67	5.81	5.80	5.82	5.86	5.84	5.85	5.78	6.04	6.07	5.98	5.85
Si	5.20	5.13	5.11	5.12	5.05	5.10	5.04	5.04	4.99	4.94	4.96	5.02
Al	2.80	2.87	2.89	2.88	2.95	2.90	2.96	2.96	3.01	3.06	3.04	2.98
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.87	2.94	2.91	2.94	2.91	2.94	2.89	2.82	3.04	3.01	2.94	2.87
Mg	3.46	3.69	3.71	3.68	3.80	3.81	3.84	3.58	3.60	3.69	3.55	3.74
Fe	5.50	5.29	5.31	5.31	5.23	5.17	5.25	5.59	5.29	5.29	5.45	5.37
Mn	0.03	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.02	0.00	0.01	0.02
Ti	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02
Cr	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Ca	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01
Na	0.02	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
K	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	11.97	11.96	11.97	11.96	11.98	11.95	12.02	12.03	11.97	12.01	11.99	12.03
F	0.17	0.19	0.18	0.21	0.21	0.24	0.20	0.22	0.20	0.12	0.17	0.16
Cl	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
(OH)	15.80	15.81	15.82	15.79	15.79	15.76	15.80	15.78	15.79	15.88	15.83	15.83
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.61	0.59	0.59	0.59	0.58	0.58	0.58	0.61	0.59	0.59	0.60	0.59
% clinochlore	38.47	41.08	41.09	40.87	42.00	42.45	42.17	38.93	40.45	41.08	39.40	40.97
% chamosite	61.23	58.82	58.77	59.07	57.81	57.52	57.70	60.92	59.31	58.87	60.48	58.84
% pennantite	0.30	0.10	0.13	0.06	0.19	0.04	0.13	0.15	0.23	0.05	0.12	0.19

APPENDIX B - Chlorite Label	180s5_2_12	180s5_2_13	180s5_2_14	180s5_2_15	180s5_2_23	17812_7	17812_17	17812_18	17812_21	17812_22	1787_2	1787_3
W%(F)	0.36	0.20	0.29	0.33	0.31	0.35	0.17	0.26	0.36	0.24	0.22	0.27
Ox%(Na)	0.01	0.00	0.00	0.00	0.06	0.05	0.00	0.03	0.01	0.00	0.07	0.01
Ox%(Mg)	11.43	11.42	11.50	11.14	2.97	11.56	11.99	11.78	11.62	11.46	10.86	10.96
Ox%(Al)	23.52	22.58	22.80	22.98	7.67	22.83	22.03	22.47	23.41	23.42	22.72	22.97
Ox%(Si)	22.94	23.58	23.47	23.08	35.34	22.89	22.48	22.34	22.50	22.52	23.26	23.36
Ox%(P)	0.03	0.02	0.08	0.05	0.01	0.03	0.06	0.07	0.06	0.11	0.01	0.03
Ox%(Cl)	0.01	0.02	0.03	0.01	0.75	0.02	0.02	0.05	0.00	0.02	0.01	0.01
W%(Cl)	0.01	0.02	0.03	0.01	0.61	0.01	0.01	0.04	0.00	0.01	0.01	0.01
Ox%(K)	0.00	0.03	0.00	0.03	0.49	0.00	0.00	0.04	0.01	0.01	0.01	0.03
Ox%(Ca)	0.03	0.07	0.04	0.02	0.03	0.06	0.03	0.01	0.03	0.02	0.03	0.02
Ox%(Ti)	0.04	0.09	0.09	0.10	0.18	0.10	0.07	0.12	0.12	0.07	0.09	0.07
Ox%(Cr)	0.00	0.00	0.00	0.00	0.09	0.01	0.03	0.00	0.00	0.01	0.00	0.02
Ox%(Mn)	0.09	0.05	0.10	0.08	0.32	0.06	0.08	0.04	0.05	0.03	0.02	0.03
Ox%(Fe)	29.28	28.41	29.19	29.34	38.89	28.31	27.81	27.93	28.17	29.05	29.61	29.44
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	6.01	5.81	5.82	5.91	2.07	5.91	5.80	5.90	6.05	6.03	5.86	5.90
Si	4.97	5.15	5.09	5.04	8.09	5.03	5.02	4.98	4.94	4.92	5.09	5.09
Al	3.03	2.85	2.91	2.96	-0.09	2.97	2.98	3.02	3.06	3.08	2.91	2.91
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.98	2.97	2.91	2.95	2.16	2.94	2.82	2.87	2.99	2.95	2.95	2.99
Mg	3.69	3.72	3.71	3.62	1.01	3.79	3.99	3.91	3.80	3.73	3.54	3.56
Fe	5.30	5.19	5.29	5.35	7.45	5.20	5.19	5.20	5.17	5.30	5.42	5.36
Mn	0.02	0.01	0.02	0.02	0.06	0.01	0.02	0.01	0.01	0.00	0.00	0.01
Ti	0.01	0.02	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.01	0.02	0.01
Cr	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00
Na	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.01	0.00	0.00	0.03	0.00
K	0.00	0.01	0.00	0.01	0.14	0.00	0.00	0.01	0.00	0.00	0.00	0.01
Total	12.01	11.92	11.95	11.97	10.91	12.00	12.04	12.03	11.99	12.00	11.97	11.94
F	0.24	0.14	0.20	0.23	0.22	0.24	0.12	0.18	0.25	0.17	0.16	0.19
Cl	0.00	0.01	0.01	0.00	0.24	0.01	0.01	0.02	0.00	0.01	0.00	0.00
(OH)	15.75	15.86	15.79	15.77	15.54	15.75	15.87	15.80	15.75	15.83	15.84	15.81
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.59	0.58	0.59	0.60	0.87	0.58	0.56	0.57	0.58	0.59	0.60	0.60
% clinochlore	40.96	41.70	41.16	40.29	11.88	42.06	43.37	42.86	42.32	41.26	39.50	39.86
% chamosite	58.86	58.20	58.64	59.53	87.40	57.80	56.46	57.05	57.57	58.69	60.46	60.08
% pennantite	0.19	0.10	0.21	0.17	0.72	0.13	0.17	0.09	0.10	0.05	0.04	0.06

APPENDIX B - Chlorite Label	1787_8	1787_9	1787_10	1787_11	1788_1_3	1788_1_5	1788_1_6	1788_1_7	1788_1_8	1788_1_9	1788_1_10	1788_1_11
W%(F)	0.34	0.36	0.30	0.22	0.35	0.33	0.26	0.32	0.22	0.25	0.23	0.37
Ox%(Na)	0.04	0.00	0.01	0.02	0.03	0.02	0.00	0.02	0.00	0.00	0.00	0.02
Ox%(Mg)	10.70	10.75	10.62	10.53	11.62	11.62	11.78	11.74	10.97	12.00	11.15	11.59
Ox%(Al)	22.81	22.44	22.57	22.57	22.89	22.79	22.43	22.71	21.58	22.65	22.09	22.58
Ox%(Si)	22.74	22.69	23.14	22.89	23.51	23.11	23.36	23.25	22.25	23.55	23.50	23.21
Ox%(P)	0.00	0.00	0.08	0.01	0.04	0.02	0.06	0.01	0.04	0.00	0.01	0.00
Ox%(Cl)	0.01	0.03	0.04	0.05	0.02	0.00	0.00	0.04	0.02	0.02	0.04	0.00
W%(Cl)	0.01	0.03	0.03	0.04	0.02	0.00	0.00	0.04	0.02	0.01	0.04	0.00
Ox%(K)	0.01	0.00	0.01	0.03	0.05	0.02	0.01	0.02	0.00	0.00	0.02	0.01
Ox%(Ca)	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.05	0.01	0.01	0.01	0.01
Ox%(Ti)	0.11	0.09	0.04	0.05	0.14	0.15	0.10	0.03	0.10	0.07	0.09	0.06
Ox%(Cr)	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
Ox%(Mn)	0.02	0.07	0.09	0.08	0.02	0.06	0.10	0.10	0.03	0.03	0.04	0.05
Ox%(Fe)	29.52	29.42	29.51	29.39	28.54	28.49	28.59	28.89	30.45	28.78	29.49	28.71
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.94	5.88	5.86	5.90	5.85	5.87	5.77	5.83	5.71	5.78	5.71	5.83
Si	5.03	5.05	5.10	5.08	5.10	5.06	5.10	5.07	4.99	5.10	5.16	5.09
Al	2.97	2.95	2.90	2.92	2.90	2.94	2.90	2.93	3.01	2.90	2.84	2.91
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.97	2.93	2.96	2.98	2.96	2.93	2.88	2.90	2.70	2.89	2.87	2.91
Mg	3.52	3.56	3.49	3.48	3.76	3.79	3.83	3.81	3.67	3.87	3.65	3.78
Fe	5.45	5.47	5.44	5.45	5.18	5.21	5.22	5.26	5.71	5.21	5.41	5.26
Mn	0.00	0.01	0.02	0.02	0.00	0.01	0.02	0.02	0.01	0.00	0.01	0.01
Ti	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Na	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01
K	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00
Total	11.99	12.00	11.93	11.96	11.94	11.98	11.97	12.02	12.11	11.99	11.97	11.99
F	0.24	0.26	0.21	0.16	0.24	0.23	0.18	0.22	0.16	0.17	0.16	0.26
Cl	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00
(OH)	15.76	15.73	15.78	15.83	15.75	15.77	15.82	15.77	15.84	15.82	15.82	15.74
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.61	0.60	0.61	0.61	0.58	0.58	0.58	0.58	0.61	0.57	0.60	0.58
% clinochlore	39.22	39.39	39.00	38.90	42.03	42.04	42.27	41.92	39.08	42.61	40.23	41.80
% chamosite	60.73	60.46	60.82	60.93	57.93	57.84	57.54	57.88	60.85	57.34	59.69	58.09
% pennantite	0.05	0.15	0.18	0.17	0.03	0.12	0.20	0.19	0.07	0.05	0.08	0.10

APPENDIX B - Chlorite Label	1788_1_12	1788_1_13	1788_1_14	1788_1_15	1788_1_16	1788_1_17	1788_1_18	1788_1_19	1788_1_20	1788_2_1	1788_2_2	1788_2_3
W%(F)	0.21	0.22	0.42	0.26	0.21	0.32	0.31	0.33	0.22	0.28	0.24	0.28
Ox%(Na)	0.02	0.02	0.03	0.05	0.00	0.01	0.00	0.05	0.00	0.01	0.03	0.02
Ox%(Mg)	11.74	12.00	12.11	11.71	11.44	11.70	11.83	12.17	0.00	11.63	11.99	11.61
Ox%(Al)	22.69	23.17	22.69	22.56	22.87	22.86	22.86	23.16	17.00	22.54	22.30	22.53
Ox%(Si)	23.17	24.34	23.42	23.40	23.00	23.21	23.54	23.84	23.51	23.27	23.47	23.64
Ox%(P)	0.04	0.00	0.09	0.02	0.03	0.01	0.05	0.02	0.02	0.10	0.00	0.07
Ox%(Cl)	0.00	0.04	0.04	0.02	0.02	0.03	0.00	0.00	0.00	0.01	0.01	0.02
W%(Cl)	0.00	0.03	0.03	0.01	0.02	0.02	0.00	0.00	0.00	0.01	0.01	0.02
Ox%(K)	0.01	0.03	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.02
Ox%(Ca)	0.02	0.16	0.04	0.01	0.03	0.00	0.04	0.02	0.00	0.04	0.04	0.19
Ox%(Ti)	0.08	0.02	0.04	0.11	0.06	0.06	0.08	0.06	0.09	0.05	0.10	0.08
Ox%(Cr)	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Ox%(Mn)	0.10	0.07	0.05	0.02	0.04	0.07	0.07	0.09	0.09	0.00	0.00	0.12
Ox%(Fe)	28.71	28.31	28.51	28.35	28.60	28.89	28.22	28.16	28.42	28.66	28.40	28.29
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.84	5.82	5.80	5.81	5.91	5.87	5.84	5.85	5.55	5.81	5.74	5.78
Si	5.06	5.18	5.08	5.11	5.05	5.05	5.11	5.11	6.51	5.09	5.13	5.14
Al	2.94	2.82	2.92	2.89	2.95	2.95	2.89	2.89	1.49	2.91	2.87	2.86
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.89	3.00	2.87	2.92	2.96	2.92	2.95	2.96	4.06	2.90	2.87	2.92
Mg	3.82	3.81	3.91	3.81	3.74	3.80	3.83	3.89	0.00	3.79	3.90	3.77
Fe	5.24	5.04	5.17	5.18	5.25	5.26	5.12	5.05	6.58	5.24	5.19	5.15
Mn	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.02
Ti	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.04	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.04
Na	0.01	0.01	0.01	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.01
K	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	12.00	11.91	11.99	11.96	11.98	12.00	11.93	11.95	10.68	11.95	11.99	11.93
F	0.14	0.15	0.29	0.18	0.14	0.22	0.21	0.22	0.19	0.19	0.17	0.19
Cl	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
(OH)	15.85	15.84	15.70	15.81	15.85	15.77	15.79	15.78	15.81	15.81	15.83	15.80
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.58	0.57	0.57	0.58	0.58	0.58	0.57	0.56	1.00	0.58	0.57	0.58
% clinochlore	42.05	42.98	43.04	42.37	41.59	41.86	42.70	43.43	0.00	41.95	42.94	42.14
% chamosite	57.73	56.88	56.87	57.58	58.34	58.00	57.15	56.39	99.69	58.04	57.05	57.60
% pennantite	0.21	0.14	0.09	0.04	0.07	0.14	0.14	0.18	0.31	0.01	0.01	0.26

APPENDIX B - Chlorite Label	1788_2_15	1789_1_1	1789_1_2	1789_1_3	1789_1_4	1789_1_5	1789_1_6	1789_1_7	1789_1_8	1789_1_9	1789_1_10	1789_1_11
W%(F)	0.34	0.19	0.34	0.23	0.26	0.29	0.36	0.37	0.22	0.18	0.25	0.29
Ox%(Na)	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.03
Ox%(Mg)	11.33	9.38	11.51	11.59	11.12	11.28	11.23	11.03	11.51	10.56	10.52	11.17
Ox%(Al)	22.39	19.67	23.54	23.19	22.88	22.87	22.74	22.80	22.19	22.55	21.98	23.30
Ox%(Si)	22.90	20.04	22.96	23.68	23.86	23.00	22.98	23.32	23.42	23.24	21.94	22.44
Ox%(P)	0.03	0.00	0.05	0.00	0.05	0.08	0.07	0.01	0.05	0.12	0.04	0.07
Ox%(Cl)	0.01	0.08	0.00	0.06	0.03	0.00	0.03	0.00	0.02	0.02	0.03	0.04
W%(Cl)	0.00	0.07	0.00	0.05	0.02	0.00	0.02	0.00	0.02	0.01	0.03	0.03
Ox%(K)	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.01
Ox%(Ca)	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01
Ox%(Ti)	0.10	0.05	0.11	0.06	0.03	0.07	0.06	0.07	0.09	0.09	0.03	0.09
Ox%(Cr)	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Ox%(Mn)	0.06	0.01	0.05	0.06	0.08	0.10	0.04	0.07	0.02	0.03	0.07	0.13
Ox%(Fe)	28.52	24.80	28.85	28.68	28.79	29.36	28.96	28.77	28.69	28.27	27.21	28.85
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.84	5.92	6.02	5.90	5.85	5.89	5.89	5.89	5.74	5.90	5.97	6.04
Si	5.07	5.12	4.98	5.11	5.18	5.03	5.05	5.11	5.14	5.16	5.06	4.94
Al	2.93	2.88	3.02	2.89	2.82	2.97	2.95	2.89	2.86	2.84	2.94	3.06
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.91	3.03	2.99	3.01	3.03	2.91	2.94	3.01	2.89	3.06	3.04	2.98
Mg	3.74	3.57	3.72	3.73	3.59	3.67	3.68	3.61	3.77	3.49	3.62	3.66
Fe	5.28	5.29	5.23	5.17	5.22	5.36	5.32	5.28	5.27	5.25	5.25	5.31
Mn	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.02
Ti	0.02	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.01	0.02
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
K	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Total	11.99	11.92	11.97	11.93	11.87	11.98	11.96	11.92	11.95	11.82	11.93	12.00
F	0.24	0.16	0.23	0.15	0.18	0.20	0.25	0.26	0.15	0.12	0.18	0.20
Cl	0.00	0.03	0.00	0.02	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01
(OH)	15.76	15.81	15.77	15.83	15.81	15.80	15.74	15.74	15.84	15.87	15.81	15.79
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.58	0.60	0.58	0.58	0.59	0.59	0.59	0.59	0.58	0.60	0.59	0.59
% clinochlore	41.40	40.26	41.50	41.82	40.70	40.54	40.82	40.53	41.67	39.94	40.73	40.70
% chamosite	58.48	59.71	58.39	58.07	59.13	59.25	59.10	59.31	58.30	59.99	59.11	59.02
% pennantite	0.12	0.03	0.11	0.12	0.16	0.21	0.09	0.15	0.03	0.07	0.16	0.27

APPENDIX B - Chlorite Label	1789_1_12	1789_1_13	1789_1_14	1789_1_15	1789_2_2	1789_2_3	1789_2_4	1789_2_5	1789_2_6	1789_2_7	1789_2_8	1789_2_9
W%(F)	0.23	0.23	0.28	0.32	0.18	0.40	0.34	0.31	0.45	0.21	0.27	0.39
Ox%(Na)	0.02	0.00	0.00	0.00	0.07	0.01	0.03	0.03	0.00	0.02	0.00	0.01
Ox%(Mg)	10.99	11.00	11.07	9.90	9.38	9.65	0.06	0.09	0.26	10.67	8.17	11.11
Ox%(Al)	22.75	22.87	22.37	20.49	18.70	18.57	0.02	0.01	0.35	20.77	16.40	22.97
Ox%(Si)	22.91	22.91	22.33	23.70	22.08	26.11	35.07	34.91	35.57	23.52	25.81	22.36
Ox%(P)	0.04	0.08	0.08	0.11	0.01	0.05	0.03	0.04	0.00	0.05	0.06	0.00
Ox%(Cl)	0.05	0.00	0.02	0.12	0.09	0.11	0.83	0.80	0.80	0.04	0.38	0.00
W%(Cl)	0.04	0.00	0.01	0.10	0.07	0.09	0.68	0.66	0.65	0.03	0.31	0.00
Ox%(K)	0.00	0.00	0.00	0.04	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00
Ox%(Ca)	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.01	0.12	0.08	0.02
Ox%(Ti)	0.10	0.10	0.09	0.06	0.10	0.00	0.00	0.00	0.06	0.08	0.07	0.06
Ox%(Cr)	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.01
Ox%(Mn)	0.02	0.00	0.05	0.15	0.06	0.01	0.17	0.14	0.24	0.05	0.12	0.08
Ox%(Fe)	28.52	29.14	27.95	29.22	27.59	33.11	52.54	50.44	50.01	29.43	34.00	28.81
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.93	5.93	5.93	5.49	5.37	4.82	0.01	0.00	0.10	5.50	4.45	6.01
Si	5.07	5.04	5.02	5.38	5.38	5.75	8.58	8.70	8.72	5.28	5.94	4.96
Al	2.93	2.96	2.98	2.62	2.62	2.25	-0.58	-0.70	-0.72	2.72	2.06	3.04
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	3.00	2.96	2.96	2.87	2.76	2.56	0.59	0.70	0.82	2.78	2.39	2.97
Mg	3.62	3.60	3.71	3.35	3.41	3.16	0.02	0.03	0.09	3.57	2.80	3.67
Fe	5.28	5.36	5.26	5.55	5.63	6.09	10.75	10.51	10.25	5.53	6.54	5.35
Mn	0.00	0.00	0.01	0.03	0.01	0.00	0.04	0.03	0.05	0.01	0.02	0.02
Ti	0.02	0.02	0.02	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Ca	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.03	0.02	0.01
Na	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.01	0.00	0.01	0.00	0.01
K	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total	11.93	11.95	11.95	11.82	11.92	11.83	11.41	11.29	11.22	11.94	11.79	12.03
F	0.16	0.16	0.20	0.23	0.14	0.28	0.26	0.25	0.35	0.15	0.19	0.28
Cl	0.01	0.00	0.00	0.04	0.03	0.03	0.28	0.28	0.27	0.01	0.12	0.00
(OH)	15.82	15.84	15.80	15.73	15.83	15.69	15.46	15.48	15.38	15.84	15.69	15.72
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.59	0.60	0.59	0.62	0.62	0.66	0.99	0.99	0.99	0.61	0.70	0.59
% clinochlore	40.69	40.22	41.34	37.52	37.67	34.18	0.20	0.33	0.91	39.21	29.90	40.67
% chamosite	59.27	59.77	58.55	62.16	62.20	65.80	99.47	99.39	98.61	60.69	69.85	59.16
% pennantite	0.04	0.00	0.11	0.33	0.13	0.02	0.33	0.28	0.48	0.10	0.25	0.17

APPENDIX B - Chlorite Label	1789_2_10	08611_2_1	08611_2_2	08611_2_3	08611_2_4	08611_2_5	08611_2_7	08611_2_8	08611_2_9	08611_2_10	08611_2_12	08611_2_13
W%(F)	0.31	0.34	0.23	0.33	0.20	0.23	0.29	0.28	0.24	0.30	0.43	0.35
Ox%(Na)	0.00	0.14	0.02	0.01	0.03	0.04	0.07	0.00	0.03	0.00	0.01	0.06
Ox%(Mg)	11.38	4.66	4.50	4.77	3.34	7.29	4.29	4.94	2.66	4.41	4.00	3.53
Ox%(Al)	22.32	6.83	6.45	6.77	4.66	11.93	6.01	6.86	3.51	5.99	5.83	4.67
Ox%(Si)	23.30	39.17	39.22	38.91	55.96	29.09	44.89	43.56	65.25	41.41	46.43	54.53
Ox%(P)	0.00	0.05	0.02	0.00	0.02	0.07	0.00	0.00	0.00	0.04	0.01	0.03
Ox%(Cl)	0.00	0.74	0.69	0.76	0.48	0.49	0.57	0.67	0.49	0.89	0.61	0.69
W%(Cl)	0.00	0.60	0.56	0.62	0.39	0.40	0.47	0.54	0.40	0.73	0.50	0.56
Ox%(K)	0.00	0.98	0.94	0.72	0.53	0.17	0.70	0.76	0.57	0.71	0.52	0.67
Ox%(Ca)	0.01	0.04	0.00	0.03	0.02	0.03	0.05	0.01	0.01	0.00	0.02	0.01
Ox%(Ti)	0.07	0.04	0.04	0.03	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.01
Ox%(Cr)	0.02	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.00
Ox%(Mn)	0.02	0.25	0.23	0.23	0.19	0.15	0.16	0.18	0.24	0.34	0.22	0.18
Ox%(Fe)	29.09	35.71	35.11	35.24	25.78	36.36	32.51	31.33	21.17	34.09	31.17	27.82
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.78	1.76	1.68	1.76	1.04	3.25	1.47	1.70	0.73	1.53	1.42	1.05
Si	5.12	8.54	8.66	8.57	10.64	6.73	9.33	9.14	11.49	8.96	9.58	10.42
Al	2.88	-0.54	-0.66	-0.57	-2.64	1.27	-1.33	-1.14	-3.49	-0.96	-1.58	-2.42
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.89	2.30	2.33	2.33	3.68	1.98	2.80	2.83	4.22	2.49	2.99	3.47
Mg	3.72	1.51	1.48	1.57	0.95	2.51	1.33	1.54	0.70	1.42	1.23	1.00
Fe	5.34	6.51	6.48	6.49	4.10	7.03	5.65	5.50	3.12	6.17	5.37	4.44
Mn	0.00	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.06	0.04	0.03
Ti	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Ca	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00
Na	0.00	0.06	0.01	0.00	0.01	0.02	0.03	0.00	0.01	0.00	0.00	0.02
K	0.00	0.27	0.26	0.20	0.13	0.05	0.19	0.20	0.13	0.19	0.14	0.16
Total	11.98	10.72	10.62	10.65	8.90	11.64	10.04	10.11	8.21	10.35	9.78	9.14
F	0.21	0.23	0.16	0.23	0.12	0.17	0.19	0.18	0.14	0.21	0.28	0.21
Cl	0.00	0.22	0.21	0.23	0.13	0.16	0.16	0.19	0.12	0.27	0.17	0.18
(OH)	15.79	15.55	15.63	15.54	15.75	15.68	15.64	15.62	15.74	15.53	15.55	15.61
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.59	0.81	0.81	0.80	0.81	0.73	0.81	0.78	0.81	0.81	0.81	0.81
% clinochlore	41.06	18.76	18.48	19.33	18.66	26.26	18.98	21.84	18.12	18.58	18.50	18.33
% chamosite	58.89	80.67	80.99	80.13	80.75	73.44	80.63	77.70	80.95	80.61	80.93	81.13
% pennantite	0.05	0.57	0.53	0.54	0.59	0.30	0.40	0.46	0.93	0.80	0.57	0.54

APPENDIX B - Chlorite Label	08611_2_16	08611_2_17	08611_2_18	08611_2_19	08611_2_20	0866_2_1	0866_2_2	0866_2_3	0866_2_4	0866_2_5	0866_2_6	0866_2_7
W%(F)	0.11	0.37	0.18	0.33	0.42	0.29	0.32	0.24	0.26	0.26	0.25	0.28
Ox%(Na)	0.02	0.01	0.01	0.04	0.02	0.00	0.02	0.00	0.04	0.05	0.00	0.00
Ox%(Mg)	2.66	6.16	6.38	4.30	5.87	5.65	12.70	13.35	12.78	12.74	12.79	13.42
Ox%(Al)	3.52	8.97	9.12	6.18	9.24	20.78	24.59	23.45	24.00	23.22	23.48	23.75
Ox%(Si)	67.23	35.96	34.46	39.74	30.76	24.21	23.51	23.83	23.37	23.78	23.98	23.48
Ox%(P)	0.00	0.03	0.04	0.06	0.02	0.06	0.01	0.01	0.00	0.02	0.00	0.02
Ox%(Cl)	0.49	0.56	0.49	0.77	0.57	0.08	0.04	0.06	0.01	0.06	0.10	0.07
W%(Cl)	0.40	0.46	0.40	0.63	0.46	0.07	0.03	0.05	0.01	0.05	0.08	0.06
Ox%(K)	0.55	0.47	0.35	0.64	0.19	0.00	0.07	0.31	0.03	0.03	0.33	0.09
Ox%(Ca)	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.02	0.00	0.01	0.00
Ox%(Ti)	0.00	0.04	0.05	0.00	0.00	0.04	0.14	0.07	0.11	0.07	0.06	0.07
Ox%(Cr)	0.00	0.01	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.02	0.04	0.03
Ox%(Mn)	0.21	0.21	0.17	0.25	0.21	0.10	0.01	0.06	0.04	0.10	0.05	0.05
Ox%(Fe)	20.84	35.10	35.79	35.56	38.75	37.89	27.49	26.85	26.96	28.04	27.21	26.91
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	0.71	2.33	2.41	1.60	2.55	5.46	6.11	5.87	6.04	5.83	5.88	5.95
Si	11.58	7.93	7.72	8.74	7.21	5.40	4.96	5.06	4.99	5.07	5.10	4.99
Al	-3.58	0.07	0.28	-0.74	0.79	2.60	3.04	2.94	3.01	2.93	2.90	3.01
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	4.29	2.26	2.13	2.34	1.77	2.86	3.07	2.93	3.03	2.90	2.98	2.94
Mg	0.68	2.03	2.13	1.41	2.05	1.88	3.99	4.22	4.07	4.05	4.05	4.25
Fe	3.00	6.47	6.70	6.54	7.60	7.07	4.85	4.77	4.82	5.00	4.84	4.78
Mn	0.03	0.04	0.03	0.05	0.04	0.02	0.00	0.01	0.01	0.02	0.01	0.01
Ti	0.00	0.01	0.01	0.00	0.00	0.01	0.02	0.01	0.02	0.01	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.01	0.01	0.01	0.02	0.01	0.00	0.01	0.00	0.02	0.02	0.00	0.00
K	0.12	0.13	0.10	0.18	0.06	0.00	0.02	0.08	0.01	0.01	0.09	0.02
Total	8.13	10.95	11.10	10.53	11.53	11.84	11.97	12.03	11.98	12.01	11.99	12.02
F	0.06	0.26	0.12	0.23	0.31	0.21	0.22	0.16	0.17	0.18	0.17	0.19
Cl	0.12	0.17	0.15	0.23	0.18	0.03	0.01	0.02	0.00	0.02	0.03	0.02
(OH)	15.82	15.57	15.72	15.53	15.51	15.77	15.77	15.82	15.82	15.80	15.80	15.79
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.81	0.76	0.76	0.82	0.78	0.79	0.55	0.53	0.54	0.55	0.54	0.53
% clinochlore	18.35	23.72	24.02	17.61	21.16	20.94	45.15	46.92	45.76	44.65	45.54	46.99
% chamosite	80.82	75.81	75.62	81.80	78.40	78.85	54.83	52.96	54.16	55.15	54.36	52.90
% pennantite	0.83	0.47	0.36	0.59	0.44	0.21	0.02	0.12	0.08	0.20	0.11	0.11

APPENDIX B - Chlorite Label	0866_2_8	0866_2_9	0866_2_10	08612_2_1	08612_2_2	08612_2_3	08612_2_4	08612_2_5	08612_2_6	08612_2_7	08612_2_8	08612_2_9
W%(F)	0.24	0.21	0.29	0.37	0.33	0.27	0.33	0.32	0.31	0.27	0.32	0.37
Ox%(Na)	0.04	0.01	0.04	0.01	0.03	0.00	0.00	0.03	0.00	0.02	0.04	0.00
Ox%(Mg)	13.45	12.10	10.74	5.62	5.55	5.66	5.61	5.19	5.46	5.40	5.82	7.20
Ox%(Al)	22.96	21.77	20.81	18.39	18.10	17.14	17.86	17.89	17.77	17.94	17.78	16.40
Ox%(Si)	23.68	24.72	24.53	24.57	24.93	24.44	24.82	24.93	24.93	24.50	25.08	25.66
Ox%(P)	0.00	0.00	0.06	0.01	0.00	0.07	0.01	0.04	0.03	0.01	0.00	0.02
Ox%(Cl)	0.03	0.25	0.17	0.21	0.23	0.21	0.19	0.22	0.23	0.24	0.22	0.27
W%(Cl)	0.02	0.20	0.14	0.17	0.18	0.17	0.15	0.18	0.19	0.19	0.18	0.22
Ox%(K)	0.12	0.78	0.57	0.00	0.01	0.00	0.01	0.03	0.00	0.02	0.01	0.01
Ox%(Ca)	0.01	0.04	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.01
Ox%(Ti)	0.06	0.03	0.09	0.03	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00
Ox%(Cr)	0.03	0.02	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.00
Ox%(Mn)	0.04	0.11	0.10	0.21	0.15	0.12	0.12	0.07	0.12	0.06	0.14	0.18
Ox%(Fe)	26.42	27.68	30.11	38.63	38.92	38.05	38.64	39.30	38.99	39.00	39.72	36.90
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.81	5.54	5.37	4.95	4.86	4.72	4.83	4.83	4.80	4.87	4.74	4.43
Si	5.09	5.33	5.37	5.61	5.68	5.71	5.70	5.71	5.71	5.65	5.68	5.88
Al	2.91	2.67	2.63	2.39	2.32	2.29	2.30	2.29	2.29	2.35	2.32	2.12
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.90	2.87	2.74	2.56	2.54	2.44	2.53	2.54	2.51	2.52	2.42	2.32
Mg	4.30	3.89	3.51	1.91	1.89	1.97	1.92	1.77	1.86	1.85	1.96	2.46
Fe	4.74	4.99	5.51	7.38	7.42	7.44	7.41	7.52	7.47	7.52	7.52	7.08
Mn	0.01	0.02	0.02	0.04	0.03	0.02	0.02	0.01	0.02	0.01	0.03	0.03
Ti	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Cr	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Na	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.00
K	0.03	0.21	0.16	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Total	12.02	12.00	11.99	11.91	11.89	11.88	11.89	11.87	11.87	11.92	11.96	11.89
F	0.17	0.14	0.20	0.27	0.24	0.20	0.24	0.23	0.22	0.20	0.23	0.27
Cl	0.01	0.07	0.05	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07	0.08
(OH)	15.83	15.78	15.75	15.67	15.69	15.73	15.70	15.70	15.70	15.73	15.70	15.64
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.52	0.56	0.61	0.79	0.79	0.79	0.79	0.81	0.80	0.80	0.79	0.74
% clinochlore	47.52	43.69	38.78	20.51	20.20	20.90	20.51	19.03	19.91	19.76	20.65	25.71
% chamosite	52.39	56.09	61.01	79.06	79.48	78.84	79.23	80.82	79.84	80.11	79.06	73.93
% pennantite	0.09	0.22	0.21	0.43	0.32	0.26	0.26	0.15	0.25	0.13	0.29	0.36

APPENDIX B - Chlorite Label	08612_2_10	08612_2_11	08612_2_12	08612_2_13	08612_2_14	08612_2_15	08612_3_1	08612_3_2	08612_3_3	08612_3_4	08612_3_5	08612_3_6
W%(F)	0.43	0.29	0.47	0.35	0.42	0.47	0.26	0.34	0.39	0.42	0.39	0.48
Ox%(Na)	0.01	0.00	0.03	0.05	0.00	0.04	0.01	0.04	0.03	0.00	0.03	0.02
Ox%(Mg)	7.03	7.31	9.08	8.73	8.38	8.26	5.54	5.69	5.52	6.77	7.25	7.12
Ox%(Al)	16.29	15.83	14.03	14.38	14.80	15.12	18.54	18.09	17.64	16.49	16.53	12.70
Ox%(Si)	26.20	26.48	30.25	29.93	28.97	28.79	25.04	24.92	24.86	25.42	26.30	25.77
Ox%(P)	0.02	0.05	0.04	0.04	0.01	0.01	0.04	0.02	0.00	0.01	0.04	0.03
Ox%(Cl)	0.26	0.22	0.14	0.16	0.16	0.22	0.26	0.27	0.21	0.22	0.25	0.21
W%(Cl)	0.21	0.18	0.12	0.13	0.13	0.18	0.21	0.22	0.17	0.18	0.20	0.17
Ox%(K)	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.02	0.01	0.00	0.01	0.02
Ox%(Ca)	0.02	0.03	0.07	0.05	0.05	0.05	0.03	0.01	0.01	0.02	0.00	0.02
Ox%(Ti)	0.04	0.00	0.01	0.00	0.04	0.05	0.01	0.04	0.04	0.03	0.00	0.00
Ox%(Cr)	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Mn)	0.07	0.12	0.12	0.17	0.08	0.12	0.15	0.15	0.13	0.16	0.08	0.06
Ox%(Fe)	37.81	37.10	35.30	35.46	35.67	36.51	38.16	38.36	38.81	37.64	38.03	38.88
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	4.35	4.24	3.60	3.70	3.86	3.92	4.96	4.87	4.78	4.47	4.38	3.57
Si	5.94	6.02	6.58	6.53	6.41	6.33	5.69	5.69	5.71	5.84	5.91	6.15
Al	2.06	1.98	1.42	1.47	1.59	1.67	2.31	2.31	2.29	2.16	2.09	1.85
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.30	2.27	2.18	2.23	2.26	2.24	2.65	2.56	2.49	2.31	2.29	1.73
Mg	2.38	2.48	2.94	2.84	2.76	2.70	1.87	1.94	1.89	2.32	2.43	2.53
Fe	7.17	7.06	6.42	6.47	6.59	6.71	7.25	7.32	7.46	7.23	7.14	7.76
Mn	0.01	0.02	0.02	0.03	0.01	0.02	0.03	0.03	0.03	0.03	0.02	0.01
Ti	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01
Na	0.00	0.00	0.01	0.02	0.00	0.02	0.00	0.02	0.01	0.00	0.01	0.01
K	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Total	11.87	11.83	11.61	11.61	11.65	11.71	11.81	11.87	11.90	11.91	11.89	12.06
F	0.31	0.21	0.32	0.24	0.29	0.33	0.18	0.25	0.28	0.31	0.28	0.36
Cl	0.08	0.07	0.04	0.05	0.05	0.07	0.08	0.09	0.07	0.07	0.08	0.07
(OH)	15.61	15.72	15.64	15.71	15.66	15.60	15.73	15.67	15.65	15.62	15.65	15.57
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.75	0.74	0.68	0.69	0.70	0.71	0.79	0.79	0.80	0.75	0.75	0.75
% clinochlore	24.85	25.93	31.36	30.38	29.46	28.66	20.49	20.84	20.17	24.19	25.31	24.58
% chamosite	75.01	73.82	68.41	69.29	70.38	71.11	79.20	78.85	79.55	75.48	74.53	75.29
% pennantite	0.13	0.25	0.23	0.33	0.16	0.23	0.31	0.31	0.28	0.33	0.16	0.12

APPENDIX B - Chlorite Label	08612_3_7	08612_3_8	08612_3_9	08612_3_10	08612_3_11	08612_3_12	08612_3_13	08612_3_14	08612_3_15	08612_4_1	08612_4_2	08612_4_3
W%(F)	0.47	0.41	0.35	0.42	0.40	0.35	0.38	0.32	0.35	0.33	0.28	0.36
Ox%(Na)	0.00	0.07	0.01	0.00	0.04	0.00	0.00	0.05	0.00	0.02	0.00	0.00
Ox%(Mg)	9.00	8.25	9.04	9.42	3.28	6.11	0.32	7.72	7.15	5.18	5.28	7.06
Ox%(Al)	14.57	13.33	15.23	15.33	5.62	9.00	2.31	15.30	15.84	18.55	17.95	17.67
Ox%(Si)	28.64	29.89	28.68	28.56	22.45	26.57	23.50	29.38	28.17	24.90	24.94	25.79
Ox%(P)	0.04	0.03	0.04	0.00	0.05	0.06	0.03	0.03	0.00	0.00	0.05	0.01
Ox%(Cl)	0.17	0.31	0.16	0.17	0.28	0.18	0.50	0.22	0.28	0.27	0.25	0.28
W%(Cl)	0.14	0.25	0.13	0.14	0.23	0.14	0.41	0.18	0.23	0.22	0.21	0.23
Ox%(K)	0.04	0.04	0.04	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.02
Ox%(Ca)	0.02	0.03	0.04	0.03	0.16	0.09	0.14	0.04	0.06	0.02	0.00	0.02
Ox%(Ti)	0.03	0.03	0.03	0.03	0.03	0.01	0.00	0.00	0.00	0.02	0.04	0.03
Ox%(Cr)	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.02	0.01	0.00
Ox%(Mn)	0.05	0.13	0.06	0.11	0.02	0.12	0.08	0.09	0.13	0.16	0.19	0.10
Ox%(Fe)	35.43	34.17	35.81	36.05	49.73	44.47	54.23	36.37	37.66	39.07	39.10	37.63
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	3.81	3.53	3.93	3.93	1.82	2.57	0.78	3.95	4.13	4.97	4.84	4.66
Si	6.35	6.72	6.28	6.22	6.18	6.43	6.77	6.43	6.23	5.66	5.70	5.78
Al	1.65	1.28	1.72	1.78	1.82	1.57	1.23	1.57	1.77	2.34	2.30	2.22
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.16	2.25	2.21	2.15	0.00	1.00	-0.45	2.37	2.35	2.63	2.53	2.44
Mg	2.97	2.76	2.95	3.06	1.35	2.20	0.14	2.52	2.36	1.75	1.80	2.36
Fe	6.57	6.42	6.55	6.56	11.45	9.00	13.06	6.65	6.96	7.42	7.47	7.05
Mn	0.01	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.04	0.02
Ti	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.01	0.01	0.01	0.05	0.02	0.04	0.01	0.01	0.00	0.00	0.01
Na	0.00	0.03	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00
K	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Total	11.73	11.52	11.74	11.81	12.89	12.26	12.82	11.60	11.71	11.86	11.85	11.88
F	0.33	0.29	0.24	0.29	0.35	0.27	0.35	0.22	0.24	0.23	0.20	0.26
Cl	0.05	0.10	0.05	0.05	0.11	0.06	0.20	0.07	0.09	0.08	0.08	0.09
(OH)	15.62	15.61	15.71	15.66	15.55	15.67	15.45	15.71	15.67	15.68	15.72	15.66
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.69	0.70	0.69	0.68	0.89	0.80	0.99	0.72	0.75	0.81	0.80	0.75
% clinochlore	31.12	29.99	31.00	31.70	10.51	19.63	1.03	27.40	25.22	19.04	19.33	25.02
% chamosite	68.78	69.74	68.89	68.10	89.44	80.16	98.83	72.42	74.53	80.63	80.27	74.78
% pennantite	0.10	0.27	0.11	0.20	0.04	0.21	0.14	0.18	0.25	0.33	0.40	0.20

APPENDIX B - Chlorite Label	08612_4_4	08612_4_5	08612_4_6	08612_4_7	08612_4_8	08612_4_9	08612_4_10	0869_21	0869_22	0869_23	0869_24	0869_25
W%(F)	0.41	0.43	0.32	0.45	0.30	0.46	0.35	0.28	0.27	0.35	0.31	0.30
Ox%(Na)	0.03	0.03	0.06	0.06	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03
Ox%(Mg)	7.50	9.00	9.07	9.19	4.02	4.91	7.00	4.45	8.99	3.65	9.92	7.46
Ox%(Al)	14.65	14.53	15.64	14.70	5.71	11.15	15.78	20.10	22.39	20.27	22.65	19.16
Ox%(Si)	26.87	28.73	29.71	28.41	24.62	25.92	28.13	23.22	22.75	23.05	22.75	24.55
Ox%(P)	0.00	0.01	0.01	0.03	0.03	0.04	0.03	0.00	0.02	0.05	0.03	0.10
Ox%(Cl)	0.21	0.14	0.16	0.15	0.29	0.32	0.20	0.28	0.02	0.37	0.01	0.08
W%(Cl)	0.17	0.12	0.13	0.12	0.24	0.26	0.17	0.23	0.02	0.30	0.01	0.07
Ox%(K)	0.00	0.04	0.01	0.01	0.03	0.04	0.00	0.01	0.00	0.01	0.01	0.01
Ox%(Ca)	0.00	0.03	0.03	0.01	0.11	0.07	0.04	0.01	0.01	0.05	0.04	0.07
Ox%(Ti)	0.04	0.00	0.00	0.00	0.00	0.01	0.04	0.06	0.05	0.04	0.02	0.09
Ox%(Cr)	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Ox%(Mn)	0.13	0.06	0.06	0.08	0.09	0.07	0.16	0.14	0.03	0.10	0.04	0.11
Ox%(Fe)	36.82	35.28	36.15	36.08	50.74	44.53	37.63	36.26	31.03	39.22	30.10	34.19
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	3.97	3.80	3.94	3.82	1.74	3.16	4.12	5.57	5.93	5.55	5.95	5.13
Si	6.18	6.37	6.35	6.27	6.38	6.24	6.23	5.46	5.11	5.36	5.07	5.58
Al	1.82	1.63	1.65	1.73	1.62	1.76	1.77	2.54	2.89	2.64	2.93	2.42
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.15	2.17	2.29	2.09	0.13	1.40	2.36	3.02	3.04	2.91	3.02	2.71
Mg	2.57	2.98	2.89	3.02	1.55	1.76	2.31	1.56	3.01	1.26	3.29	2.53
Fe	7.08	6.54	6.46	6.66	11.00	8.96	6.97	7.12	5.83	7.62	5.61	6.50
Mn	0.03	0.01	0.01	0.01	0.02	0.01	0.03	0.03	0.01	0.02	0.01	0.02
Ti	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.01	0.01	0.00	0.03	0.02	0.01	0.00	0.00	0.01	0.01	0.02
Na	0.01	0.01	0.02	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
K	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Total	11.84	11.73	11.69	11.82	12.73	12.17	11.68	11.75	11.90	11.84	11.94	11.80
F	0.30	0.30	0.21	0.31	0.25	0.35	0.25	0.21	0.19	0.26	0.22	0.21
Cl	0.07	0.04	0.05	0.05	0.11	0.11	0.06	0.09	0.01	0.12	0.00	0.03
(OH)	15.63	15.65	15.74	15.64	15.65	15.54	15.69	15.70	15.80	15.62	15.77	15.76
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.73	0.69	0.69	0.69	0.88	0.83	0.75	0.82	0.66	0.86	0.63	0.72
% clinochlore	26.55	31.22	30.85	31.17	12.34	16.41	24.81	17.88	34.02	14.19	36.97	27.93
% chamosite	73.18	68.66	69.02	68.68	87.50	83.46	74.86	81.80	65.92	85.58	62.93	71.83
% pennantite	0.27	0.11	0.12	0.15	0.15	0.13	0.33	0.33	0.06	0.23	0.10	0.23

APPENDIX B - Chlorite Label	0869_26	0869_27	0869_28	0869_29	0869_30	0869_31	0869_32	0869_33	0869_34	0868_3_1	0868_3_2	0868_3_3
W%(F)	0.25	0.38	0.30	0.33	0.38	0.17	0.35	0.26	0.32	0.41	0.24	0.37
Ox%(Na)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.02
Ox%(Mg)	11.47	3.38	4.37	9.67	11.64	12.18	5.72	5.84	9.40	12.80	12.72	12.77
Ox%(Al)	23.19	18.32	20.33	22.23	22.84	23.30	18.86	18.88	20.81	21.46	21.72	21.82
Ox%(Si)	23.22	24.13	23.13	23.05	22.81	23.38	24.17	23.71	25.05	23.55	23.78	24.08
Ox%(P)	0.00	0.03	0.04	0.00	0.00	0.04	0.00	0.02	0.00	0.01	0.11	0.00
Ox%(Cl)	0.00	0.04	0.37	0.04	0.02	0.03	0.07	0.09	0.26	0.00	0.03	0.00
W%(Cl)	0.00	0.03	0.31	0.03	0.02	0.03	0.06	0.07	0.21	0.00	0.03	0.00
Ox%(K)	0.01	0.00	0.00	0.02	0.01	0.01	0.00	0.01	0.76	0.00	0.01	0.01
Ox%(Ca)	0.03	0.02	0.07	0.01	0.01	0.00	0.00	0.05	0.01	0.01	0.00	0.00
Ox%(Ti)	0.08	0.00	0.10	0.09	0.00	0.03	0.04	0.05	0.28	0.13	0.07	0.06
Ox%(Cr)	0.00	0.00	0.00	0.03	0.00	0.00	0.04	0.00	0.02	0.06	0.02	0.05
Ox%(Mn)	0.03	0.24	0.19	0.05	0.03	0.05	0.03	0.09	0.07	0.02	0.09	0.03
Ox%(Fe)	28.52	40.35	36.51	31.06	28.02	27.09	37.42	36.48	31.03	27.24	26.98	27.21
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.95	5.05	5.60	5.82	5.94	5.96	5.12	5.18	5.37	5.57	5.60	5.60
Si	5.06	5.65	5.41	5.12	5.04	5.08	5.56	5.52	5.49	5.18	5.21	5.24
Al	2.94	2.35	2.59	2.88	2.96	2.92	2.44	2.48	2.51	2.82	2.79	2.76
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	3.01	2.70	3.01	2.94	2.98	3.04	2.68	2.70	2.86	2.75	2.81	2.83
Mg	3.72	1.18	1.52	3.20	3.83	3.94	1.96	2.03	3.07	4.20	4.15	4.14
Fe	5.19	7.89	7.14	5.77	5.17	4.92	7.20	7.10	5.68	5.01	4.94	4.95
Mn	0.01	0.05	0.04	0.01	0.00	0.01	0.01	0.02	0.01	0.00	0.02	0.00
Ti	0.01	0.00	0.02	0.01	0.00	0.00	0.01	0.01	0.05	0.02	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01
Ca	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Na	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01
K	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00
Total	11.95	11.82	11.75	11.95	11.99	11.92	11.87	11.87	11.89	12.01	11.93	11.95
F	0.17	0.28	0.22	0.23	0.26	0.12	0.26	0.19	0.22	0.29	0.17	0.26
Cl	0.00	0.01	0.12	0.01	0.01	0.01	0.02	0.03	0.08	0.00	0.01	0.00
(OH)	15.83	15.71	15.65	15.76	15.73	15.87	15.72	15.78	15.70	15.71	15.82	15.74
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.58	0.87	0.82	0.64	0.57	0.55	0.79	0.78	0.65	0.54	0.54	0.54
% clinochlore	41.73	12.91	17.51	35.65	42.51	44.45	21.40	22.16	35.01	45.56	45.57	45.52
% chamosite	58.21	86.57	82.06	64.24	57.43	55.46	78.53	77.64	64.84	54.40	54.25	54.43
% pennantite	0.06	0.53	0.43	0.11	0.05	0.09	0.07	0.20	0.15	0.03	0.18	0.05

APPENDIX B - Chlorite Label	0868_3_4	0868_3_5	0868_3_6	0868_3_7	0868_3_8	0868_3_9	0868_3_10	0868_3_11	0868_3_12	0868_3_13	0868_3_14	0868_3_15
W%(F)	0.45	0.24	0.34	0.34	0.27	0.21	0.18	0.29	0.30	0.38	0.23	0.17
Ox%(Na)	0.00	0.00	0.02	0.03	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.02
Ox%(Mg)	12.76	12.36	12.45	12.58	12.25	12.54	12.70	12.86	12.71	12.36	12.48	13.00
Ox%(Al)	21.89	22.68	22.03	21.80	22.22	21.53	21.61	22.04	21.23	21.32	21.45	21.99
Ox%(Si)	24.04	23.27	23.60	23.68	23.39	23.71	23.79	23.58	24.19	23.93	23.84	24.21
Ox%(P)	0.07	0.00	0.01	0.07	0.16	0.02	0.05	0.00	0.03	0.06	0.08	0.01
Ox%(Cl)	0.05	0.01	0.00	0.05	0.04	0.03	0.05	0.01	0.01	0.07	0.03	0.04
W%(Cl)	0.04	0.01	0.00	0.04	0.03	0.03	0.04	0.01	0.00	0.06	0.03	0.03
Ox%(K)	0.01	0.02	0.01	0.00	0.01	0.00	0.02	0.08	0.08	0.20	0.02	0.01
Ox%(Ca)	0.03	0.01	0.02	0.00	0.03	0.05	0.04	0.01	0.03	0.03	0.02	0.02
Ox%(Ti)	0.04	0.04	0.09	0.08	0.08	0.15	0.06	0.04	0.03	0.07	0.12	0.09
Ox%(Cr)	0.04	0.05	0.05	0.03	0.05	0.06	0.03	0.02	0.06	0.04	0.03	0.06
Ox%(Mn)	0.08	0.00	0.02	0.08	0.00	0.00	0.05	0.00	0.04	0.06	0.01	0.05
Ox%(Fe)	27.10	27.49	26.71	27.74	27.92	27.19	28.14	28.13	27.46	26.80	27.29	27.01
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.61	5.84	5.71	5.61	5.72	5.58	5.55	5.64	5.47	5.55	5.56	5.60
Si	5.23	5.08	5.19	5.17	5.11	5.21	5.18	5.12	5.29	5.28	5.24	5.23
Al	2.77	2.92	2.81	2.83	2.89	2.79	2.82	2.88	2.71	2.72	2.76	2.77
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.83	2.92	2.90	2.78	2.83	2.80	2.73	2.76	2.76	2.83	2.79	2.83
Mg	4.13	4.02	4.08	4.09	3.98	4.11	4.12	4.16	4.14	4.07	4.09	4.19
Fe	4.93	5.02	4.91	5.06	5.10	5.00	5.12	5.11	5.02	4.95	5.01	4.88
Mn	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.01
Ti	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.00	0.01	0.02	0.01
Cr	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01
Ca	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01
Na	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
K	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.06	0.01	0.00
Total	11.93	11.99	11.93	11.98	11.95	11.96	12.02	12.06	11.97	11.93	11.93	11.95
F	0.31	0.16	0.24	0.23	0.19	0.15	0.12	0.20	0.20	0.26	0.16	0.11
Cl	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.02	0.01	0.01
(OH)	15.67	15.83	15.76	15.75	15.80	15.84	15.86	15.80	15.79	15.71	15.83	15.88
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.54	0.56	0.55	0.55	0.56	0.55	0.55	0.55	0.55	0.55	0.55	0.54
% clinochlore	45.55	44.48	45.35	44.63	43.87	45.12	44.54	44.90	45.15	45.06	44.90	46.13
% chamosite	54.29	55.52	54.60	55.21	56.13	54.88	55.36	55.10	54.76	54.83	55.08	53.77
% pennantite	0.16	0.00	0.05	0.15	0.00	0.00	0.09	0.00	0.09	0.12	0.02	0.10

APPENDIX B - Chlorite Label	1807_7	1807_8	1807_9	1807_10	1807_11	1807_2	1807_3	1807_6	1803_8	1803_12	1803_1	1803_2
W%(F)	0.37	0.34	0.19	0.37	0.34	0.33	0.27	0.29	0.35	0.33	0.30	0.26
Ox%(Na)	0.10	0.12	0.13	0.18	0.09	0.01	0.01	0.00	0.00	0.01	0.00	0.01
Ox%(Mg)	1.61	2.04	2.11	1.98	1.80	1.38	1.08	1.13	0.18	0.08	6.66	6.55
Ox%(Al)	0.95	1.28	1.16	1.00	1.01	27.39	26.29	26.61	0.92	0.38	19.90	20.20
Ox%(Si)	24.62	27.39	30.02	28.30	28.52	18.12	18.84	18.14	12.52	66.73	23.82	24.10
Ox%(P)	0.08	0.17	0.58	0.29	0.06	0.04	0.01	0.05	0.04	0.00	0.01	0.05
Ox%(Cl)	0.39	0.54	0.19	0.10	0.09	0.04	0.04	0.03	0.20	0.09	0.02	0.04
W%(Cl)	0.32	0.44	0.16	0.08	0.07	0.03	0.03	0.02	0.16	0.07	0.02	0.03
Ox%(K)	0.13	0.06	0.11	0.17	0.19	0.01	0.02	0.00	0.02	0.01	0.01	0.01
Ox%(Ca)	0.18	0.20	0.14	0.08	0.25	0.01	0.00	0.05	0.07	0.11	0.02	0.02
Ox%(Ti)	0.00	0.00	0.00	0.00	0.01	0.33	0.18	0.88	0.00	0.04	0.01	0.02
Ox%(Cr)	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.02
Ox%(Mn)	0.07	0.06	0.04	0.09	0.05	0.05	0.19	0.08	0.10	0.00	0.21	0.19
Ox%(Fe)	51.59	52.19	48.65	49.77	48.73	37.00	38.24	38.48	61.29	26.84	33.79	34.90
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	0.32	0.40	0.35	0.32	0.32	7.64	7.34	7.40	0.39	0.08	5.42	5.41
Si	7.10	7.34	7.82	7.62	7.76	4.29	4.46	4.28	4.47	11.91	5.50	5.48
Al	0.90	0.66	0.18	0.38	0.24	3.71	3.54	3.72	3.53	-3.91	2.50	2.52
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	-0.58	-0.26	0.17	-0.07	0.08	3.93	3.80	3.67	-3.14	3.99	2.92	2.89
Mg	0.69	0.81	0.82	0.80	0.73	0.49	0.38	0.40	0.09	0.02	2.29	2.22
Fe	12.44	11.69	10.59	11.20	11.09	7.32	7.57	7.59	18.29	4.00	6.53	6.63
Mn	0.02	0.01	0.01	0.02	0.01	0.01	0.04	0.02	0.03	0.00	0.04	0.04
Ti	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.16	0.00	0.01	0.00	0.00
Cr	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.06	0.06	0.04	0.02	0.07	0.00	0.00	0.01	0.03	0.02	0.00	0.01
Na	0.06	0.06	0.06	0.09	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00
K	0.05	0.02	0.04	0.06	0.06	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Total	12.74	12.40	11.74	12.13	12.10	11.81	11.84	11.84	15.31	8.05	11.79	11.79
F	0.34	0.29	0.15	0.31	0.29	0.25	0.20	0.22	0.39	0.18	0.22	0.18
Cl	0.16	0.20	0.07	0.04	0.03	0.01	0.01	0.01	0.10	0.02	0.01	0.01
(OH)	15.51	15.51	15.78	15.65	15.67	15.74	15.79	15.78	15.51	15.79	15.77	15.80
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.95	0.93	0.93	0.93	0.94	0.94	0.95	0.95	0.99	0.99	0.74	0.75
% clinochlore	5.25	6.49	7.18	6.62	6.18	6.24	4.75	4.97	0.51	0.54	25.86	24.97
% chamosite	94.62	93.40	92.75	93.20	93.72	93.62	94.77	94.83	99.33	99.46	73.68	74.63
% pennantite	0.12	0.11	0.07	0.18	0.09	0.13	0.48	0.21	0.16	0.00	0.45	0.41

APPENDIX B - Chlorite Label	1803_3	1803_9	1803_10	1803_11	1803_13	1803_14	1803_15	1803_16	1803_17	1803_18	1803_22	1803_21
W%(F)	0.32	0.33	0.34	0.27	0.36	0.25	0.21	0.33	0.26	0.34	0.32	0.31
Ox%(Na)	0.00	0.05	0.03	0.01	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.02
Ox%(Mg)	5.95	6.19	5.18	6.84	3.66	6.83	6.06	4.60	6.47	6.31	6.20	6.16
Ox%(Al)	19.36	19.42	17.21	20.38	11.85	20.33	18.65	14.92	19.44	20.38	20.02	19.91
Ox%(Si)	23.23	23.75	24.98	23.69	19.73	23.31	24.83	20.09	22.88	23.50	23.18	22.78
Ox%(P)	0.07	0.00	0.03	0.00	0.21	0.05	0.01	0.10	0.09	0.02	0.01	0.04
Ox%(Cl)	0.05	0.05	0.02	0.04	0.13	0.03	0.05	0.11	0.03	0.05	0.03	0.04
W%(Cl)	0.04	0.04	0.02	0.03	0.11	0.03	0.04	0.09	0.03	0.04	0.02	0.03
Ox%(K)	0.02	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.01	0.00	0.00	0.01
Ox%(Ca)	0.05	0.00	0.00	0.03	0.05	0.03	0.01	0.08	0.04	0.01	0.00	0.00
Ox%(Ti)	0.03	0.04	0.02	0.02	0.00	0.04	0.04	0.01	0.00	0.03	0.03	0.00
Ox%(Cr)	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Mn)	0.16	0.17	0.18	0.24	0.14	0.20	0.24	0.11	0.16	0.14	0.12	0.17
Ox%(Fe)	34.50	35.54	36.43	34.95	44.01	34.19	35.61	43.15	34.41	35.08	34.47	36.48
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.38	5.30	4.78	5.46	3.78	5.51	5.06	4.48	5.39	5.51	5.51	5.44
Si	5.47	5.49	5.88	5.39	5.35	5.36	5.71	5.12	5.39	5.39	5.41	5.28
Al	2.53	2.51	2.12	2.61	2.65	2.64	2.29	2.88	2.61	2.61	2.59	2.72
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.85	2.79	2.66	2.85	1.13	2.88	2.77	1.60	2.78	2.91	2.92	2.73
Mg	2.09	2.13	1.82	2.32	1.48	2.34	2.08	1.75	2.27	2.16	2.16	2.13
Fe	6.80	6.87	7.18	6.65	9.97	6.58	6.85	9.19	6.77	6.73	6.73	7.08
Mn	0.03	0.03	0.04	0.05	0.03	0.04	0.05	0.02	0.03	0.03	0.02	0.03
Ti	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.01	0.00	0.00	0.00
Na	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
K	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	11.80	11.86	11.71	11.88	12.65	11.85	11.75	12.60	11.87	11.83	11.83	11.98
F	0.24	0.24	0.25	0.19	0.31	0.18	0.15	0.27	0.19	0.25	0.23	0.22
Cl	0.02	0.01	0.01	0.01	0.05	0.01	0.02	0.04	0.01	0.01	0.01	0.01
(OH)	15.75	15.74	15.74	15.80	15.64	15.81	15.83	15.69	15.80	15.73	15.76	15.76
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.76	0.76	0.79	0.74	0.87	0.73	0.76	0.84	0.75	0.76	0.76	0.77
% clinochlore	23.43	23.60	20.14	25.74	12.87	26.15	23.14	15.94	25.02	24.20	24.21	23.04
% chamosite	76.23	76.04	79.46	73.76	86.85	73.41	76.33	83.84	74.63	75.50	75.53	76.60
% pennantite	0.35	0.37	0.40	0.50	0.28	0.43	0.53	0.22	0.35	0.30	0.26	0.36

APPENDIX B - Chlorite Label	1803_24	18013_2_5	18013_2_6	18013_2_7	18013_2_11	18013_2_12	18013_2_13	18013_2_14	18013_2_15	18013_4_4	18013_4_5	18013_4_6
W%(F)	0.29	0.31	0.37	0.36	0.27	0.24	0.16	0.27	0.22	0.27	0.10	0.29
Ox%(Na)	0.00	0.01	0.00	0.00	0.03	0.02	0.01	0.04	0.03	0.02	0.00	0.04
Ox%(Mg)	5.74	13.00	12.98	12.77	12.99	12.98	13.25	13.25	13.30	12.60	12.81	13.03
Ox%(Al)	19.29	22.18	22.59	22.47	22.29	22.45	22.47	22.13	22.49	23.02	23.30	23.14
Ox%(Si)	22.96	23.82	23.97	23.81	24.35	24.07	24.45	24.40	24.48	23.73	23.60	23.74
Ox%(P)	0.04	0.00	0.01	0.04	0.10	0.11	0.07	0.12	0.00	0.03	0.00	0.00
Ox%(Cl)	0.06	0.01	0.00	0.06	0.00	0.03	0.00	0.01	0.05	0.01	0.00	0.00
W%(Cl)	0.05	0.00	0.00	0.05	0.00	0.02	0.00	0.01	0.04	0.01	0.00	0.00
Ox%(K)	0.00	0.02	0.03	0.03	0.04	0.01	0.03	0.05	0.03	0.00	0.01	0.00
Ox%(Ca)	0.00	0.02	0.02	0.03	0.07	0.03	0.04	0.04	0.03	0.01	0.03	0.02
Ox%(Ti)	0.00	0.15	0.10	0.15	0.05	0.12	0.09	0.08	0.14	0.03	0.09	0.08
Ox%(Cr)	0.02	0.00	0.01	0.00	0.01	0.02	0.02	0.02	0.00	0.00	0.01	0.00
Ox%(Mn)	0.18	0.00	0.12	0.05	0.05	0.07	0.06	0.04	0.04	0.05	0.08	0.04
Ox%(Fe)	37.18	26.51	27.19	26.86	27.42	27.10	27.16	26.78	26.96	26.79	27.07	27.01
(Fe,Mg)10Al2](Al2Si6)O20(OH)16												
Al (total)	5.31	5.69	5.72	5.74	5.62	5.68	5.64	5.59	5.65	5.87	5.90	5.85
Si	5.36	5.18	5.15	5.16	5.21	5.17	5.21	5.23	5.22	5.13	5.07	5.09
Al	2.64	2.82	2.85	2.84	2.79	2.83	2.79	2.77	2.78	2.87	2.93	2.91
Total	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.67	2.87	2.87	2.90	2.83	2.85	2.85	2.82	2.86	3.00	2.97	2.94
Mg	2.00	4.21	4.15	4.12	4.14	4.15	4.20	4.23	4.22	4.06	4.10	4.16
Fe	7.26	4.82	4.89	4.87	4.91	4.87	4.84	4.80	4.80	4.84	4.86	4.84
Mn	0.03	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Ti	0.00	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.02	0.00	0.01	0.01
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00
Na	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.02
K	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Total	11.96	11.95	11.97	11.93	11.94	11.92	11.93	11.92	11.95	11.92	11.97	11.98
F	0.21	0.22	0.25	0.25	0.18	0.16	0.11	0.19	0.15	0.19	0.07	0.20
Cl	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00
(OH)	15.77	15.78	15.75	15.74	15.82	15.83	15.89	15.81	15.84	15.81	15.93	15.80
Total	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.78	0.53	0.54	0.54	0.54	0.54	0.53	0.53	0.53	0.54	0.54	0.54
% clinochlore	21.49	46.63	45.85	45.82	45.72	45.98	46.45	46.81	46.74	45.56	45.67	46.18
% chamosite	78.14	53.37	53.92	54.08	54.18	53.87	53.42	53.12	53.18	54.34	54.18	53.74
% pennantite	0.38	0.00	0.23	0.10	0.10	0.15	0.13	0.07	0.09	0.10	0.15	0.07

APPENDIX B - Chlorite Label	18013_4_7	18013_4_8	18013_4_9	18013_4_10	18013_4_11	18013_4_12
W%(F)	0.11	0.28	0.30	0.33	0.25	0.31
Ox%(Na)	0.01	0.03	0.04	0.00	0.00	0.00
Ox%(Mg)	12.52	12.78	12.36	12.67	12.39	12.44
Ox%(Al)	23.03	23.21	23.40	23.17	23.27	23.21
Ox%(Si)	23.54	23.88	23.70	23.82	23.52	24.02
Ox%(P)	0.00	0.04	0.00	0.05	0.00	0.03
Ox%(Cl)	0.01	0.00	0.02	0.01	0.00	0.02
W%(Cl)	0.01	0.00	0.02	0.01	0.00	0.02
Ox%(K)	0.02	0.00	0.02	0.01	0.04	0.22
Ox%(Ca)	0.00	0.00	0.01	0.00	0.00	0.01
Ox%(Ti)	0.08	0.11	0.09	0.06	0.08	0.16
Ox%(Cr)	0.00	0.00	0.01	0.00	0.00	0.02
Ox%(Mn)	0.05	0.07	0.05	0.07	0.06	0.00
Ox%(Fe)	27.02	26.99	27.73	27.32	27.92	27.63
(Fe,Mg)10Al2](Al2Si6)O20(OH)16						
Al (total)	5.88	5.86	5.91	5.86	5.90	5.84
Si	5.10	5.11	5.08	5.11	5.06	5.13
Al	2.90	2.89	2.92	2.89	2.94	2.87
Total	8.00	8.00	8.00	8.00	8.00	8.00
Al	2.98	2.97	2.99	2.96	2.96	2.96
Mg	4.04	4.08	3.95	4.05	3.97	3.96
Fe	4.89	4.83	4.97	4.90	5.02	4.93
Mn	0.01	0.01	0.01	0.01	0.01	0.00
Ti	0.01	0.02	0.02	0.01	0.01	0.03
Cr	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.00	0.00	0.00	0.00
Na	0.01	0.01	0.01	0.00	0.00	0.00
K	0.01	0.00	0.01	0.00	0.01	0.06
Total	11.95	11.93	11.96	11.93	11.98	11.95
F	0.08	0.19	0.20	0.22	0.17	0.21
Cl	0.00	0.00	0.01	0.00	0.00	0.01
(OH)	15.92	15.81	15.79	15.77	15.83	15.78
Total	16.00	16.00	16.00	16.00	16.00	16.00
Fe/(Fe+Mg+Mn)	0.55	0.54	0.56	0.55	0.56	0.55
% clinochlore	45.18	45.68	44.22	45.18	44.10	44.51
% chamosite	54.72	54.16	55.69	54.67	55.79	55.48
% pennantite	0.10	0.15	0.10	0.14	0.11	0.00

APPENDIX B- Biotite Label	1803_4	1803_5	1803_6	1803_7	1807_18	1807_19	1807_20	1807_22	1807_23	1807_24	1807_26
Ox%(Ca)	0.06	0.03	0.06	0.04	0.00	0.00	0.01	0.01	0.00	0.01	0.00
Ox%(Na)	0.64	0.63	0.61	0.63	0.19	0.17	0.25	0.23	0.21	0.16	0.19
Ox%(K)	4.49	2.56	6.35	2.58	9.16	9.13	9.10	9.06	8.93	8.90	9.05
Ox%(Fe)	19.41	19.52	20.19	19.92	20.73	20.69	20.99	20.77	21.25	21.12	20.72
Ox%(Ti)	1.05	0.81	1.19	0.76	1.57	1.64	1.66	1.69	1.65	1.70	1.65
Ox%(Mg)	9.89	9.69	9.64	9.80	8.22	8.23	8.14	8.25	8.13	7.96	8.04
Ox%(Si)	36.61	36.24	36.16	35.79	34.43	34.80	34.54	34.54	34.06	34.31	33.13
Ox%(Mn)	0.04	0.04	0.07	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00
Ox%(Cr)	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.01
Ox%(Al)	20.06	19.78	20.24	20.14	19.70	19.46	19.58	19.42	19.15	18.94	19.19
W%(F)	0.02	0.03	0.10	0.03	0.51	0.51	0.44	0.48	0.45	0.37	0.33
W%(Cl)	0.05	0.05	0.06	0.07	0.02	0.02	0.02	0.00	0.02	0.04	0.00
Total	**91.64**	**88.76**	**94.00**	**89.08**	**94.35**	**94.48**	**94.49**	**94.26**	**93.66**	**93.36**	**92.13**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.19	0.19	0.18	0.19	0.06	0.05	0.08	0.07	0.06	0.05	0.06
K	0.87	0.51	1.22	0.51	1.81	1.80	1.80	1.79	1.79	1.78	1.84
Total	1.06	0.70	1.40	0.70	1.87	1.85	1.87	1.86	1.85	1.83	1.90
Mg	2.24	2.24	2.17	2.26	1.90	1.90	1.88	1.91	1.90	1.86	1.91
Fe	2.46	2.53	2.55	2.58	2.69	2.68	2.72	2.70	2.79	2.77	2.76
Mn	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti	0.12	0.09	0.13	0.09	0.18	0.19	0.19	0.20	0.19	0.20	0.20
Total	4.84	4.88	4.87	4.94	4.78	4.77	4.80	4.81	4.88	4.84	4.87
Al	3.59	3.62	3.60	3.68	3.61	3.55	3.58	3.55	3.54	3.51	3.61
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.59	3.62	3.60	3.68	3.61	3.55	3.58	3.56	3.54	3.51	3.61
Si	5.56	5.62	5.45	5.55	5.35	5.39	5.35	5.36	5.34	5.39	5.28
F	0.01	0.01	0.05	0.01	0.25	0.25	0.22	0.24	0.22	0.18	0.17
Cl	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.00	0.00	0.01	0.00
OH	3.98	3.97	3.94	3.97	3.74	3.74	3.78	3.76	3.77	3.81	3.83
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.05	18.82	19.31	18.87	19.60	19.57	19.60	19.59	19.62	19.57	19.66
Mol.% end-members											
Annite	50.94	51.93	52.32	52.26	56.33	56.18	56.71	56.07	57.09	57.33	56.73
Phlogopite	46.25	45.93	44.53	45.81	39.81	39.80	39.20	39.72	38.90	38.51	39.20
Fluorphlogopite	0.25	0.32	1.17	0.31	6.28	6.29	5.45	5.91	5.54	4.54	4.21

APPENDIX B- Biotite Label	1807_27	1807_28	18013_1_8	18013_1_15	18013_2_1	18013_2_2	18013_2_3	18013_2_4	18013_2_8	18013_2_9	18013_2_10
Ox%(Ca)	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.04
Ox%(Na)	0.25	0.21	0.23	0.14	0.20	0.29	0.22	0.11	0.16	0.28	0.11
Ox%(K)	9.04	8.96	8.55	8.16	8.94	8.63	8.60	8.15	8.93	8.48	2.33
Ox%(Fe)	20.65	20.65	20.01	20.80	21.27	21.30	21.73	22.46	21.55	21.89	27.02
Ox%(Ti)	1.67	1.56	1.48	1.50	1.61	1.61	1.58	1.58	1.64	1.51	1.24
Ox%(Mg)	8.16	8.06	9.91	8.94	8.65	8.54	8.64	7.80	8.90	8.95	10.92
Ox%(Si)	33.85	33.68	34.71	34.23	34.72	34.68	35.15	32.07	34.93	35.38	27.21
Ox%(Mn)	0.06	0.03	0.04	0.06	0.00	0.05	0.00	0.01	0.00	0.01	0.00
Ox%(Cr)	0.00	0.04	0.03	0.00	0.03	0.01	0.02	0.00	0.02	0.02	0.01
Ox%(Al)	19.64	19.69	19.51	18.87	19.04	18.71	18.86	17.52	18.96	19.12	21.20
W%(F)	0.43	0.43	0.61	0.59	0.54	0.58	0.67	0.71	0.54	0.67	0.25
W%(Cl)	0.00	0.01	0.00	0.06	0.02	0.02	0.02	0.00	0.02	0.00	0.05
Total	**93.51**	**93.10**	**94.85**	**93.22**	**94.83**	**94.13**	**95.28**	**90.31**	**95.48**	**96.04**	**90.24**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.08	0.06	0.07	0.04	0.06	0.09	0.07	0.03	0.05	0.08	0.03
K	1.81	1.80	1.67	1.63	1.76	1.72	1.69	1.72	1.75	1.65	0.49
Total	1.88	1.86	1.74	1.68	1.83	1.80	1.76	1.75	1.80	1.73	0.52
Mg	1.91	1.89	2.26	2.09	1.99	1.98	1.98	1.92	2.04	2.03	2.67
Fe	2.70	2.72	2.57	2.73	2.75	2.78	2.80	3.10	2.77	2.79	3.70
Mn	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ti	0.20	0.18	0.17	0.18	0.19	0.19	0.18	0.20	0.19	0.17	0.15
Total	4.81	4.80	5.01	5.01	4.94	4.95	4.97	5.22	5.00	5.00	6.53
Al	3.63	3.65	3.53	3.49	3.47	3.43	3.42	3.41	3.44	3.44	4.09
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.63	3.66	3.53	3.49	3.48	3.44	3.43	3.41	3.44	3.44	4.10
Si	5.30	5.30	5.33	5.37	5.37	5.40	5.42	5.30	5.37	5.40	4.46
F	0.21	0.21	0.30	0.29	0.27	0.29	0.33	0.37	0.26	0.32	0.13
Cl	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.01	0.00	0.01
OH	3.79	3.78	3.70	3.69	3.73	3.71	3.67	3.63	3.73	3.68	3.86
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.63	19.62	19.61	19.54	19.61	19.59	19.57	19.68	19.62	19.57	19.60
Mol.% end-members											
Annite	56.17	56.65	51.24	54.53	55.78	56.04	56.37	59.41	55.42	55.80	56.71
Phlogopite	39.57	39.38	45.21	41.76	40.41	40.02	39.95	36.79	40.79	40.65	40.84
Fluorphlogopite	5.37	5.31	7.40	7.35	6.66	7.19	8.21	9.32	6.57	8.05	3.25

APPENDIX B- Biotite Label	18013_2_16	18013_2_17	18013_2_18	18013_2_19	18013_2_20	18013_3_1	18013_3_2	18013_3_3	18013_3_4	18013_3_5	18013_3_6
Ox%(Ca)	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.02	0.03	0.02
Ox%(Na)	0.16	0.16	0.18	0.24	0.14	0.22	0.22	0.26	0.31	0.23	0.19
Ox%(K)	8.32	8.58	8.25	8.75	8.10	8.34	8.39	8.51	8.36	8.61	8.55
Ox%(Fe)	22.35	21.98	22.44	21.05	23.31	21.15	21.18	20.98	21.01	20.97	21.34
Ox%(Ti)	2.00	1.76	1.77	1.62	1.74	1.34	1.33	1.33	1.31	1.36	1.38
Ox%(Mg)	8.73	8.83	8.70	8.92	8.46	8.90	8.82	8.70	8.85	8.81	8.55
Ox%(Si)	35.64	35.17	35.42	35.41	34.53	34.84	35.13	35.72	35.44	35.53	35.00
Ox%(Mn)	0.06	0.02	0.00	0.01	0.00	0.10	0.03	0.01	0.02	0.08	0.03
Ox%(Cr)	0.01	0.01	0.01	0.00	0.01	0.02	0.00	0.00	0.02	0.01	0.02
Ox%(Al)	19.21	18.91	19.06	18.98	18.39	19.34	19.43	19.64	19.69	19.86	19.84
W%(F)	0.58	0.60	0.56	0.40	0.60	0.46	0.58	0.60	0.52	0.54	0.56
W%(Cl)	0.02	0.01	0.02	0.03	0.02	0.01	0.01	0.03	0.01	0.02	0.03
Total	**96.92**	**95.87**	**96.24**	**95.17**	**95.16**	**94.50**	**94.90**	**95.51**	**95.22**	**95.79**	**95.31**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.05	0.05	0.05	0.07	0.04	0.07	0.07	0.08	0.09	0.07	0.06
K	1.61	1.68	1.60	1.71	1.60	1.64	1.65	1.65	1.63	1.67	1.67
Total	1.65	1.72	1.66	1.78	1.65	1.71	1.71	1.73	1.72	1.74	1.73
Mg	1.97	2.02	1.98	2.04	1.96	2.05	2.02	1.97	2.01	2.00	1.95
Fe	2.83	2.82	2.86	2.70	3.03	2.73	2.72	2.67	2.68	2.67	2.74
Mn	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti	0.23	0.20	0.20	0.19	0.20	0.16	0.15	0.15	0.15	0.16	0.16
Total	5.03	5.04	5.04	4.92	5.19	4.95	4.90	4.80	4.85	4.83	4.86
Al	3.42	3.41	3.42	3.43	3.37	3.52	3.52	3.53	3.54	3.56	3.59
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.43	3.42	3.42	3.43	3.37	3.52	3.52	3.53	3.55	3.56	3.59
Si	5.39	5.39	5.40	5.43	5.36	5.38	5.40	5.44	5.41	5.40	5.37
F	0.28	0.29	0.27	0.19	0.29	0.22	0.28	0.29	0.25	0.26	0.27
Cl	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01
OH	3.72	3.71	3.72	3.80	3.70	3.77	3.72	3.70	3.75	3.74	3.72
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.49	19.56	19.52	19.56	19.57	19.56	19.54	19.51	19.53	19.53	19.54
Mol.% end-members											
Annite	56.21	55.90	56.77	54.81	58.33	55.19	55.53	55.63	55.31	55.17	56.35
Phlogopite	39.11	40.01	39.21	41.37	37.70	41.39	41.24	41.10	41.49	41.29	40.22
Fluorphlogopite	6.94	7.28	6.72	4.82	7.36	5.57	7.03	7.20	6.27	6.45	6.77

APPENDIX B- Biotite Label	18013_3_7	18013_3_8	18013_3_9	18013_3_10	18013_4_1	18013_4_2	18013_4_3	18013_4_13	18013_4_14	18013_4_15	18013_4_16
Ox%(Ca)	0.04	0.01	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.20	0.00
Ox%(Na)	0.25	0.23	0.12	0.25	0.24	0.17	0.08	0.24	0.16	0.14	0.25
Ox%(K)	8.43	8.74	7.01	8.38	8.72	8.88	4.58	8.99	8.73	4.95	8.64
Ox%(Fe)	20.99	21.13	23.88	21.05	20.80	21.38	24.73	21.37	21.69	27.93	22.35
Ox%(Ti)	1.33	1.36	1.23	1.38	1.54	1.80	1.09	1.49	1.43	0.92	1.29
Ox%(Mg)	8.61	8.37	8.38	8.56	8.55	8.28	9.96	8.37	8.48	7.49	8.47
Ox%(Si)	34.94	35.26	33.42	34.47	34.99	34.62	30.11	35.16	34.77	30.64	34.90
Ox%(Mn)	0.00	0.00	0.00	0.01	0.02	0.01	0.05	0.00	0.04	0.09	0.06
Ox%(Cr)	0.03	0.03	0.04	0.00	0.01	0.02	0.01	0.02	0.04	0.03	0.00
Ox%(Al)	19.57	19.33	18.65	19.47	19.24	19.24	20.73	19.19	19.34	19.13	19.62
W%(F)	0.55	0.49	0.56	0.57	0.45	0.55	0.37	0.57	0.42	0.39	0.59
W%(Cl)	0.01	0.02	0.04	0.01	0.00	0.00	0.01	0.00	0.02	0.12	0.02
Total	**94.47**	**94.75**	**93.20**	**93.90**	**94.32**	**94.78**	**91.63**	**95.16**	**94.96**	**91.70**	**95.92**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.08	0.07	0.04	0.08	0.07	0.05	0.02	0.07	0.05	0.04	0.08
K	1.66	1.72	1.42	1.66	1.72	1.75	0.94	1.77	1.72	1.03	1.69
Total	1.74	1.79	1.45	1.74	1.79	1.81	0.96	1.84	1.77	1.08	1.77
Mg	1.98	1.92	1.98	1.98	1.97	1.91	2.38	1.92	1.95	1.82	1.93
Fe	2.71	2.72	3.17	2.74	2.69	2.77	3.32	2.75	2.80	3.82	2.86
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
Ca	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Ti	0.15	0.16	0.15	0.16	0.18	0.21	0.13	0.17	0.17	0.11	0.15
Total	4.85	4.80	5.29	4.89	4.84	4.89	5.84	4.85	4.92	5.80	4.95
Al	3.56	3.51	3.48	3.57	3.51	3.51	3.92	3.48	3.52	3.68	3.54
Cr	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.56	3.52	3.49	3.57	3.51	3.51	3.92	3.49	3.52	3.69	3.54
Si	5.39	5.43	5.30	5.36	5.41	5.36	4.83	5.42	5.37	5.01	5.35
F	0.27	0.24	0.28	0.28	0.22	0.27	0.19	0.28	0.21	0.20	0.29
Cl	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00
OH	3.73	3.75	3.71	3.72	3.78	3.73	3.81	3.72	3.79	3.77	3.71
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.54	19.54	19.54	19.56	19.55	19.57	19.56	19.59	19.59	19.57	19.61
Mol.% end-members											
Annite	55.86	56.65	59.80	56.00	55.54	56.61	56.84	56.79	56.87	65.78	57.81
Phlogopite	40.81	40.02	37.38	40.58	40.69	39.06	40.79	39.64	39.62	31.45	39.03
Fluorphlogopite	6.73	6.01	6.97	6.99	5.53	6.77	4.70	6.97	5.18	4.99	7.15

APPENDIX B- Biotite Label	18013_4_17	18013_4_18	18013_4_19	18013_4_20	1788_1_1	1788_1_2	1788_1_4	1788_2_11	1788_2_12	1788_2_13	1788_2_14
Ox%(Ca)	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.20	0.03	0.01	0.00
Ox%(Na)	0.23	0.23	0.25	0.20	0.44	0.44	0.40	0.09	0.15	0.40	0.10
Ox%(K)	8.85	8.94	8.27	8.89	8.87	8.79	8.67	2.18	2.90	8.78	1.85
Ox%(Fe)	21.37	20.88	21.75	21.41	20.78	20.27	21.30	26.56	26.05	22.18	26.93
Ox%(Ti)	1.36	1.31	1.19	1.29	1.80	1.79	1.69	0.49	0.65	1.76	0.42
Ox%(Mg)	8.60	8.50	8.63	8.60	7.20	7.20	7.73	10.79	10.19	7.38	10.68
Ox%(Si)	35.15	35.31	34.78	35.15	34.40	34.42	34.56	26.12	27.09	34.62	25.62
Ox%(Mn)	0.00	0.06	0.07	0.05	0.01	0.00	0.02	0.01	0.03	0.01	0.08
Ox%(Cr)	0.03	0.02	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Ox%(Al)	19.54	19.65	19.34	19.59	20.47	20.36	19.82	21.90	21.69	19.50	22.16
W%(F)	0.54	0.62	0.57	0.60	0.46	0.44	0.58	0.30	0.28	0.44	0.26
W%(Cl)	0.00	0.00	0.01	0.03	0.02	0.02	0.02	0.00	0.00	0.01	0.02
Total	**95.46**	**95.30**	**94.60**	**95.63**	**94.02**	**93.30**	**94.41**	**88.36**	**88.90**	**94.69**	**88.02**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.07	0.07	0.07	0.06	0.13	0.13	0.12	0.03	0.05	0.12	0.03
K	1.73	1.75	1.63	1.74	1.75	1.75	1.71	0.46	0.61	1.74	0.40
Total	1.80	1.82	1.71	1.80	1.89	1.88	1.83	0.49	0.66	1.86	0.43
Mg	1.96	1.94	1.99	1.96	1.66	1.67	1.79	2.69	2.52	1.70	2.68
Fe	2.74	2.68	2.81	2.74	2.69	2.64	2.76	3.71	3.62	2.87	3.79
Mn	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00
Ti	0.16	0.15	0.14	0.15	0.21	0.21	0.20	0.06	0.08	0.21	0.05
Total	4.86	4.78	4.95	4.86	4.57	4.52	4.74	6.49	6.23	4.79	6.53
Al	3.53	3.55	3.53	3.54	3.74	3.74	3.62	4.31	4.24	3.56	4.39
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.53	3.55	3.53	3.54	3.74	3.74	3.62	4.31	4.24	3.56	4.39
Si	5.39	5.41	5.38	5.39	5.33	5.36	5.35	4.36	4.50	5.37	4.31
F	0.26	0.30	0.28	0.29	0.23	0.22	0.28	0.16	0.15	0.22	0.14
Cl	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01
OH	3.74	3.70	3.72	3.70	3.77	3.78	3.71	3.84	3.85	3.78	3.86
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.59	19.57	19.57	19.59	19.53	19.50	19.55	19.66	19.63	19.57	19.66
Mol.% end-members											
Annite	56.36	56.00	56.84	56.40	58.95	58.39	58.16	57.12	58.07	60.03	58.01
Phlogopite	40.40	40.61	40.17	40.39	36.42	36.96	37.63	41.35	40.47	35.59	40.99
Fluorphlogopite	6.54	7.48	6.97	7.23	5.68	5.38	7.07	4.00	3.68	5.41	3.41

APPENDIX B- Biotite Label	1788_2_16	1788_2_17	1788_2_18	1788_2_19	1788_2_20	17812_4	17812_5	17812_6	17812_10	17812_12	17812_13
Ox%(Ca)	0.02	0.04	0.00	0.03	0.04	0.00	0.00	0.00	0.02	0.00	0.01
Ox%(Na)	0.19	0.29	0.43	0.38	0.28	0.53	0.50	0.56	0.49	0.53	0.48
Ox%(K)	5.30	6.12	8.76	8.49	4.66	8.52	8.43	8.34	8.29	8.43	8.22
Ox%(Fe)	23.99	24.17	21.76	22.21	25.84	22.34	22.45	22.54	22.07	20.97	21.12
Ox%(Ti)	1.27	1.25	1.85	1.67	1.14	1.49	1.51	1.60	1.52	1.77	1.48
Ox%(Mg)	8.59	8.57	7.52	7.88	8.68	8.60	8.17	8.44	8.01	7.93	8.02
Ox%(Si)	30.17	30.59	34.50	34.84	30.42	34.63	34.09	34.59	33.43	31.79	32.21
Ox%(Mn)	0.01	0.14	0.02	0.00	0.03	0.03	0.00	0.01	0.03	0.01	0.04
Ox%(Cr)	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.00	0.00
Ox%(Al)	19.55	19.72	19.48	19.42	19.75	18.67	18.30	18.50	18.29	17.75	18.09
W%(F)	0.46	0.44	0.48	0.40	0.44	0.56	0.58	0.58	0.58	0.59	0.53
W%(Cl)	0.01	0.05	0.01	0.01	0.06	0.01	0.03	0.03	0.03	0.00	0.01
Total	**89.36**	**91.06**	**94.38**	**94.93**	**91.02**	**94.88**	**93.56**	**94.64**	**92.28**	**89.24**	**89.73**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.06	0.09	0.13	0.11	0.09	0.16	0.15	0.17	0.15	0.17	0.15
K	1.12	1.27	1.74	1.67	0.97	1.68	1.69	1.65	1.69	1.78	1.72
Total	1.18	1.36	1.86	1.79	1.05	1.84	1.85	1.82	1.84	1.95	1.87
Mg	2.11	2.08	1.74	1.81	2.10	1.99	1.92	1.95	1.91	1.96	1.96
Fe	3.31	3.29	2.83	2.86	3.51	2.89	2.96	2.93	2.95	2.90	2.90
Mn	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ca	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Ti	0.16	0.15	0.22	0.19	0.14	0.17	0.18	0.19	0.18	0.22	0.18
Total	5.59	5.54	4.79	4.87	5.76	5.06	5.06	5.07	5.05	5.08	5.05
Al	3.80	3.78	3.57	3.53	3.78	3.41	3.40	3.39	3.44	3.46	3.50
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.80	3.78	3.57	3.53	3.79	3.41	3.40	3.39	3.45	3.46	3.50
Si	4.98	4.98	5.36	5.37	4.95	5.36	5.37	5.37	5.34	5.26	5.29
F	0.24	0.22	0.24	0.20	0.23	0.28	0.29	0.29	0.29	0.31	0.28
Cl	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.01	0.01	0.00	0.00
OH	3.76	3.76	3.76	3.80	3.75	3.72	3.70	3.71	3.70	3.69	3.72
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.55	19.66	19.57	19.56	19.55	19.68	19.67	19.66	19.67	19.76	19.72
Mol.% end-members											
Annite	59.27	59.29	59.04	58.78	60.93	57.22	58.49	57.75	58.42	57.12	57.40
Phlogopite	37.80	37.48	36.39	37.16	36.48	39.27	37.96	38.53	37.80	38.51	38.85
Fluorphlogopite	6.07	5.62	5.89	4.93	5.69	6.92	7.26	7.15	7.35	7.68	6.94

APPENDIX B- Biotite Label	17812_19	17812_20	0869_1	0869_2	0869_3	0869_4	0869_5	0869_6	0869_7	0869_8	0869_9
Ox%(Ca)	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Ox%(Na)	0.49	0.43	0.12	0.18	0.13	0.15	0.17	0.16	0.19	0.21	0.15
Ox%(K)	8.49	8.79	6.60	9.30	9.29	8.79	9.00	8.90	9.07	9.23	8.92
Ox%(Fe)	21.25	21.13	27.45	21.37	21.93	23.82	22.59	23.22	22.13	21.05	21.03
Ox%(Ti)	1.76	1.56	0.77	1.15	1.05	0.99	1.10	1.08	0.99	1.12	1.10
Ox%(Mg)	8.33	8.15	6.62	8.66	8.40	7.82	8.64	8.37	8.15	8.58	8.42
Ox%(Si)	35.40	34.90	30.92	34.31	33.76	33.50	34.12	33.52	33.81	34.41	34.25
Ox%(Mn)	0.06	0.04	0.09	0.00	0.01	0.00	0.00	0.02	0.00	0.02	0.07
Ox%(Cr)	0.00	0.01	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.03	0.01
Ox%(Al)	19.62	19.44	18.10	19.09	18.79	18.34	18.85	18.53	18.71	19.19	19.27
W%(F)	0.56	0.58	0.66	0.53	0.84	0.77	0.68	0.58	0.54	0.49	0.67
W%(Cl)	0.02	0.00	0.60	0.21	0.36	0.78	0.18	0.60	0.50	0.15	0.11
Total	**95.48**	**94.60**	**91.80**	**94.63**	**94.46**	**94.81**	**95.18**	**94.82**	**93.90**	**94.27**	**93.85**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.15	0.13	0.04	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.04
K	1.65	1.73	1.40	1.85	1.87	1.78	1.79	1.79	1.83	1.84	1.78
Total	1.80	1.86	1.44	1.91	1.91	1.83	1.85	1.84	1.89	1.90	1.83
Mg	1.89	1.88	1.64	2.01	1.98	1.85	2.01	1.97	1.92	1.99	1.97
Fe	2.71	2.73	3.82	2.79	2.90	3.17	2.95	3.07	2.93	2.75	2.76
Mn	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti	0.20	0.18	0.10	0.14	0.12	0.12	0.13	0.13	0.12	0.13	0.13
Total	4.81	4.79	5.57	4.94	5.00	5.14	5.09	5.17	4.97	4.88	4.87
Al	3.53	3.54	3.55	3.51	3.50	3.44	3.47	3.45	3.50	3.53	3.56
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.53	3.54	3.55	3.51	3.50	3.44	3.47	3.45	3.50	3.53	3.56
Si	5.40	5.39	5.15	5.35	5.33	5.33	5.33	5.30	5.36	5.37	5.37
F	0.27	0.28	0.35	0.26	0.42	0.39	0.34	0.29	0.27	0.24	0.33
Cl	0.01	0.00	0.17	0.05	0.10	0.21	0.05	0.16	0.13	0.04	0.03
OH	3.73	3.72	3.48	3.68	3.49	3.40	3.61	3.55	3.60	3.72	3.64
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.53	19.59	19.70	19.71	19.75	19.74	19.73	19.77	19.72	19.68	19.63
Mol.% end-members											
Annite	56.32	56.94	68.59	56.47	57.94	61.63	57.94	59.32	58.95	56.31	56.70
Phlogopite	39.34	39.13	29.46	40.79	39.53	36.06	39.51	38.12	38.67	40.88	40.42
Fluorphlogopite	6.70	7.10	8.73	6.52	10.45	9.74	8.44	7.31	6.74	6.01	8.33

APPENDIX B- Biotite Label	180s4_12	180s4_13	180s4_14	180s4_15	180s4_16	180s4_17	180s4_18	180s5_1_13	180s5_2_16	180s5_2_17	180s5_2_18
Ox%(Ca)	0.76	0.00	0.00	0.00	0.01	0.04	0.00	0.03	0.01	0.00	0.00
Ox%(Na)	0.27	0.06	0.07	0.09	0.13	0.15	0.18	0.08	0.28	0.30	0.24
Ox%(K)	7.56	8.66	7.97	6.46	6.61	4.30	5.87	6.71	8.98	8.73	8.91
Ox%(Fe)	31.21	29.83	28.94	27.78	27.96	28.03	28.10	27.94	22.02	22.61	22.37
Ox%(Ti)	0.60	0.63	0.32	0.19	0.15	0.20	0.16	0.46	1.52	1.55	1.54
Ox%(Mg)	4.55	4.97	6.25	6.70	6.45	6.71	6.64	6.87	8.08	7.85	7.77
Ox%(Si)	30.23	32.18	33.41	33.90	33.76	33.48	33.64	33.54	34.41	33.91	33.59
Ox%(Mn)	0.08	0.08	0.03	0.10	0.15	0.11	0.07	0.18	0.03	0.06	0.00
Ox%(Cr)	0.00	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.03	0.01	0.00
Ox%(Al)	15.16	16.14	16.50	16.64	16.50	16.53	16.89	16.13	18.72	18.75	18.93
W%(F)	0.40	0.39	0.55	0.43	0.50	0.51	0.41	0.73	0.58	0.58	0.61
W%(Cl)	2.87	3.25	2.16	2.14	2.21	1.90	1.91	1.41	0.02	0.00	0.08
Total	**92.67**	**96.15**	**96.13**	**94.33**	**94.31**	**91.77**	**93.71**	**93.96**	**94.40**	**94.05**	**93.79**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.09	0.02	0.02	0.03	0.04	0.05	0.06	0.02	0.08	0.09	0.07
K	1.67	1.84	1.66	1.34	1.38	0.91	1.22	1.40	1.79	1.75	1.80
Total	1.76	1.86	1.68	1.37	1.42	0.96	1.28	1.43	1.87	1.84	1.87
Mg	1.17	1.23	1.52	1.63	1.57	1.66	1.61	1.68	1.88	1.84	1.83
Fe	4.52	4.16	3.94	3.79	3.83	3.88	3.84	3.82	2.88	2.97	2.96
Mn	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.03	0.00	0.01	0.00
Ca	0.14	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ti	0.08	0.08	0.04	0.02	0.02	0.02	0.02	0.06	0.18	0.18	0.18
Total	5.92	5.49	5.50	5.45	5.44	5.58	5.48	5.58	4.95	5.01	4.97
Al	3.09	3.17	3.17	3.20	3.18	3.22	3.25	3.11	3.45	3.48	3.53
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.09	3.18	3.17	3.20	3.19	3.22	3.25	3.11	3.45	3.48	3.53
Si	5.24	5.37	5.44	5.52	5.53	5.54	5.49	5.49	5.38	5.34	5.31
F	0.22	0.21	0.28	0.22	0.26	0.27	0.21	0.38	0.29	0.29	0.31
Cl	0.84	0.92	0.60	0.59	0.61	0.53	0.53	0.39	0.01	0.00	0.02
OH	2.94	2.87	3.12	3.19	3.13	3.20	3.26	3.23	3.71	3.71	3.67
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	20.02	19.89	19.78	19.54	19.57	19.30	19.50	19.61	19.65	19.66	19.68
Mol.% end-members											
Annite	76.29	75.85	71.62	69.49	70.32	69.49	70.00	68.46	58.18	59.42	59.50
Phlogopite	19.81	22.50	27.59	29.84	28.92	29.66	29.46	30.00	38.07	36.78	36.82
Fluorphlogopite	5.49	5.17	7.06	5.56	6.49	6.66	5.28	9.42	7.17	7.16	7.63

APPENDIX B- Biotite Label	180s5_2_19	180s5_2_20	180s5_2_21	180s5_2_22	180s5_2_24	180s5_2_25	180s7_1_13	180s7_2_1	180s7_2_8	180s7_2_9	180s7_2_10
Ox%(Ca)	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Na)	0.23	0.25	0.21	0.24	0.21	0.26	0.06	0.07	0.07	0.13	0.08
Ox%(K)	8.95	9.06	8.16	8.36	8.04	8.66	6.94	7.79	5.16	9.16	6.58
Ox%(Fe)	22.43	22.47	23.30	23.62	24.05	22.52	31.84	31.05	31.30	27.82	29.92
Ox%(Ti)	1.62	1.65	1.66	1.78	1.62	1.50	0.27	0.52	0.36	0.19	0.27
Ox%(Mg)	7.47	7.75	7.43	7.67	7.64	7.82	4.87	4.06	4.48	4.95	4.62
Ox%(Si)	33.58	33.48	33.07	32.67	32.56	33.12	30.39	31.51	29.88	32.70	30.56
Ox%(Mn)	0.05	0.01	0.03	0.00	0.02	0.08	0.08	0.04	0.01	0.07	0.05
Ox%(Cr)	0.01	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.00
Ox%(Al)	18.54	18.51	18.19	17.89	18.10	18.63	17.07	16.40	19.66	19.87	20.25
W%(F)	0.73	0.62	0.65	0.64	0.59	0.63	0.38	0.48	0.38	0.41	0.38
W%(Cl)	0.02	0.01	0.05	0.08	0.03	0.02	2.00	2.50	0.82	1.42	0.94
Total	**93.41**	**93.59**	**92.54**	**92.71**	**92.65**	**92.99**	**93.83**	**94.35**	**92.07**	**96.61**	**93.57**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4											
Na	0.07	0.08	0.06	0.07	0.07	0.08	0.02	0.02	0.02	0.04	0.02
K	1.82	1.84	1.67	1.72	1.65	1.76	1.50	1.68	1.10	1.87	1.38
Total	1.89	1.91	1.74	1.79	1.72	1.84	1.52	1.70	1.13	1.91	1.41
Mg	1.77	1.83	1.78	1.84	1.84	1.86	1.23	1.02	1.12	1.18	1.14
Fe	2.98	2.98	3.13	3.19	3.24	3.01	4.51	4.40	4.38	3.72	4.12
Mn	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01
Ca	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ti	0.19	0.20	0.20	0.22	0.20	0.18	0.03	0.07	0.05	0.02	0.03
Total	4.96	5.01	5.12	5.25	5.28	5.06	5.79	5.50	5.55	4.93	5.30
Al	3.48	3.46	3.45	3.40	3.44	3.51	3.41	3.27	3.88	3.75	3.93
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	3.48	3.47	3.45	3.40	3.44	3.51	3.41	3.27	3.88	3.75	3.93
Si	5.34	5.32	5.32	5.27	5.25	5.29	5.15	5.34	5.01	5.23	5.03
F	0.37	0.31	0.33	0.32	0.30	0.32	0.20	0.26	0.20	0.21	0.20
Cl	0.01	0.00	0.01	0.02	0.01	0.01	0.57	0.72	0.23	0.39	0.26
OH	3.63	3.69	3.66	3.65	3.69	3.68	3.23	3.03	3.57	3.41	3.54
Total	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
TOTAL	19.67	19.71	19.62	19.71	19.69	19.70	19.87	19.81	19.57	19.83	19.67
Mol.% end-members											
Annite	60.20	59.49	61.19	60.74	61.42	59.44	77.97	80.03	78.98	75.41	77.81
Phlogopite	35.73	36.55	34.80	35.13	34.76	36.77	21.25	18.64	20.16	23.93	21.43
Fluorphlogopite	9.16	7.77	8.21	8.11	7.51	7.93	5.02	6.40	4.98	5.13	4.96

APPENDIX B- Biotite Label	180s7_2_12	180s7_2_14	180s7_2_13
Ox%(Ca)	0.01	0.12	0.01
Ox%(Na)	0.07	0.08	0.00
Ox%(K)	2.73	3.80	4.34
Ox%(Fe)	34.39	31.85	27.04
Ox%(Ti)	0.33	0.57	0.55
Ox%(Mg)	3.74	3.80	2.33
Ox%(Si)	30.46	30.56	17.01
Ox%(Mn)	0.04	0.02	0.04
Ox%(Cr)	0.01	0.01	0.00
Ox%(Al)	15.83	15.68	10.45
W%(F)	0.45	0.43	0.12
W%(Cl)	1.50	2.04	1.75
Total	**89.49**	**88.77**	**63.62**
K2(Fe,Mg,Mn)6Al2Si6O20(OH,F)4			
Na	0.02	0.03	0.00
K	0.61	0.86	1.48
Total	0.64	0.88	1.48
Mg	0.98	1.00	0.93
Fe	5.04	4.70	6.05
Mn	0.01	0.00	0.01
Ca	0.00	0.02	0.00
Ti	0.04	0.08	0.11
Total	6.06	5.80	7.10
Al	3.27	3.26	3.30
Cr	0.00	0.00	0.00
Total	3.27	3.26	3.30
Si	5.34	5.39	4.55
F	0.25	0.24	0.10
Cl	0.44	0.61	0.79
OH	3.31	3.15	3.10
Total	4.00	4.00	4.00
TOTAL	19.30	19.34	20.43
Mol.% end-members			
Annite	83.06	81.01	85.21
Phlogopite	16.10	17.23	13.07
Fluorphlogopite	6.18	6.01	2.53

APPENDIX B - Magnetite Label	17812_1	17812_2	17812_3	17812_4	17812_5	17812_6	17812_7	1787_1	1787_2	1787_3	1787_4
Ox%(Mg)	0.01	0.01	0.00	0.00	0.05	0.01	0.02	0.03	0.01	0.02	0.02
Ox%(Al)	0.40	0.44	0.39	0.33	0.38	0.38	0.34	0.35	0.77	0.46	0.37
Ox%(Si)	0.01	0.03	0.05	0.10	0.10	0.04	0.02	0.04	0.60	0.01	0.06
Ox%(Ti)	0.18	0.13	0.15	0.18	0.12	0.19	0.09	0.13	0.19	0.14	0.13
Ox%(Cr)	0.01	0.01	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Ox%(Mn)	0.03	0.03	0.06	0.02	0.02	0.00	0.00	0.00	0.03	0.04	0.02
Ox%(Fe)	100.20	100.26	100.69	99.81	100.53	99.25	100.00	98.62	97.87	97.14	99.75
Ox%(Co)	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ni)	0.00	0.00	0.07	0.06	0.04	0.01	0.00	0.01	0.08	0.00	0.08
Ox%(Zn)	0.12	0.06	0.00	0.07	0.00	0.01	0.00	0.00	0.06	0.16	0.06
Total	**101.00**	**100.97**	**101.42**	**100.57**	**101.25**	**99.90**	**100.48**	**99.17**	**99.61**	**97.97**	**100.48**

APPENDIX B - Magnetite Label	1787_5	1787_6	1787_7	1787_8	17810_1_1	17810_1_2	17810_1_3	17810_1_4	17810_1_5	17810_1_6	17810_1_7
Ox%(Mg)	0.00	0.00	0.02	0.03	0.07	0.00	0.04	6.27	0.00	0.00	0.00
Ox%(Al)	0.24	0.39	0.38	0.41	0.48	0.02	0.36	16.50	0.40	0.34	0.44
Ox%(Si)	0.25	0.03	0.09	0.02	0.43	0.03	0.21	21.08	0.05	0.04	0.25
Ox%(Ti)	0.44	0.25	0.22	0.21	0.24	0.11	0.10	0.80	0.12	0.11	0.21
Ox%(Cr)	0.02	0.03	0.00	0.03	0.02	0.00	0.13	0.01	0.00	0.02	0.00
Ox%(Mn)	0.01	0.04	0.05	0.04	0.00	0.02	0.04	0.01	0.00	0.00	0.01
Ox%(Fe)	61.59	100.28	100.75	100.69	99.96	55.43	96.18	54.60	101.36	101.78	100.16
Ox%(Co)	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00
Ox%(Ni)	0.02	0.00	0.00	0.03	0.03	0.02	0.34	0.00	0.07	0.08	0.02
Ox%(Zn)	0.00	0.00	0.00	0.01	0.16	0.24	0.00	0.15	0.01	0.08	0.02
Total	**62.58**	**101.02**	**101.55**	**101.47**	**101.36**	**55.87**	**97.39**	**99.45**	**102.02**	**102.45**	**101.11**

APPENDIX B - Magnetite Label	17810_1_8	17810_1_9	17810_1_10	17810_1_11	17810_1_12	17810_1_13	17810_1_14	17810_1_15	1788_1_1	1788_1_2	1788_1_3
Ox%(Mg)	0.00	0.00	0.03	0.01	0.02	0.00	0.00	0.05	0.00	0.00	0.00
Ox%(Al)	0.43	0.38	0.42	0.39	0.37	0.41	0.32	0.38	0.40	0.43	0.48
Ox%(Si)	0.08	0.06	0.06	0.03	0.00	0.02	0.07	0.02	0.09	0.31	0.07
Ox%(Ti)	0.13	0.13	0.13	0.15	0.13	0.15	0.25	0.09	0.12	0.13	0.14
Ox%(Cr)	0.00	0.01	0.00	0.00	0.03	0.02	0.02	0.01	0.01	0.02	0.03
Ox%(Mn)	0.00	0.09	0.00	0.05	0.00	0.12	0.00	0.00	0.00	0.00	0.00
Ox%(Fe)	101.71	100.39	101.59	101.61	101.31	101.78	101.34	102.16	99.12	97.28	100.22
Ox%(Co)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
Ox%(Ni)	0.00	0.04	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Zn)	0.00	0.13	0.03	0.00	0.13	0.05	0.00	0.00	0.06	0.00	0.08
Total	**102.35**	**101.23**	**102.25**	**102.28**	**102.03**	**102.55**	**101.99**	**102.73**	**99.80**	**98.18**	**101.02**

APPENDIX B - Magnetite Label	1788_1_4	1788_1_5	1788_1_6	1788_1_7	1788_1_8	1788_1_9	1788_1_10	1788_1_11	1788_1_12	1788_1_13
Ox%(Mg)	0.00	0.00	0.11	0.00	0.16	0.03	0.04	0.02	0.10	0.00
Ox%(Al)	0.46	0.89	1.22	0.43	0.95	0.89	0.52	0.54	1.71	0.56
Ox%(Si)	0.02	0.22	1.95	0.08	15.72	0.61	0.26	0.18	0.74	0.22
Ox%(Ti)	0.12	0.20	0.17	0.13	0.04	0.11	0.14	0.17	0.34	0.10
Ox%(Cr)	0.02	0.03	0.03	0.00	0.01	0.00	0.02	0.01	0.01	0.00
Ox%(Mn)	0.05	0.00	0.00	0.00	0.08	0.01	0.00	0.10	0.00	0.00
Ox%(Fe)	99.99	99.58	96.36	98.89	76.37	98.61	99.68	100.12	96.32	99.83
Ox%(Co)	0.01	0.00	0.00	0.00	0.61	0.02	0.00	0.00	0.00	0.00
Ox%(Ni)	0.08	0.00	0.00	0.00	0.06	0.03	0.00	0.00	0.00	0.00
Ox%(Zn)	0.05	0.00	0.00	0.23	0.19	0.00	0.06	0.04	0.06	0.00
Total	**100.78**	**100.92**	**99.83**	**99.76**	**94.20**	**100.31**	**100.72**	**101.18**	**99.27**	**100.71**

APPENDIX B - Magnetite Label	1788_1_14	1788_1_15	1789_1_1	1789_1_2	1789_1_3	1789_1_4	1789_1_5	1789_1_6	1789_1_7	1789_1_8
Ox%(Mg)	0.00	0.02	0.10	0.03	0.00	0.01	0.00	0.07	0.03	0.05
Ox%(Al)	0.49	0.54	3.09	0.34	0.32	0.61	0.52	0.82	0.54	0.49
Ox%(Si)	0.16	0.05	0.00	1.21	1.63	0.45	0.13	2.06	0.20	0.20
Ox%(Ti)	0.23	0.13	0.38	0.13	0.23	0.11	0.16	0.15	0.15	0.21
Ox%(Cr)	0.00	0.01	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.02
Ox%(Mn)	0.02	0.03	0.03	0.00	0.01	0.09	0.10	0.07	0.05	0.00
Ox%(Fe)	100.25	99.86	96.22	98.12	99.00	99.48	99.38	97.43	99.40	100.22
Ox%(Co)	0.03	0.00	0.00	0.00	0.04	0.00	0.07	0.00	0.00	0.00
Ox%(Ni)	0.04	0.01	0.17	0.11	0.02	0.08	0.08	0.05	0.05	0.04
Ox%(Zn)	0.17	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Total	**101.40**	**100.65**	**100.08**	**99.93**	**101.26**	**100.83**	**100.43**	**100.65**	**100.42**	**101.25**

APPENDIX B - Magnetite Label	1789_1_9	1789_1_10	1789_1_11	1789_1_12	1789_1_13	1789_1_14	1789_1_15	180s5_1_1	180s5_1_2	180s5_1_3
Ox%(Mg)	0.00	0.00	0.03	0.15	0.02	0.00	0.00	0.00	0.01	0.02
Ox%(Al)	0.52	0.43	2.66	3.04	0.44	0.44	0.36	0.44	0.34	0.35
Ox%(Si)	0.19	0.05	0.89	0.11	0.34	0.15	0.15	6.85	0.07	0.07
Ox%(Ti)	0.17	0.10	0.10	0.31	0.13	0.16	0.12	0.28	0.23	0.21
Ox%(Cr)	0.00	0.00	0.00	0.03	0.00	0.02	0.01	0.03	0.02	0.00
Ox%(Mn)	0.05	0.05	0.03	0.03	0.00	0.00	0.00	0.03	0.00	0.01
Ox%(Fe)	100.13	99.69	97.09	97.29	99.25	100.38	99.61	94.57	100.19	99.97
Ox%(Co)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ni)	0.00	0.00	0.05	0.05	0.08	0.00	0.04	0.09	0.00	0.10
Ox%(Zn)	0.09	0.06	0.01	0.10	0.00	0.02	0.18	0.01	0.00	0.00
Total	**101.16**	**100.38**	**100.85**	**101.12**	**100.26**	**101.18**	**100.47**	**102.28**	**100.85**	**100.73**

APPENDIX B - Magnetite Label	180s5_1_4	180s5_1_5	180s5_1_6	180s5_1_7	180s5_1_8	180s5_1_9	180s5_1_10	180s5_1_11	180s5_1_12	180s5_1_13
Ox%(Mg)	0.00	0.24	0.82	0.00	0.00	0.04	0.00	0.00	0.01	0.02
Ox%(Al)	0.27	0.87	3.02	0.31	0.31	0.27	0.00	0.28	0.26	0.22
Ox%(Si)	0.04	2.52	4.76	0.03	0.10	0.06	0.02	0.01	0.03	0.34
Ox%(Ti)	0.23	0.20	0.21	0.23	0.19	0.21	0.00	0.23	0.23	0.12
Ox%(Cr)	0.02	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.02	0.00
Ox%(Mn)	0.01	0.03	0.10	0.07	0.04	0.01	0.00	0.01	0.00	0.02
Ox%(Fe)	99.79	95.53	91.67	100.29	100.51	100.85	51.31	101.04	100.38	77.70
Ox%(Co)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ox%(Ni)	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
Ox%(Zn)	0.00	0.00	0.04	0.00	0.00	0.00	0.19	0.00	0.00	0.04
Total	**100.42**	**99.38**	**100.61**	**100.95**	**101.15**	**101.46**	**51.52**	**101.59**	**100.93**	**78.46**

APPENDIX B - Magnetite Label	180s5_1_14	180s5_1_15	180s4_1	180s4_2	180s4_3	180s4_4	180s4_5	180s4_6	180s4_7	180s7_1_1
Ox%(Mg)	0.00	0.00	0.00	0.01	0.00	0.01	0.03	0.00	0.00	0.00
Ox%(Al)	0.22	0.18	0.10	0.21	0.21	0.21	0.19	0.22	0.19	0.27
Ox%(Si)	0.09	0.12	0.02	0.02	0.05	0.02	0.00	0.00	0.01	0.05
Ox%(Ti)	1.24	0.34	0.05	0.07	0.07	0.08	0.11	0.10	0.08	0.22
Ox%(Cr)	0.02	0.03	0.00	0.02	0.00	0.00	0.03	0.00	0.00	0.03
Ox%(Mn)	0.02	0.00	0.00	0.06	0.03	0.01	0.04	0.00	0.00	0.02
Ox%(Fe)	99.87	101.13	100.23	101.20	99.07	100.43	100.94	100.46	100.77	101.32
Ox%(Co)	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.05	0.00	0.00
Ox%(Ni)	0.00	0.00	0.00	0.05	0.01	0.06	0.03	0.04	0.00	0.00
Ox%(Zn)	0.03	0.04	0.02	0.17	0.32	0.12	0.00	0.00	0.00	0.13
Total	**101.51**	**101.84**	**100.44**	**101.81**	**99.76**	**100.93**	**101.43**	**100.87**	**101.06**	**102.05**

APPENDIX B - Magnetite Label	180s7_1_2	180s7_1_3	180s7_1_4	180s7_1_5	180s7_1_6	180s7_1_7	180s7_1_8	180s7_1_9	180s7_1_10	180s7_1_11
Ox%(Mg)	0.00	0.02	0.00	0.01	0.00	0.02	0.00	0.03	0.02	0.02
Ox%(Al)	0.26	0.31	0.31	0.30	0.31	0.33	0.33	0.38	0.30	0.31
Ox%(Si)	0.00	0.04	0.01	0.05	0.03	0.00	0.01	0.07	0.03	0.01
Ox%(Ti)	0.22	0.27	0.23	0.23	0.20	0.25	0.21	0.35	0.16	0.21
Ox%(Cr)	0.02	0.02	0.01	0.05	0.04	0.02	0.00	0.01	0.03	0.02
Ox%(Mn)	0.00	0.09	0.04	0.03	0.01	0.00	0.00	0.02	0.01	0.01
Ox%(Fe)	101.29	102.14	101.04	101.65	101.42	101.00	101.60	101.12	100.92	101.11
Ox%(Co)	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Ni)	0.00	0.02	0.06	0.02	0.00	0.00	0.06	0.03	0.07	0.13
Ox%(Zn)	0.09	0.08	0.17	0.00	0.00	0.08	0.00	0.00	0.03	0.00
Total	**101.88**	**103.01**	**101.87**	**102.36**	**102.02**	**101.71**	**102.21**	**102.01**	**101.56**	**101.81**

APPENDIX B - Magnetite Label	180s7_1_12	180s7_1_13	180s7_1_14	180s7_1_15
Ox%(Mg)	0.01	0.00	0.01	0.03
Ox%(Al)	0.33	0.29	0.30	0.31
Ox%(Si)	0.00	0.00	0.05	0.05
Ox%(Ti)	0.16	0.17	0.14	0.17
Ox%(Cr)	0.00	0.02	0.00	0.02
Ox%(Mn)	0.01	0.01	0.00	0.05
Ox%(Fe)	100.92	101.51	101.72	101.62
Ox%(Co)	0.00	0.03	0.00	0.07
Ox%(Ni)	0.09	0.00	0.03	0.02
Ox%(Zn)	0.01	0.00	0.10	0.00
Total	**101.53**	**102.03**	**102.36**	**102.33**

APPENDIX B - Magnetite Label
Ox%(Mg)
Ox%(Al)
Ox%(Si)
Ox%(Ti)
Ox%(Cr)
Ox%(Mn)
Ox%(Fe)
Ox%(Co)
Ox%(Ni)
Ox%(Zn)
Total

APPENDIX B - Magnetite Label
Ox%(Mg)
Ox%(Al)
Ox%(Si)
Ox%(Ti)
Ox%(Cr)
Ox%(Mn)
Ox%(Fe)
Ox%(Co)
Ox%(Ni)
Ox%(Zn)
Total

APPENDIX B-Wolframite Label	17810_1_1	17810_1_2	17810_1_3	17810_1_4	17810_1_5	17810_1_6	17810_1_7	17810_1_8	17810_1_9	17810_1_10	17810_2_1
Ox%(O)	0	0	0	0	0	0	0	0	0	0	0
Ox%(Mg)	0.59	0.66	0.66	0.57	0.58	0.59	0.64	0.68	0.51	0.56	0.40
Ox%(Mn)	0.39	0.34	0.34	0.24	0.35	0.38	0.26	0.36	0.26	0.38	0.43
Ox%(Fe)	22.94	22.04	21.98	22.19	22.33	22.29	22.07	22.03	21.50	22.82	21.33
Ox%(Co)	0.00	0.00	0.02	0.07	0.00	0.03	0.00	0.05	0.00	0.00	0.00
Ox%(Ni)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Zn)	0.02	0.00	0.00	0.16	0.16	0.00	0.00	0.00	0.65	0.00	0.00
Ox%(Mo)	0.00	0.00	0.03	0.00	0.00	0.15	0.08	0.13	0.24	0.16	0.00
Ox%(W)	**76.84**	**74.32**	**76.41**	**76.96**	**75.80**	**75.69**	**75.57**	**78.08**	**71.91**	**75.09**	**75.67**

APPENDIX B-Wolframite Label	17810_2_2	17810_2_3	17810_2_4	17810_2_5	17810_2_6	17810_2_7	17810_2_8	17810_2_9	17810_2_10	17810_3_1	17810_3_2
Ox%(O)	0	0	0	0	0	0	0	0	0	0	0
Ox%(Mg)	0.44	0.50	0.44	0.53	0.52	0.46	0.50	0.47	0.51	0.62	0.65
Ox%(Mn)	0.50	0.45	0.42	0.48	0.38	0.44	0.36	0.32	0.35	0.38	0.40
Ox%(Fe)	21.45	21.36	21.20	21.45	21.93	21.51	21.80	21.78	21.70	22.95	21.99
Ox%(Co)	0.00	0.00	0.00	0.00	0.05	0.00	0.07	0.01	0.00	0.05	0.02
Ox%(Ni)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Zn)	0.00	0.00	0.02	0.00	0.00	0.17	0.00	0.00	0.00	0.08	0.02
Ox%(Mo)	0.11	0.00	0.06	0.00	0.02	0.03	0.00	0.00	0.00	0.15	0.00
Ox%(W)	**77.02**	**77.03**	**76.92**	**78.06**	**76.16**	**76.69**	**76.11**	**76.84**	**76.59**	**75.42**	**77.38**

APPENDIX B-Wolframite Label	17810_3_3	17810_3_4	17810_3_5	17810_3_6	17810_3_7	17810_3_8	17810_3_9	17810_3_10
Ox%(O)	0	0	0	0	0	0	0	0
Ox%(Mg)	0.69	0.63	0.67	0.69	0.63	0.63	0.66	0.64
Ox%(Mn)	0.43	0.44	0.41	0.44	0.41	0.40	0.35	0.33
Ox%(Fe)	21.91	21.76	21.88	21.71	21.51	21.65	21.73	22.64
Ox%(Co)	0.00	0.00	0.00	0.11	0.02	0.00	0.03	0.11
Ox%(Ni)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ox%(Zn)	0.04	0.09	0.00	0.00	0.00	0.10	0.00	0.14
Ox%(Mo)	0.13	0.00	0.00	0.09	0.08	0.10	0.16	0.00
Ox%(W)	**77.24**	**78.00**	**76.43**	**75.40**	**76.03**	**77.33**	**76.80**	**75.33**

APPENDIX B	18013_cp_1	18013_cp_2	18013_cp_3	18013_cp_4	18013_cp_5	18013_cp_6	1803_cp_1	1803_cp_2
CHALCOPYRITE								
S	35.07	34.84	34.48	34.60	34.83	34.74	35.02	35.37
Mn	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00
Fe	30.46	30.48	30.61	30.71	30.46	30.50	30.13	30.52
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00
Cu	34.95	35.05	34.87	34.45	34.83	35.03	33.51	33.05
Zn	0.00	0.00	0.00	0.04	0.05	0.01	0.00	0.00
As	0.06	0.00	0.00	0.00	0.02	0.05	0.13	0.01
Se	0.03	0.02	0.08	0.03	0.00	0.00	0.06	0.00
Ag	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.08
Cd	0.00	0.00	0.03	0.00	0.00	0.03	0.01	0.00
Sn	0.08	0.12	0.06	0.00	0.06	0.04	0.00	0.06
Sb	0.03	0.00	0.02	0.06	0.02	0.06	0.04	0.00
Te	0.00	0.02	0.00	0.02	0.02	0.03	0.00	0.01
Pb	0.09	0.24	0.08	0.00	0.13	0.02	0.05	0.19
Bi	0.10	0.10	0.11	0.06	0.07	0.13	0.12	0.07
Total	100.86	100.88	100.37	99.98	100.55	100.63	99.06	99.37
Atomic %								
S	109.36	108.66	107.55	107.90	108.62	108.35	109.22	110.30
Mn	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00
Fe	54.54	54.58	54.81	55.00	54.54	54.62	53.96	54.66
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00
Cu	54.99	55.16	54.87	54.21	54.80	55.12	52.73	52.01
Zn	0.00	0.00	0.00	0.06	0.07	0.02	0.00	0.01
As	0.08	0.00	0.00	0.00	0.03	0.06	0.17	0.02
Se	0.04	0.03	0.10	0.04	0.00	0.00	0.07	0.00
Ag	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.07
Cd	0.00	0.00	0.03	0.00	0.00	0.02	0.01	0.00
Sn	0.07	0.10	0.05	0.00	0.05	0.03	0.00	0.05
Sb	0.02	0.00	0.02	0.05	0.02	0.05	0.03	0.00
Te	0.00	0.01	0.00	0.02	0.01	0.02	0.00	0.01
Pb	0.04	0.12	0.04	0.00	0.06	0.01	0.02	0.09
Bi	0.05	0.05	0.05	0.03	0.03	0.06	0.06	0.03
Total	219.19	218.71	217.56	217.32	218.30	218.36	216.28	217.25
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**1.00**	**1.00**	**1.01**	**1.01**	**1.00**	**1.00**	**1.00**	**1.01**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**1.00**	**1.01**	**1.01**	**1.00**	**1.00**	**1.01**	**0.98**	**0.96**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**2.00**	**2.01**	**2.02**	**2.01**	**2.01**	**2.01**	**1.98**	**1.97**
S	2.00	1.99	1.98	1.99	1.99	1.98	2.02	2.03
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.00**	**1.99**	**1.98**	**1.99**	**1.99**	**1.99**	**2.02**	**2.03**
M/S	**1.00**	**1.01**	**1.02**	**1.01**	**1.01**	**1.01**	**0.98**	**0.97**

APPENDIX B	1803_cp_3	1803_cp_5	1803_cp_6	1803_cp_7	1803_cp_8	1803_cp_9	1803_cp_10	1803_cp_11
CHALCOPYRITE								
S	35.63	34.87	35.02	35.07	34.89	34.89	34.68	34.98
Mn	0.02	0.00	0.01	0.00	0.03	0.02	0.00	0.02
Fe	30.15	29.83	30.18	30.21	30.20	30.29	29.57	30.28
Co	0.01	0.00	0.00	0.04	0.01	0.01	0.00	0.00
Ni	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Cu	33.98	34.30	33.43	34.08	34.44	34.17	34.68	34.41
Zn	0.01	0.00	0.00	0.04	0.03	0.00	0.03	0.01
As	0.09	0.06	0.03	0.01	0.00	0.00	0.05	0.00
Se	0.04	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Ag	0.00	0.00	0.06	0.00	0.08	0.03	0.00	0.05
Cd	0.05	0.00	0.00	0.00	0.00	0.01	0.05	0.00
Sn	0.07	0.00	0.01	0.09	0.03	0.03	0.00	0.00
Sb	0.00	0.00	0.02	0.01	0.02	0.00	0.00	0.05
Te	0.06	0.00	0.00	0.02	0.01	0.00	0.00	0.00
Pb	0.08	0.04	0.12	0.00	0.17	0.00	0.07	0.07
Bi	0.13	0.11	0.13	0.12	0.12	0.10	0.02	0.14
Total	100.36	99.22	99.00	99.68	100.03	99.56	99.16	100.00
Atomic %								
S	111.12	108.76	109.21	109.38	108.81	108.80	108.17	109.09
Mn	0.04	0.00	0.02	0.00	0.05	0.04	0.00	0.03
Fe	53.99	53.41	54.03	54.09	54.08	54.23	52.95	54.23
Co	0.02	0.00	0.00	0.07	0.02	0.01	0.00	0.00
Ni	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Cu	53.47	53.98	52.60	53.63	54.20	53.77	54.58	54.15
Zn	0.02	0.00	0.00	0.05	0.05	0.00	0.04	0.01
As	0.12	0.08	0.05	0.01	0.00	0.00	0.07	0.00
Se	0.05	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Ag	0.00	0.00	0.06	0.00	0.07	0.03	0.00	0.05
Cd	0.04	0.00	0.00	0.00	0.00	0.01	0.05	0.00
Sn	0.06	0.00	0.01	0.07	0.03	0.02	0.00	0.00
Sb	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.04
Te	0.05	0.00	0.00	0.01	0.01	0.00	0.00	0.00
Pb	0.04	0.02	0.06	0.00	0.08	0.00	0.03	0.03
Bi	0.06	0.05	0.06	0.06	0.06	0.05	0.01	0.07
Total	219.13	216.30	216.12	217.39	217.47	216.99	215.90	217.68
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**0.99**	**0.99**	**1.00**	**1.00**	**0.99**	**1.00**	**0.98**	**1.00**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**0.98**	**1.00**	**0.97**	**0.99**	**1.00**	**0.99**	**1.01**	**0.99**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**1.97**	**1.99**	**1.98**	**1.99**	**2.00**	**1.99**	**2.00**	**2.00**
S	2.03	2.01	2.02	2.01	2.00	2.01	2.00	2.00
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.03**	**2.01**	**2.02**	**2.01**	**2.00**	**2.01**	**2.00**	**2.00**
M/S	**0.97**	**0.99**	**0.98**	**0.99**	**1.00**	**0.99**	**1.00**	**1.00**

APPENDIX B	1807_cp_1	1807_cp_2	1807_cp_3	1807_cp_4	1807_cp_5	1807_cp_6	1807_cp_7	17812_cp_1
CHALCOPYRITE								
S	35.44	35.51	35.39	35.11	35.28	35.29	35.07	35.01
Mn	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.04
Fe	29.96	29.44	30.11	29.76	29.61	28.77	28.60	30.31
Co	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.03	0.00	0.01	0.00	0.00	0.01	0.02
Cu	34.15	33.54	34.38	33.65	33.45	33.22	32.69	35.11
Zn	0.05	0.02	0.00	0.01	0.00	0.00	0.00	0.04
As	0.00	0.00	0.05	0.05	0.04	0.01	0.05	0.00
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ag	0.00	0.06	0.00	0.00	0.00	0.01	0.02	0.01
Cd	0.00	0.00	0.01	0.02	0.00	0.00	0.10	0.00
Sn	0.01	0.02	0.11	0.07	0.05	0.05	0.00	0.10
Sb	0.00	0.00	0.00	0.01	0.00	0.04	0.02	0.00
Te	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.00
Pb	0.16	0.00	0.26	0.14	0.06	0.10	0.08	0.10
Bi	0.11	0.09	0.12	0.09	0.11	0.13	0.11	0.16
Total	99.88	98.74	100.42	98.92	98.61	97.62	96.83	100.92
Atomic %								
S	110.51	110.73	110.36	109.50	110.02	110.06	109.36	109.19
Mn	0.00	0.01	0.01	0.00	0.00	0.00	0.02	0.07
Fe	53.65	52.71	53.91	53.29	53.02	51.52	51.21	54.27
Co	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.05	0.00	0.02	0.00	0.00	0.02	0.03
Cu	53.73	52.78	54.10	52.95	52.63	52.28	51.45	55.25
Zn	0.08	0.03	0.00	0.01	0.00	0.00	0.00	0.07
As	0.00	0.00	0.06	0.07	0.05	0.02	0.06	0.00
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Ag	0.00	0.05	0.00	0.00	0.00	0.01	0.02	0.01
Cd	0.00	0.00	0.01	0.02	0.00	0.00	0.09	0.00
Sn	0.01	0.02	0.09	0.06	0.04	0.04	0.00	0.08
Sb	0.00	0.00	0.00	0.01	0.00	0.03	0.02	0.00
Te	0.00	0.00	0.00	0.00	0.02	0.00	0.05	0.00
Pb	0.08	0.00	0.13	0.07	0.03	0.05	0.04	0.05
Bi	0.05	0.04	0.06	0.04	0.05	0.06	0.05	0.08
Total	218.11	216.47	218.73	216.03	215.86	214.07	212.39	219.12
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**0.98**	**0.97**	**0.99**	**0.99**	**0.98**	**0.96**	**0.96**	**0.99**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**0.99**	**0.98**	**0.99**	**0.98**	**0.98**	**0.98**	**0.97**	**1.01**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**1.97**	**1.95**	**1.98**	**1.97**	**1.96**	**1.94**	**1.94**	**2.01**
S	2.03	2.05	2.02	2.03	2.04	2.06	2.06	1.99
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.03**	**2.05**	**2.02**	**2.03**	**2.04**	**2.06**	**2.06**	**1.99**
M/S	**0.97**	**0.95**	**0.98**	**0.97**	**0.96**	**0.94**	**0.94**	**1.01**

APPENDIX B	17812_cp_2	17812_cp_3	17812_cp_4	17812_cp_5	17812_cp_6	17812_cp_7	17812_cp_8	1787_cp_1
CHALCOPYRITE								
S	34.90	34.89	34.37	34.92	34.98	34.90	34.89	34.86
Mn	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Fe	30.28	30.38	29.86	30.11	30.44	30.59	30.40	28.56
Co	0.01	0.00	0.02	0.00	0.00	0.03	0.00	0.03
Ni	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.01
Cu	33.92	34.21	34.51	34.35	34.92	34.74	35.08	32.46
Zn	0.02	0.02	0.04	0.05	0.03	0.05	0.00	0.00
As	0.04	0.06	0.04	0.06	0.04	0.07	0.07	0.00
Se	0.00	0.00	0.07	0.02	0.03	0.06	0.03	0.00
Ag	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
Cd	0.08	0.00	0.04	0.00	0.07	0.00	0.00	0.00
Sn	0.08	0.10	0.00	0.05	0.04	0.12	0.05	0.01
Sb	0.02	0.00	0.00	0.01	0.01	0.00	0.03	0.00
Te	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.04
Pb	0.13	0.12	0.00	0.00	0.32	0.18	0.19	0.20
Bi	0.12	0.11	0.12	0.06	0.15	0.08	0.01	0.03
Total	99.63	99.93	99.08	99.66	101.05	100.83	100.75	96.23
Atomic %								
S	108.85	108.80	107.18	108.92	109.08	108.84	108.81	108.73
Mn	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Fe	54.21	54.41	53.47	53.91	54.51	54.77	54.43	51.14
Co	0.02	0.00	0.03	0.00	0.00	0.04	0.00	0.06
Ni	0.03	0.04	0.00	0.01	0.01	0.02	0.00	0.01
Cu	53.37	53.84	54.31	54.06	54.96	54.67	55.20	51.08
Zn	0.02	0.04	0.06	0.07	0.04	0.08	0.00	0.00
As	0.05	0.07	0.06	0.08	0.05	0.09	0.10	0.00
Se	0.00	0.00	0.09	0.03	0.04	0.07	0.03	0.00
Ag	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02
Cd	0.07	0.00	0.04	0.00	0.06	0.00	0.00	0.00
Sn	0.06	0.09	0.00	0.04	0.04	0.10	0.04	0.01
Sb	0.02	0.00	0.00	0.01	0.01	0.00	0.03	0.00
Te	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03
Pb	0.06	0.06	0.00	0.00	0.16	0.09	0.09	0.10
Bi	0.06	0.05	0.06	0.03	0.07	0.04	0.00	0.01
Total	216.86	217.40	215.30	217.17	219.03	218.82	218.73	211.20
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**1.00**	**1.00**	**0.99**	**0.99**	**1.00**	**1.00**	**1.00**	**0.97**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**0.98**	**0.99**	**1.01**	**1.00**	**1.00**	**1.00**	**1.01**	**0.97**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**1.99**	**2.00**	**2.01**	**1.99**	**2.01**	**2.01**	**2.01**	**1.94**
S	2.01	2.00	1.99	2.01	1.99	1.99	1.99	2.06
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.01**	**2.00**	**1.99**	**2.01**	**1.99**	**1.99**	**1.99**	**2.06**
M/S	**0.99**	**1.00**	**1.01**	**0.99**	**1.01**	**1.01**	**1.01**	**0.94**

APPENDIX B	1787_cp_2	1787_cp_3	1787_cp_4	1787_cp_5	1787_cp_6	1787_cp_7	180s7_cp_1	180s7_cp_2
CHALCOPYRITE								
S	34.79	34.66	34.91	34.96	34.77	34.87	34.90	34.82
Mn	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00
Fe	28.84	29.19	28.93	29.05	29.31	29.76	30.78	30.11
Co	0.00	0.00	0.00	0.03	0.02	0.00	0.01	0.01
Ni	0.02	0.06	0.02	0.00	0.00	0.01	0.00	0.01
Cu	32.95	32.91	33.22	32.92	33.37	33.51	34.41	34.43
Zn	0.05	0.01	0.00	0.07	0.00	0.00	0.00	0.05
As	0.04	0.00	0.05	0.00	0.05	0.03	0.00	0.00
Se	0.05	0.00	0.01	0.06	0.08	0.00	0.04	0.03
Ag	0.01	0.00	0.04	0.05	0.01	0.03	0.00	0.00
Cd	0.00	0.00	0.03	0.11	0.02	0.00	0.04	0.05
Sn	0.06	0.04	0.04	0.03	0.04	0.00	0.06	0.01
Sb	0.00	0.00	0.02	0.00	0.04	0.00	0.05	0.06
Te	0.02	0.05	0.00	0.05	0.00	0.01	0.01	0.02
Pb	0.05	0.02	0.07	0.19	0.17	0.06	0.11	0.00
Bi	0.09	0.05	0.11	0.05	0.05	0.18	0.06	0.01
Total	96.96	97.00	97.45	97.58	97.96	98.45	100.47	99.63
Atomic %								
S	108.48	108.10	108.88	109.03	108.43	108.75	108.84	108.59
Mn	0.00	0.01	0.00	0.00	0.04	0.00	0.01	0.00
Fe	51.64	52.27	51.80	52.01	52.49	53.29	55.11	53.91
Co	0.00	0.00	0.00	0.05	0.03	0.00	0.01	0.02
Ni	0.03	0.10	0.03	0.00	0.00	0.01	0.00	0.02
Cu	51.85	51.79	52.27	51.81	52.52	52.73	54.14	54.18
Zn	0.07	0.01	0.00	0.11	0.00	0.00	0.00	0.08
As	0.06	0.00	0.06	0.00	0.07	0.03	0.00	0.00
Se	0.06	0.00	0.02	0.07	0.10	0.00	0.06	0.04
Ag	0.01	0.00	0.04	0.05	0.01	0.02	0.00	0.00
Cd	0.00	0.00	0.03	0.10	0.02	0.00	0.04	0.05
Sn	0.05	0.04	0.03	0.03	0.03	0.00	0.05	0.01
Sb	0.00	0.00	0.01	0.00	0.03	0.00	0.04	0.05
Te	0.02	0.04	0.00	0.04	0.00	0.01	0.01	0.02
Pb	0.02	0.01	0.03	0.09	0.08	0.03	0.05	0.00
Bi	0.04	0.03	0.05	0.02	0.02	0.09	0.03	0.01
Total	212.33	212.38	213.27	213.41	213.88	214.97	218.39	216.97
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**0.97**	**0.98**	**0.97**	**0.97**	**0.98**	**0.99**	**1.01**	**0.99**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**0.98**	**0.98**	**0.98**	**0.97**	**0.98**	**0.98**	**0.99**	**1.00**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**1.95**	**1.96**	**1.96**	**1.95**	**1.97**	**1.98**	**2.01**	**2.00**
S	2.04	2.04	2.04	2.04	2.03	2.02	1.99	2.00
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.05**	**2.04**	**2.04**	**2.05**	**2.03**	**2.02**	**1.99**	**2.00**
M/S	**0.96**	**0.96**	**0.96**	**0.96**	**0.97**	**0.98**	**1.01**	**1.00**

APPENDIX B	180s7_cp_3	180s7_cp_4	180s4_cp_1	180s4_cp_2	180s4_cp_3	180s4_cp_4	180s4_cp_5	180s4_cp_6
CHALCOPYRITE								
S	35.35	35.06	34.57	34.82	34.61	35.45	35.09	34.98
Mn	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.02
Fe	30.40	30.46	30.52	30.48	30.91	30.75	30.60	30.53
Co	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Cu	34.59	34.63	35.07	34.95	34.47	35.54	35.36	35.52
Zn	0.07	0.00	0.00	0.01	0.00	0.03	0.00	0.05
As	0.01	0.07	0.02	0.00	0.08	0.00	0.06	0.05
Se	0.04	0.00	0.00	0.09	0.00	0.00	0.00	0.00
Ag	0.00	0.10	0.11	0.06	0.00	0.07	0.00	0.07
Cd	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Sn	0.06	0.06	0.02	0.05	0.00	0.01	0.06	0.00
Sb	0.00	0.03	0.03	0.00	0.01	0.00	0.00	0.08
Te	0.06	0.04	0.04	0.05	0.00	0.00	0.00	0.00
Pb	0.17	0.00	0.14	0.01	0.09	0.15	0.00	0.02
Bi	0.03	0.07	0.02	0.08	0.11	0.12	0.02	0.17
Total	100.82	100.51	100.54	100.69	100.32	102.12	101.19	101.48
Atomic %								
S	110.26	109.35	107.82	108.59	107.93	110.55	109.44	109.09
Mn	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.04
Fe	54.44	54.54	54.65	54.58	55.36	55.06	54.80	54.67
Co	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00
Cu	54.43	54.49	55.18	54.99	54.24	55.93	55.64	55.89
Zn	0.11	0.00	0.00	0.01	0.01	0.05	0.00	0.08
As	0.01	0.09	0.03	0.00	0.11	0.00	0.08	0.06
Se	0.05	0.00	0.00	0.11	0.00	0.00	0.00	0.00
Ag	0.00	0.09	0.10	0.05	0.00	0.06	0.00	0.07
Cd	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Sn	0.05	0.05	0.01	0.04	0.00	0.01	0.05	0.00
Sb	0.00	0.02	0.02	0.00	0.01	0.00	0.00	0.06
Te	0.05	0.03	0.03	0.04	0.00	0.00	0.00	0.00
Pb	0.08	0.00	0.07	0.01	0.05	0.07	0.00	0.01
Bi	0.02	0.03	0.01	0.04	0.05	0.06	0.01	0.08
Total	219.54	218.70	217.93	218.59	217.78	221.80	220.02	220.05
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**0.99**	**1.00**	**1.00**	**1.00**	**1.02**	**0.99**	**1.00**	**0.99**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**0.99**	**1.00**	**1.01**	**1.01**	**1.00**	**1.01**	**1.01**	**1.02**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**1.99**	**2.00**	**2.02**	**2.01**	**2.02**	**2.01**	**2.01**	**2.02**
S	2.01	2.00	1.98	1.99	1.98	1.99	1.99	1.98
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.01**	**2.00**	**1.98**	**1.99**	**1.98**	**1.99**	**1.99**	**1.98**
M/S	**0.99**	**1.00**	**1.02**	**1.01**	**1.02**	**1.01**	**1.01**	**1.02**

APPENDIX B	180s4_cp_7	180s4_cp_8	0869_po_18	0869_po_20	0869_po_21	0869_po_24	0869_po_25	0869_po_26
CHALCOPYRITE								
S	35.11	34.90	32.35	33.88	34.63	34.39	34.68	34.68
Mn	0.04	0.03	0.01	0.00	0.00	0.02	0.00	0.00
Fe	30.56	30.34	30.52	28.91	29.23	29.52	30.03	29.64
Co	0.00	0.00	0.18	0.11	0.02	0.00	0.09	0.01
Ni	0.03	0.00	0.00	0.00	0.00	0.03	0.01	0.00
Cu	35.19	35.33	31.51	32.82	33.39	33.69	33.77	33.97
Zn	0.00	0.01	0.02	0.00	0.04	0.10	0.05	0.00
As	0.00	0.05	0.00	0.07	0.05	0.00	0.02	0.01
Se	0.01	0.04	0.02	0.11	0.04	0.01	0.00	0.03
Ag	0.00	0.10	0.08	0.05	0.06	0.10	0.05	0.00
Cd	0.00	0.09	0.00	0.04	0.00	0.00	0.00	0.00
Sn	0.06	0.06	0.04	0.00	0.00	0.05	0.00	0.00
Sb	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.01
Te	0.00	0.00	0.00	0.02	0.09	0.00	0.00	0.00
Pb	0.02	0.02	0.03	0.00	0.10	0.04	0.11	0.25
Bi	0.16	0.13	0.12	0.09	0.07	0.14	0.10	0.17
Total	101.22	101.10	94.88	96.09	97.71	98.11	98.89	98.78
Atomic %								
S	109.50	108.83	100.88	105.65	108.00	107.25	108.14	108.17
Mn	0.07	0.06	0.02	0.00	0.00	0.04	0.00	0.00
Fe	54.73	54.34	54.65	51.77	52.33	52.85	53.77	53.08
Co	0.00	0.00	0.31	0.18	0.04	0.00	0.14	0.02
Ni	0.05	0.00	0.00	0.00	0.00	0.05	0.02	0.00
Cu	55.38	55.59	49.58	51.64	52.54	53.01	53.14	53.45
Zn	0.00	0.01	0.03	0.00	0.06	0.16	0.07	0.00
As	0.00	0.06	0.00	0.09	0.06	0.00	0.02	0.01
Se	0.02	0.05	0.03	0.14	0.05	0.01	0.00	0.04
Ag	0.00	0.10	0.07	0.05	0.05	0.09	0.04	0.00
Cd	0.00	0.08	0.00	0.03	0.00	0.00	0.00	0.00
Sn	0.05	0.05	0.03	0.00	0.00	0.04	0.00	0.00
Sb	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.01
Te	0.00	0.00	0.00	0.01	0.07	0.00	0.00	0.00
Pb	0.01	0.01	0.02	0.00	0.05	0.02	0.05	0.12
Bi	0.08	0.06	0.06	0.04	0.03	0.07	0.05	0.08
Total	219.91	219.24	205.68	209.62	213.29	213.61	215.46	214.99
At 4 apfu			At 4 apfu					
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**1.00**	**0.99**	**1.06**	**0.99**	**0.98**	**0.99**	**1.00**	**0.99**
Co	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**1.01**	**1.01**	**0.96**	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**2.01**	**2.01**	**2.04**	**1.98**	**1.97**	**1.99**	**1.99**	**1.99**
S	1.99	1.99	1.96	2.02	2.03	2.01	2.01	2.01
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**1.99**	**1.99**	**1.96**	**2.02**	**2.03**	**2.01**	**2.01**	**2.01**
M/S	**1.01**	**1.01**	**1.04**	**0.98**	**0.97**	**0.99**	**0.99**	**0.99**

APPENDIX B	0869_po_32	0869_po_33	0869_po_34	0869_po_35	0869_cp_1	0869_cp_2	0869_cp_3	0869_cp_4
CHALCOPYRITE								
S	34.58	34.12	34.44	29.47	34.95	34.93	34.65	34.50
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Fe	30.20	29.88	30.29	29.80	30.02	30.51	30.24	30.08
Co	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Ni	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.00
Cu	33.91	34.63	34.34	32.75	34.53	34.71	34.38	34.31
Zn	0.07	0.01	0.00	0.04	0.02	0.00	0.04	0.02
As	0.08	0.07	0.00	0.07	0.01	0.03	0.05	0.04
Se	0.07	0.00	0.02	0.01	0.10	0.01	0.04	0.08
Ag	0.00	0.03	0.00	0.00	0.08	0.06	0.00	0.00
Cd	0.07	0.10	0.00	0.00	0.00	0.03	0.00	0.03
Sn	0.00	0.11	0.03	0.00	0.07	0.07	0.02	0.00
Sb	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02
Te	0.02	0.00	0.00	0.02	0.02	0.01	0.03	0.00
Pb	0.00	0.05	0.19	0.16	0.13	0.20	0.13	0.21
Bi	0.14	0.11	0.09	0.93	0.19	0.07	0.16	0.11
Total	99.14	99.12	99.41	93.28	100.14	100.64	99.76	99.41
Atomic %								
S	107.84	106.41	107.41	91.90	108.99	108.93	108.06	107.60
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Fe	54.08	53.50	54.24	53.36	53.76	54.63	54.16	53.86
Co	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Ni	0.00	0.04	0.00	0.02	0.02	0.00	0.01	0.00
Cu	53.36	54.49	54.03	51.54	54.34	54.63	54.09	53.98
Zn	0.10	0.02	0.00	0.06	0.02	0.00	0.06	0.04
As	0.11	0.09	0.00	0.09	0.02	0.03	0.07	0.06
Se	0.09	0.00	0.03	0.01	0.13	0.02	0.05	0.11
Ag	0.00	0.02	0.00	0.00	0.07	0.05	0.00	0.00
Cd	0.07	0.09	0.00	0.00	0.00	0.03	0.00	0.03
Sn	0.00	0.09	0.03	0.00	0.06	0.06	0.02	0.00
Sb	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
Te	0.02	0.00	0.00	0.02	0.02	0.01	0.02	0.00
Pb	0.00	0.02	0.09	0.08	0.06	0.10	0.06	0.10
Bi	0.07	0.05	0.04	0.45	0.09	0.04	0.08	0.05
Total	215.73	214.83	215.88	197.54	217.58	218.53	216.71	215.85
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**1.00**	**1.00**	**1.01**	**1.08**	**0.99**	**1.00**	**1.00**	**1.00**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**0.99**	**1.01**	**1.00**	**1.04**	**1.00**	**1.00**	**1.00**	**1.00**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
M total	**2.00**	**2.02**	**2.01**	**2.14**	**1.99**	**2.01**	**2.00**	**2.00**
S	2.00	1.98	1.99	1.86	2.00	1.99	1.99	1.99
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**2.00**	**1.98**	**1.99**	**1.86**	**2.01**	**1.99**	**2.00**	**2.00**
M/S	**1.00**	**1.02**	**1.01**	**1.15**	**0.99**	**1.01**	**1.00**	**1.00**

APPENDIX B	0869_cp_5	0869_cp_6	0869_cp_7	0869_cp_8	0869_cp_9	0869_cp_10	0869_cp_11	0869_cp_12
CHALCOPYRITE								
S	34.82	34.29	34.55	34.61	34.38	34.77	34.73	34.64
Mn	0.00	0.01	0.00	0.04	0.03	0.00	0.00	0.02
Fe	30.31	29.92	30.28	30.42	30.22	30.19	30.24	29.99
Co	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Cu	35.06	34.39	33.87	34.73	34.11	33.93	34.12	34.49
Zn	0.03	0.04	0.03	0.06	0.00	0.03	0.05	0.05
As	0.02	0.05	0.00	0.10	0.06	0.00	0.05	0.00
Se	0.05	0.04	0.02	0.05	0.02	0.08	0.03	0.08
Ag	0.00	0.03	0.00	0.10	0.03	0.00	0.09	0.00
Cd	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00
Sb	0.01	0.00	0.00	0.02	0.02	0.00	0.03	0.07
Te	0.00	0.03	0.00	0.00	0.00	0.03	0.02	0.00
Pb	0.27	0.21	0.00	0.00	0.21	0.00	0.00	0.06
Bi	0.10	0.19	0.14	0.05	0.16	0.05	0.11	0.12
Total	100.73	99.27	98.93	100.20	99.23	99.08	99.48	99.53
Atomic %								
S	108.61	106.94	107.76	107.93	107.21	108.45	108.31	108.04
Mn	0.00	0.02	0.00	0.07	0.05	0.00	0.00	0.04
Fe	54.28	53.58	54.23	54.47	54.11	54.06	54.16	53.70
Co	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
Cu	55.17	54.11	53.30	54.65	53.68	53.40	53.69	54.27
Zn	0.05	0.06	0.05	0.09	0.00	0.05	0.08	0.08
As	0.03	0.06	0.01	0.14	0.08	0.00	0.07	0.00
Se	0.06	0.04	0.03	0.07	0.03	0.10	0.04	0.10
Ag	0.00	0.03	0.00	0.09	0.03	0.00	0.09	0.00
Cd	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00
Sb	0.01	0.00	0.00	0.02	0.02	0.00	0.02	0.06
Te	0.00	0.02	0.00	0.00	0.00	0.02	0.01	0.00
Pb	0.13	0.10	0.00	0.00	0.10	0.00	0.00	0.03
Bi	0.05	0.09	0.07	0.02	0.07	0.02	0.05	0.06
Total	218.43	215.14	215.45	217.58	215.38	216.09	216.52	216.37
At 4 apfu								
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	**0.99**	**1.00**	**1.01**	**1.00**	**1.00**	**1.00**	**1.00**	**0.99**
Co	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	**1.01**	**1.01**	**0.99**	**1.00**	**1.00**	**0.99**	**0.99**	**1.00**
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M total	**2.01**	**2.01**	**2.00**	**2.01**	**2.01**	**1.99**	**2.00**	**2.00**
S	1.99	1.99	2.00	1.98	1.99	2.01	2.00	2.00
Se	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S total	**1.99**	**1.99**	**2.00**	**1.99**	**1.99**	**2.01**	**2.00**	**2.00**
M/S	**1.01**	**1.01**	**1.00**	**1.01**	**1.01**	**0.99**	**1.00**	**1.00**

APPENDIX B	08606_cp_2	08606_cp_3	08606_cp_4	08606_cp_5
CHALCOPYRITE				
S	35.09	35.87	35.56	35.02
Mn	0.01	0.03	0.00	0.00
Fe	29.30	29.37	29.76	29.59
Co	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00
Cu	33.65	33.50	33.42	34.21
Zn	0.00	0.04	0.03	0.01
As	0.06	0.02	0.00	0.10
Se	0.02	0.00	0.07	0.02
Ag	0.00	0.00	0.00	0.00
Cd	0.00	0.05	0.03	0.00
Sn	0.03	0.03	0.02	0.00
Sb	0.00	0.00	0.05	0.02
Te	0.00	0.02	0.00	0.05
Pb	0.12	0.00	0.00	0.02
Bi	0.05	0.11	0.13	0.14
Total	98.34	99.03	99.08	99.18
Atomic %				
S	109.42	111.85	110.90	109.23
Mn	0.02	0.05	0.00	0.00
Fe	52.46	52.58	53.29	52.99
Co	0.00	0.00	0.01	0.00
Ni	0.00	0.00	0.00	0.00
Cu	52.95	52.72	52.59	53.83
Zn	0.00	0.05	0.05	0.01
As	0.09	0.02	0.00	0.14
Se	0.03	0.00	0.08	0.03
Ag	0.00	0.00	0.00	0.00
Cd	0.00	0.05	0.02	0.00
Sn	0.03	0.02	0.02	0.00
Sb	0.00	0.00	0.04	0.01
Te	0.00	0.02	0.00	0.04
Pb	0.06	0.00	0.00	0.01
Bi	0.02	0.05	0.06	0.07
Total	215.08	217.43	217.08	216.35
At 4 apfu				
Mn	0.00	0.00	0.00	0.00
Fe	**0.98**	**0.97**	**0.98**	**0.98**
Co	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.00	0.00
Cu	**0.98**	**0.97**	**0.97**	**1.00**
Zn	0.00	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00
Ag	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00
Pb	0.00	0.00	0.00	0.00
Bi	0.00	0.00	0.00	0.00
M total	**1.96**	**1.94**	**1.95**	**1.98**
S	2.03	2.06	2.04	2.02
Se	0.00	0.00	0.00	0.00
Te	0.00	0.00	0.00	0.00
S total	**2.04**	**2.06**	**2.05**	**2.02**
M/S	**0.97**	**0.94**	**0.96**	**0.98**

APPENDIX B	17812_po_2	17812_po_3	17812_po_4	17812_po_5	17812_po_6	17812_po_7	17812_po_8	17812_po_9
PYRRHOTITE								
S	38.52	39.14	39.54	39.47	39.74	39.02	38.81	38.86
Mn	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Fe	59.49	59.60	59.90	60.04	60.09	60.38	59.90	59.59
Co	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00
Ni	0.02	0.02	0.03	0.01	0.04	0.04	0.00	0.01
Cu	0.02	0.00	0.01	0.10	0.01	0.00	0.00	0.03
Zn	0.00	0.02	0.03	0.00	0.07	0.03	0.01	0.01
As	0.06	0.00	0.02	0.08	0.15	0.06	0.04	0.06
Se	0.06	0.00	0.00	0.00	0.05	0.01	0.00	0.01
Ag	0.06	0.07	0.00	0.17	0.00	0.02	0.02	0.00
Cd	0.07	0.04	0.01	0.02	0.00	0.00	0.00	0.02
Sn	0.02	0.05	0.01	0.03	0.04	0.00	0.01	0.02
Sb	0.00	0.02	0.00	0.00	0.00	0.00	0.04	0.00
Te	0.03	0.00	0.02	0.02	0.00	0.00	0.03	0.02
Pb	0.09	0.12	0.13	0.15	0.13	0.17	0.00	0.16
Bi	0.15	0.13	0.12	0.11	0.12	0.14	0.14	0.11
Total	98.58	99.21	99.81	100.22	100.44	99.87	99.00	98.90
Atomic %								
S	120.13	122.07	123.31	123.08	123.93	121.68	121.02	121.20
Mn	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Fe	106.53	106.72	107.27	107.51	107.61	108.12	107.25	106.70
Co	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00
Ni	0.03	0.03	0.05	0.02	0.07	0.06	0.00	0.02
Cu	0.03	0.00	0.01	0.16	0.01	0.00	0.00	0.04
Zn	0.00	0.04	0.04	0.00	0.11	0.04	0.01	0.01
As	0.08	0.00	0.03	0.11	0.20	0.08	0.06	0.08
Se	0.07	0.00	0.00	0.00	0.07	0.02	0.00	0.01
Ag	0.06	0.07	0.00	0.16	0.00	0.02	0.02	0.00
Cd	0.06	0.03	0.01	0.02	0.00	0.00	0.00	0.02
Sn	0.02	0.04	0.01	0.02	0.03	0.00	0.01	0.02
Sb	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00
Te	0.02	0.00	0.02	0.02	0.00	0.00	0.02	0.02
Pb	0.04	0.06	0.06	0.07	0.06	0.08	0.00	0.08
Bi	0.07	0.06	0.06	0.05	0.06	0.07	0.07	0.05
Total	227.15	229.13	230.85	231.25	232.15	230.17	228.52	228.25
At 13 apfu								
Mn	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Fe	7.035	6.987	6.970	6.974	6.953	7.046	7.040	7.012
Co	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000
Ni	0.002	0.002	0.003	0.002	0.005	0.004	0.000	0.001
Cu	0.002	0.000	0.001	0.010	0.001	0.000	0.000	0.003
Zn	0.000	0.002	0.002	0.000	0.007	0.003	0.001	0.001
As	0.005	0.000	0.002	0.007	0.013	0.005	0.004	0.005
Ag	0.004	0.004	0.000	0.010	0.000	0.001	0.001	0.000
Cd	0.004	0.002	0.001	0.001	0.000	0.000	0.000	0.001
Sn	0.001	0.002	0.001	0.002	0.002	0.000	0.000	0.001
Sb	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000
Pb	0.003	0.004	0.004	0.005	0.004	0.005	0.000	0.005
Bi	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.003
M total	7.061	7.009	6.986	7.015	6.988	7.070	7.055	7.033
S	7.933	7.991	8.012	7.984	8.007	7.929	7.944	7.965
Se	0.005	0.000	0.000	0.000	0.004	0.001	0.000	0.001
Te	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.001
S total	7.939	7.991	8.014	7.985	8.012	7.930	7.945	7.967
M/S	0.890	0.877	0.872	0.879	0.872	0.891	0.888	0.883

APPENDIX B	17812_po_10	17812_po_11	17812_po_12	17812_po_13	17812_po_14	17812_po_15	17812_po_16	17812_po_17
PYRRHOTITE								
S	39.60	38.81	38.81	38.42	38.60	38.35	39.13	38.52
Mn	0.02	0.00	0.00	0.01	0.00	0.02	0.00	0.00
Fe	59.22	59.20	57.87	57.65	58.35	57.96	57.35	57.58
Co	0.01	0.05	0.02	0.03	0.02	0.00	0.00	0.00
Ni	0.01	0.03	0.03	0.07	0.03	0.01	0.00	0.01
Cu	0.04	0.09	0.04	0.00	0.00	0.02	0.00	0.03
Zn	0.01	0.03	0.00	0.01	0.00	0.01	0.02	0.02
As	0.01	0.17	0.05	0.04	0.03	0.11	0.07	0.05
Se	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.02
Ag	0.01	0.07	0.01	0.07	0.05	0.00	0.05	0.05
Cd	0.00	0.05	0.00	0.07	0.00	0.00	0.03	0.00
Sn	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.01	0.06	0.00	0.02	0.00
Te	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.00
Pb	0.07	0.05	0.01	0.11	0.19	0.09	0.00	0.11
Bi	0.13	0.08	0.11	0.09	0.07	0.19	0.07	0.15
Total	99.14	98.66	96.96	96.63	97.43	96.81	96.75	96.53
Atomic %								
S	123.50	121.04	121.05	119.83	120.39	119.60	122.02	120.14
Mn	0.04	0.00	0.00	0.03	0.00	0.03	0.00	0.00
Fe	106.04	106.00	103.63	103.23	104.48	103.79	102.69	103.10
Co	0.02	0.09	0.04	0.05	0.04	0.00	0.01	0.00
Ni	0.02	0.05	0.05	0.11	0.05	0.01	0.00	0.02
Cu	0.07	0.14	0.06	0.00	0.00	0.03	0.00	0.04
Zn	0.02	0.05	0.00	0.01	0.00	0.01	0.03	0.03
As	0.01	0.22	0.07	0.05	0.04	0.14	0.10	0.07
Se	0.00	0.04	0.00	0.00	0.00	0.04	0.00	0.02
Ag	0.01	0.06	0.01	0.07	0.05	0.00	0.04	0.04
Cd	0.00	0.04	0.00	0.07	0.00	0.00	0.03	0.00
Sn	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.01	0.05	0.00	0.02	0.00
Te	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00
Pb	0.04	0.02	0.01	0.05	0.09	0.05	0.00	0.05
Bi	0.06	0.04	0.05	0.04	0.03	0.09	0.03	0.07
Total	229.83	227.81	224.95	223.59	225.25	223.81	224.98	223.58
At 13 apfu								
Mn	0.003	0.000	0.000	0.002	0.000	0.002	0.000	0.000
Fe	6.921	6.980	6.910	6.926	6.958	6.956	6.847	6.917
Co	0.001	0.006	0.002	0.004	0.003	0.000	0.000	0.000
Ni	0.001	0.004	0.003	0.007	0.004	0.001	0.000	0.001
Cu	0.004	0.009	0.004	0.000	0.000	0.002	0.000	0.003
Zn	0.001	0.003	0.000	0.001	0.000	0.001	0.002	0.002
As	0.001	0.015	0.004	0.003	0.002	0.010	0.007	0.005
Ag	0.001	0.004	0.001	0.004	0.003	0.000	0.003	0.003
Cd	0.000	0.003	0.000	0.004	0.000	0.000	0.002	0.000
Sn	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.000
Pb	0.002	0.002	0.000	0.004	0.006	0.003	0.000	0.004
Bi	0.004	0.002	0.004	0.003	0.002	0.006	0.002	0.005
M total	6.940	7.027	6.928	6.961	6.982	6.980	6.864	6.939
S	8.060	7.970	8.072	8.039	8.017	8.016	8.135	8.060
Se	0.000	0.003	0.000	0.000	0.000	0.003	0.000	0.001
Te	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000
S total	8.060	7.973	8.072	8.039	8.018	8.020	8.136	8.061
M/S	0.861	0.881	0.858	0.866	0.871	0.870	0.844	0.861

APPENDIX B	17812_po_18	17812_po_19	17812_po_21	17812_po_22	17812_po_23	17812_po_24	17812_po_25	17812_po_26
PYRRHOTITE								
S	38.68	37.86	34.73	38.99	38.88	39.31	38.88	39.06
Mn	0.03	0.04	0.02	0.00	0.02	0.02	0.00	0.00
Fe	57.22	58.95	29.82	58.87	59.79	59.12	59.39	58.73
Co	0.01	0.00	0.18	0.00	0.00	0.00	0.03	0.03
Ni	0.00	0.03	0.04	0.00	0.02	0.02	0.03	0.01
Cu	0.02	0.05	33.67	0.00	0.03	0.01	0.00	0.01
Zn	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03
As	0.07	0.05	0.00	0.10	0.11	0.00	0.00	0.00
Se	0.00	0.05	0.00	0.02	0.00	0.04	0.07	0.07
Ag	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.00
Cd	0.09	0.00	0.01	0.00	0.00	0.07	0.03	0.00
Sn	0.06	0.06	0.05	0.10	0.00	0.02	0.03	0.02
Sb	0.03	0.00	0.07	0.02	0.07	0.00	0.00	0.00
Te	0.01	0.01	0.00	0.00	0.00	0.04	0.00	0.00
Pb	0.03	0.28	0.13	0.05	0.13	0.18	0.21	0.23
Bi	0.16	0.05	0.14	0.13	0.16	0.11	0.16	0.13
Total	96.42	97.44	98.86	98.31	99.27	98.94	98.83	98.32
Atomic %								
S	120.63	118.08	108.30	121.59	121.25	122.60	121.25	121.83
Mn	0.06	0.07	0.03	0.00	0.03	0.03	0.00	0.01
Fe	102.47	105.56	53.39	105.42	107.07	105.86	106.35	105.16
Co	0.02	0.00	0.30	0.00	0.00	0.00	0.05	0.06
Ni	0.00	0.05	0.07	0.00	0.03	0.04	0.05	0.01
Cu	0.03	0.07	52.98	0.00	0.05	0.02	0.00	0.01
Zn	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.05
As	0.09	0.07	0.00	0.13	0.14	0.00	0.00	0.01
Se	0.00	0.07	0.00	0.03	0.00	0.05	0.09	0.09
Ag	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.00
Cd	0.08	0.00	0.01	0.00	0.00	0.07	0.03	0.00
Sn	0.05	0.05	0.04	0.09	0.00	0.02	0.02	0.01
Sb	0.03	0.00	0.06	0.02	0.06	0.00	0.00	0.00
Te	0.01	0.01	0.00	0.00	0.00	0.03	0.00	0.00
Pb	0.01	0.13	0.06	0.03	0.06	0.09	0.10	0.11
Bi	0.08	0.02	0.07	0.06	0.08	0.05	0.08	0.06
Total	223.55	224.20	215.32	227.40	228.83	228.84	228.02	227.41
At 13 apfu								
Mn	0.004	0.005	0.002	0.000	0.002	0.002	0.000	0.000
Fe	6.875	7.062	3.719	6.954	7.018	6.939	6.996	6.937
Co	0.001	0.000	0.021	0.000	0.000	0.000	0.003	0.004
Ni	0.000	0.003	0.005	0.000	0.002	0.003	0.003	0.001
Cu	0.002	0.005	3.691	0.000	0.004	0.001	0.000	0.001
Zn	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.003
As	0.006	0.005	0.000	0.008	0.009	0.000	0.000	0.000
Ag	0.000	0.000	0.001	0.000	0.004	0.000	0.000	0.000
Cd	0.005	0.000	0.001	0.000	0.000	0.004	0.002	0.000
Sn	0.003	0.004	0.003	0.006	0.000	0.001	0.001	0.001
Sb	0.002	0.000	0.004	0.001	0.004	0.000	0.000	0.000
Pb	0.001	0.009	0.004	0.002	0.004	0.006	0.007	0.007
Bi	0.005	0.002	0.005	0.004	0.005	0.003	0.005	0.004
M total	6.905	7.094	7.456	6.978	7.052	6.959	7.017	6.958
S	8.094	7.900	7.544	8.020	7.948	8.036	7.976	8.036
Se	0.000	0.005	0.000	0.002	0.000	0.003	0.006	0.006
Te	0.001	0.001	0.000	0.000	0.000	0.002	0.000	0.000
S total	8.095	7.906	7.544	8.022	7.948	8.041	7.983	8.042
M/S	0.853	0.897	0.988	0.870	0.887	0.865	0.879	0.865

APPENDIX B	1787_po_1	1787_po_2	1787_po_3	1787_po_4	1787_po_5	1787_po_6	1787_po_7	1787_po_8
PYRRHOTITE								
S	38.83	39.11	39.11	39.02	39.01	38.96	38.79	39.11
Mn	0.00	0.03	0.00	0.02	0.00	0.00	0.04	0.03
Fe	59.56	59.96	59.83	59.84	59.08	59.47	60.13	60.49
Co	0.11	0.11	0.12	0.10	0.14	0.08	0.11	0.12
Ni	0.08	0.01	0.00	0.05	0.08	0.03	0.06	0.02
Cu	0.00	0.03	0.00	0.00	0.08	0.00	0.06	0.00
Zn	0.08	0.00	0.00	0.00	0.01	0.01	0.00	0.01
As	0.05	0.00	0.05	0.11	0.03	0.13	0.08	0.04
Se	0.04	0.07	0.01	0.03	0.08	0.11	0.03	0.00
Ag	0.00	0.04	0.00	0.04	0.00	0.03	0.00	0.01
Cd	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sn	0.05	0.02	0.00	0.00	0.00	0.00	0.05	0.02
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Te	0.00	0.08	0.00	0.03	0.01	0.00	0.05	0.00
Pb	0.24	0.21	0.28	0.00	0.00	0.21	0.20	0.02
Bi	0.15	0.13	0.10	0.09	0.12	0.10	0.12	0.10
Total	99.19	99.79	99.50	99.33	98.66	99.13	99.71	99.97
Atomic %								
S	121.10	121.98	121.97	121.69	121.67	121.49	120.96	121.98
Mn	0.00	0.05	0.00	0.04	0.00	0.01	0.06	0.05
Fe	106.64	107.37	107.13	107.15	105.79	106.50	107.68	108.32
Co	0.19	0.19	0.20	0.18	0.23	0.13	0.18	0.21
Ni	0.13	0.01	0.00	0.08	0.14	0.05	0.10	0.04
Cu	0.00	0.05	0.00	0.00	0.12	0.00	0.09	0.00
Zn	0.13	0.00	0.00	0.00	0.01	0.01	0.00	0.02
As	0.07	0.00	0.07	0.15	0.03	0.17	0.10	0.05
Se	0.05	0.08	0.02	0.04	0.10	0.14	0.03	0.00
Ag	0.00	0.04	0.00	0.03	0.00	0.03	0.00	0.01
Cd	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Sn	0.04	0.01	0.00	0.00	0.00	0.00	0.04	0.02
Sb	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Te	0.00	0.06	0.00	0.02	0.01	0.00	0.04	0.00
Pb	0.12	0.10	0.14	0.00	0.00	0.10	0.10	0.01
Bi	0.07	0.06	0.05	0.04	0.06	0.05	0.06	0.05
Total	228.54	230.01	229.57	229.42	228.20	228.68	229.45	230.74
At 13 apfu								
Mn	0.000	0.003	0.000	0.003	0.000	0.001	0.004	0.003
Fe	6.999	7.002	7.000	7.006	6.954	6.986	7.039	7.042
Co	0.013	0.012	0.013	0.012	0.015	0.009	0.012	0.013
Ni	0.008	0.001	0.000	0.005	0.009	0.003	0.007	0.002
Cu	0.000	0.003	0.000	0.000	0.008	0.000	0.006	0.000
Zn	0.008	0.000	0.000	0.000	0.001	0.001	0.000	0.001
As	0.004	0.000	0.004	0.010	0.002	0.011	0.007	0.003
Ag	0.000	0.003	0.000	0.002	0.000	0.002	0.000	0.001
Cd	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sn	0.003	0.001	0.000	0.000	0.000	0.000	0.003	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Pb	0.008	0.006	0.009	0.000	0.000	0.007	0.006	0.001
Bi	0.005	0.004	0.003	0.003	0.004	0.003	0.004	0.003
M total	7.048	7.036	7.030	7.040	6.995	7.022	7.088	7.071
S	7.948	7.955	7.969	7.956	7.998	7.969	7.907	7.929
Se	0.003	0.005	0.001	0.002	0.007	0.009	0.002	0.000
Te	0.000	0.004	0.000	0.001	0.001	0.000	0.002	0.000
S total	7.952	7.964	7.970	7.960	8.005	7.978	7.912	7.929
M/S	0.886	0.883	0.882	0.884	0.874	0.880	0.896	0.892

APPENDIX B	1787_po_9	1787_po_10	1787_po_11	1787_po_12	1787_po_13	1787_po_14	1787_po_15	1787_po_16
PYRRHOTITE								
S	39.17	38.97	39.29	39.14	39.06	38.21	38.86	39.06
Mn	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
Fe	60.71	60.53	60.36	60.91	59.84	58.39	58.82	59.73
Co	0.14	0.16	0.14	0.16	0.07	0.14	0.18	0.17
Ni	0.08	0.03	0.00	0.02	0.04	0.05	0.05	0.02
Cu	0.06	0.04	0.04	0.00	0.03	0.02	0.03	0.01
Zn	0.03	0.00	0.00	0.01	0.03	0.01	0.02	0.03
As	0.03	0.11	0.00	0.01	0.03	0.02	0.03	0.08
Se	0.04	0.01	0.00	0.03	0.08	0.06	0.00	0.00
Ag	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Cd	0.10	0.08	0.02	0.13	0.05	0.00	0.01	0.03
Sn	0.00	0.00	0.00	0.01	0.06	0.00	0.01	0.05
Sb	0.03	0.01	0.00	0.06	0.00	0.00	0.00	0.02
Te	0.00	0.01	0.00	0.07	0.04	0.00	0.00	0.00
Pb	0.09	0.15	0.15	0.17	0.07	0.25	0.00	0.05
Bi	0.05	0.18	0.09	0.07	0.13	0.10	0.04	0.06
Total	100.53	100.28	100.09	100.83	99.50	97.28	98.05	99.30
Atomic %								
S	122.15	121.53	122.52	122.07	121.80	119.17	121.18	121.81
Mn	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00
Fe	108.71	108.40	108.08	109.07	107.15	104.55	105.32	106.96
Co	0.24	0.28	0.24	0.28	0.12	0.24	0.31	0.29
Ni	0.14	0.05	0.00	0.04	0.07	0.09	0.09	0.04
Cu	0.09	0.06	0.06	0.00	0.05	0.03	0.05	0.02
Zn	0.05	0.00	0.00	0.02	0.04	0.02	0.02	0.05
As	0.05	0.15	0.00	0.01	0.03	0.03	0.04	0.11
Se	0.05	0.01	0.00	0.04	0.10	0.08	0.00	0.00
Ag	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00
Cd	0.09	0.07	0.02	0.12	0.05	0.00	0.01	0.02
Sn	0.00	0.00	0.00	0.01	0.05	0.00	0.01	0.04
Sb	0.03	0.01	0.00	0.05	0.00	0.00	0.00	0.01
Te	0.00	0.00	0.00	0.06	0.03	0.00	0.00	0.00
Pb	0.05	0.07	0.07	0.08	0.03	0.12	0.00	0.02
Bi	0.02	0.08	0.04	0.03	0.06	0.05	0.02	0.03
Total	231.65	230.72	231.04	231.90	229.58	224.40	227.06	229.40
At 13 apfu								
Mn	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000
Fe	7.039	7.047	7.017	7.055	7.001	6.989	6.958	6.994
Co	0.016	0.018	0.016	0.018	0.008	0.016	0.020	0.019
Ni	0.009	0.004	0.000	0.002	0.005	0.006	0.006	0.003
Cu	0.006	0.004	0.004	0.000	0.003	0.002	0.003	0.001
Zn	0.003	0.000	0.000	0.001	0.003	0.001	0.002	0.003
As	0.003	0.010	0.000	0.001	0.002	0.002	0.003	0.007
Ag	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000
Cd	0.006	0.005	0.001	0.007	0.003	0.000	0.001	0.002
Sn	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.003
Sb	0.002	0.000	0.000	0.003	0.000	0.000	0.000	0.001
Pb	0.003	0.005	0.005	0.005	0.002	0.008	0.000	0.001
Bi	0.001	0.005	0.003	0.002	0.004	0.003	0.001	0.002
M total	7.088	7.098	7.046	7.098	7.033	7.029	6.994	7.035
S	7.909	7.901	7.954	7.896	7.958	7.966	8.006	7.965
Se	0.003	0.001	0.000	0.003	0.006	0.005	0.000	0.000
Te	0.000	0.000	0.000	0.004	0.002	0.000	0.000	0.000
S total	7.912	7.902	7.954	7.902	7.967	7.971	8.006	7.965
M/S	0.896	0.898	0.886	0.898	0.883	0.882	0.874	0.883

APPENDIX B	1787_po_17	1787_po_18	1787_po_19	1787_po_20	1787_po_21	1787_po_22	1787_po_23	1787_po_24
PYRRHOTITE								
S	39.80	39.20	39.65	39.33	38.99	39.41	39.10	38.92
Mn	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01
Fe	58.96	60.12	60.40	59.54	58.89	57.94	58.83	58.81
Co	0.08	0.07	0.07	0.12	0.09	0.08	0.10	0.07
Ni	0.03	0.04	0.02	0.04	0.05	0.02	0.01	0.00
Cu	0.06	0.02	0.02	0.03	0.02	0.00	0.02	0.00
Zn	0.00	0.00	0.02	0.03	0.05	0.03	0.03	0.00
As	0.06	0.12	0.03	0.00	0.00	0.00	0.05	0.06
Se	0.00	0.01	0.04	0.04	0.06	0.00	0.03	0.00
Ag	0.00	0.04	0.05	0.00	0.00	0.03	0.00	0.00
Cd	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.07	0.02	0.00	0.03	0.03	0.00	0.00	0.05
Sb	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.06	0.08	0.00	0.00	0.00	0.00	0.04	0.04
Pb	0.22	0.19	0.18	0.00	0.13	0.07	0.00	0.13
Bi	0.09	0.07	0.08	0.14	0.06	0.14	0.15	0.16
Total	99.42	100.10	100.56	99.31	98.35	97.72	98.37	98.27
Atomic %								
S	124.14	122.27	123.67	122.66	121.60	122.91	121.95	121.39
Mn	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.02
Fe	105.58	107.65	108.15	106.62	105.45	103.75	105.35	105.30
Co	0.14	0.12	0.11	0.21	0.15	0.13	0.17	0.12
Ni	0.06	0.07	0.03	0.07	0.08	0.03	0.02	0.01
Cu	0.09	0.03	0.04	0.04	0.03	0.00	0.03	0.00
Zn	0.00	0.00	0.03	0.05	0.07	0.05	0.04	0.00
As	0.07	0.16	0.04	0.00	0.00	0.00	0.07	0.08
Se	0.00	0.02	0.04	0.05	0.07	0.00	0.04	0.00
Ag	0.00	0.04	0.04	0.00	0.00	0.03	0.00	0.00
Cd	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Sn	0.06	0.02	0.00	0.02	0.02	0.00	0.00	0.04
Sb	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Te	0.05	0.07	0.00	0.00	0.00	0.00	0.03	0.03
Pb	0.10	0.09	0.09	0.00	0.06	0.04	0.00	0.06
Bi	0.04	0.03	0.04	0.07	0.03	0.07	0.07	0.08
Total	230.32	230.66	232.30	229.79	227.57	227.00	227.78	227.15
At 13 apfu								
Mn	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.001
Fe	6.876	7.000	6.984	6.960	6.950	6.855	6.938	6.954
Co	0.009	0.008	0.007	0.014	0.010	0.009	0.011	0.008
Ni	0.004	0.005	0.002	0.005	0.005	0.002	0.002	0.000
Cu	0.006	0.002	0.002	0.003	0.002	0.000	0.002	0.000
Zn	0.000	0.000	0.002	0.003	0.005	0.003	0.003	0.000
As	0.005	0.010	0.003	0.000	0.000	0.000	0.004	0.006
Ag	0.000	0.003	0.003	0.000	0.000	0.002	0.000	0.000
Cd	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Sn	0.004	0.001	0.000	0.002	0.002	0.000	0.000	0.003
Sb	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.007	0.006	0.006	0.000	0.004	0.002	0.000	0.004
Bi	0.003	0.002	0.002	0.005	0.002	0.004	0.005	0.005
M total	6.912	7.044	7.012	6.990	6.980	6.878	6.964	6.981
S	8.085	7.951	7.985	8.007	8.015	8.122	8.031	8.016
Se	0.000	0.001	0.003	0.003	0.005	0.000	0.003	0.000
Te	0.003	0.004	0.000	0.000	0.000	0.000	0.002	0.002
S total	8.088	7.956	7.988	8.010	8.020	8.122	8.036	8.019
M/S	0.855	0.885	0.878	0.873	0.870	0.847	0.867	0.871

APPENDIX B	0869_po_2	0869_po_3	0869_po_4	0869_po_5	0869_po_6	0869_po_7	0869_po_8	0869_po_9
PYRRHOTITE								
S	39.92	39.08	39.24	35.12	39.66	38.67	39.53	38.77
Mn	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Fe	59.78	59.91	60.24	30.00	60.12	60.58	59.50	59.40
Co	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ni	0.02	0.04	0.07	0.01	0.01	0.03	0.01	0.00
Cu	0.14	0.00	0.12	34.32	0.09	0.11	0.07	0.06
Zn	0.00	0.00	0.00	0.09	0.00	0.01	0.02	0.02
As	0.00	0.06	0.00	0.02	0.02	0.04	0.12	0.05
Se	0.00	0.00	0.02	0.05	0.02	0.03	0.06	0.02
Ag	0.00	0.00	0.02	0.03	0.11	0.00	0.03	0.00
Cd	0.10	0.01	0.07	0.00	0.00	0.08	0.00	0.00
Sn	0.02	0.02	0.06	0.02	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.02	0.00	0.01	0.01	0.00
Te	0.02	0.00	0.00	0.00	0.05	0.01	0.02	0.02
Pb	0.04	0.06	0.00	0.04	0.00	0.09	0.09	0.23
Bi	0.06	0.08	0.13	0.12	0.23	0.03	0.24	0.07
Total	100.09	99.28	99.96	99.84	100.33	99.71	99.69	98.65
Atomic %								
S	124.51	121.89	122.38	109.54	123.68	120.61	123.27	120.90
Mn	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Fe	107.04	107.27	107.87	53.72	107.65	108.47	106.54	106.36
Co	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ni	0.03	0.08	0.12	0.01	0.02	0.06	0.01	0.00
Cu	0.21	0.00	0.19	54.01	0.15	0.18	0.10	0.10
Zn	0.00	0.00	0.00	0.13	0.00	0.01	0.04	0.03
As	0.00	0.09	0.00	0.03	0.03	0.06	0.15	0.06
Se	0.01	0.00	0.02	0.06	0.03	0.03	0.08	0.02
Ag	0.00	0.00	0.02	0.03	0.10	0.00	0.02	0.00
Cd	0.09	0.01	0.06	0.00	0.00	0.07	0.00	0.00
Sn	0.01	0.02	0.05	0.02	0.00	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00
Te	0.01	0.00	0.00	0.00	0.04	0.01	0.02	0.02
Pb	0.02	0.03	0.00	0.02	0.00	0.04	0.05	0.11
Bi	0.03	0.04	0.06	0.06	0.11	0.02	0.11	0.04
Total	231.96	229.42	230.77	217.64	231.82	229.59	230.41	227.68
At 13 apfu								
Mn	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002
Fe	6.922	7.014	7.011	3.702	6.966	7.087	6.936	7.008
Co	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Ni	0.002	0.005	0.008	0.001	0.001	0.004	0.001	0.000
Cu	0.014	0.000	0.012	3.722	0.009	0.011	0.007	0.007
Zn	0.000	0.000	0.000	0.009	0.000	0.001	0.002	0.002
As	0.000	0.006	0.000	0.002	0.002	0.004	0.010	0.004
Ag	0.000	0.000	0.001	0.002	0.007	0.000	0.002	0.000
Cd	0.006	0.001	0.004	0.000	0.000	0.005	0.000	0.000
Sn	0.001	0.001	0.003	0.001	0.000	0.000	0.000	0.000
Sb	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.000
Pb	0.001	0.002	0.000	0.001	0.000	0.003	0.003	0.007
Bi	0.002	0.003	0.004	0.004	0.007	0.001	0.007	0.002
M total	6.947	7.031	7.044	7.446	6.993	7.118	6.969	7.032
S	8.051	7.969	7.955	7.550	8.003	7.880	8.025	7.965
Se	0.000	0.000	0.002	0.004	0.002	0.002	0.005	0.001
Te	0.001	0.000	0.000	0.000	0.002	0.001	0.001	0.001
S total	8.053	7.969	7.956	7.554	8.007	7.882	8.031	7.968
M/S	0.863	0.882	0.885	0.986	0.873	0.903	0.868	0.883

APPENDIX B	0869_po_10	0869_po_11	0869_po_12	0869_po_13	0869_po_14	0869_po_15	0869_po_16	0869_po_17
PYRRHOTITE								
S	39.13	38.19	39.39	39.08	38.58	38.55	38.36	39.55
Mn	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00
Fe	60.25	58.10	59.61	60.31	59.77	59.75	59.38	58.85
Co	0.03	0.20	0.00	0.00	0.00	0.00	0.00	0.01
Ni	0.01	0.03	0.04	0.00	0.00	0.00	0.02	0.00
Cu	0.18	0.17	0.05	0.02	0.09	0.00	0.00	0.02
Zn	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.04
As	0.11	0.04	0.00	0.00	0.13	0.00	0.10	0.00
Se	0.00	0.08	0.02	0.03	0.05	0.03	0.07	0.04
Ag	0.05	0.05	0.00	0.00	0.02	0.00	0.00	0.13
Cd	0.00	0.00	0.02	0.00	0.04	0.03	0.10	0.00
Sn	0.06	0.00	0.01	0.00	0.00	0.09	0.03	0.00
Sb	0.00	0.00	0.00	0.03	0.05	0.00	0.03	0.02
Te	0.00	0.03	0.00	0.00	0.04	0.00	0.03	0.02
Pb	0.22	0.11	0.07	0.06	0.24	0.17	0.15	0.19
Bi	0.11	0.08	0.05	0.23	0.03	0.09	0.11	0.06
Total	100.12	97.10	99.26	99.80	99.04	98.72	98.39	98.94
Atomic %								
S	122.03	119.09	122.83	121.89	120.31	120.22	119.64	123.34
Mn	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00
Fe	107.88	104.04	106.74	107.99	107.03	106.99	106.34	105.37
Co	0.05	0.35	0.00	0.01	0.00	0.00	0.00	0.02
Ni	0.01	0.06	0.06	0.00	0.00	0.00	0.03	0.00
Cu	0.28	0.26	0.08	0.03	0.14	0.00	0.00	0.04
Zn	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.06
As	0.14	0.06	0.00	0.00	0.17	0.00	0.13	0.00
Se	0.00	0.10	0.03	0.04	0.06	0.04	0.09	0.05
Ag	0.05	0.05	0.00	0.00	0.02	0.00	0.00	0.12
Cd	0.00	0.00	0.02	0.00	0.03	0.03	0.08	0.00
Sn	0.05	0.00	0.01	0.00	0.00	0.07	0.03	0.00
Sb	0.00	0.00	0.00	0.02	0.04	0.00	0.03	0.01
Te	0.00	0.03	0.00	0.00	0.03	0.00	0.03	0.02
Pb	0.10	0.05	0.03	0.03	0.12	0.08	0.07	0.09
Bi	0.05	0.04	0.03	0.11	0.01	0.04	0.05	0.03
Total	230.65	224.14	229.83	230.17	227.97	227.51	226.53	229.18
At 13 apfu								
Mn	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000
Fe	7.016	6.963	6.967	7.038	7.043	7.054	7.041	6.897
Co	0.003	0.023	0.000	0.000	0.000	0.000	0.000	0.001
Ni	0.001	0.004	0.004	0.000	0.000	0.000	0.002	0.000
Cu	0.018	0.018	0.005	0.002	0.009	0.000	0.000	0.002
Zn	0.000	0.000	0.000	0.002	0.000	0.000	0.001	0.004
As	0.009	0.004	0.000	0.000	0.011	0.000	0.008	0.000
Ag	0.003	0.003	0.000	0.000	0.001	0.000	0.000	0.008
Cd	0.000	0.000	0.001	0.000	0.002	0.002	0.006	0.000
Sn	0.003	0.000	0.000	0.000	0.000	0.005	0.002	0.000
Sb	0.000	0.000	0.000	0.001	0.003	0.000	0.002	0.001
Pb	0.007	0.004	0.002	0.002	0.008	0.005	0.005	0.006
Bi	0.003	0.003	0.002	0.007	0.001	0.003	0.003	0.002
M total	7.064	7.021	6.981	7.054	7.078	7.071	7.070	6.922
S	7.936	7.970	8.016	7.943	7.916	7.927	7.922	8.073
Se	0.000	0.007	0.002	0.003	0.004	0.003	0.006	0.003
Te	0.000	0.002	0.000	0.000	0.002	0.000	0.002	0.001
S total	7.936	7.979	8.019	7.946	7.922	7.929	7.930	8.078
M/S	0.890	0.880	0.871	0.888	0.893	0.892	0.892	0.857

APPENDIX B	0869_po_22	0869_po_23	0869_po_27	0869_po_29	0869_po_30	0869_po_31	0869_po_36	0869_po_37
PYRRHOTITE								
S	39.24	39.19	38.81	38.44	38.92	39.07	39.19	39.38
Mn	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03
Fe	58.96	58.40	59.36	58.28	59.93	59.16	59.40	59.30
Co	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.03	0.03	0.03	0.00	0.00	0.00
Cu	0.01	0.00	0.00	1.42	0.02	0.05	0.00	0.04
Zn	0.06	0.03	0.01	0.00	0.03	0.00	0.00	0.00
As	0.00	0.08	0.04	0.00	0.05	0.09	0.10	0.13
Se	0.00	0.00	0.06	0.05	0.05	0.00	0.02	0.01
Ag	0.00	0.00	0.00	0.02	0.02	0.00	0.03	0.03
Cd	0.01	0.08	0.00	0.00	0.00	0.04	0.00	0.04
Sn	0.00	0.04	0.02	0.10	0.00	0.01	0.07	0.00
Sb	0.01	0.00	0.04	0.01	0.01	0.03	0.00	0.00
Te	0.00	0.00	0.03	0.02	0.00	0.01	0.00	0.00
Pb	0.15	0.26	0.10	0.24	0.03	0.29	0.07	0.12
Bi	0.13	0.13	0.15	0.12	0.10	0.13	0.13	0.23
Total	98.59	98.21	98.65	98.73	99.18	98.87	99.02	99.30
Atomic %								
S	122.38	122.21	121.04	119.90	121.37	121.85	122.22	122.80
Mn	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.05
Fe	105.58	104.57	106.29	104.36	107.32	105.94	106.37	106.19
Co	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ni	0.00	0.00	0.06	0.06	0.04	0.00	0.00	0.00
Cu	0.02	0.01	0.00	2.23	0.03	0.08	0.00	0.06
Zn	0.09	0.04	0.01	0.00	0.04	0.00	0.00	0.00
As	0.00	0.10	0.05	0.00	0.07	0.12	0.13	0.17
Se	0.00	0.00	0.08	0.07	0.07	0.00	0.03	0.01
Ag	0.00	0.00	0.00	0.02	0.02	0.00	0.02	0.02
Cd	0.01	0.07	0.00	0.00	0.00	0.03	0.00	0.04
Sn	0.00	0.03	0.01	0.08	0.00	0.00	0.06	0.00
Sb	0.01	0.00	0.03	0.01	0.01	0.02	0.00	0.00
Te	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00
Pb	0.07	0.13	0.05	0.11	0.01	0.14	0.04	0.06
Bi	0.06	0.06	0.07	0.06	0.05	0.06	0.06	0.11
Total	228.26	227.24	227.72	226.92	229.02	228.26	228.94	229.51
At 13 apfu								
Mn	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003
Fe	6.938	6.903	7.001	6.899	7.029	6.962	6.969	6.940
Co	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.000	0.000	0.004	0.004	0.003	0.000	0.000	0.000
Cu	0.001	0.000	0.000	0.148	0.002	0.006	0.000	0.004
Zn	0.006	0.003	0.001	0.000	0.003	0.000	0.000	0.000
As	0.000	0.007	0.003	0.000	0.005	0.008	0.009	0.011
Ag	0.000	0.000	0.000	0.001	0.001	0.000	0.002	0.002
Cd	0.001	0.005	0.000	0.000	0.000	0.002	0.000	0.003
Sn	0.000	0.002	0.001	0.005	0.000	0.000	0.004	0.000
Sb	0.001	0.000	0.002	0.001	0.001	0.002	0.000	0.000
Pb	0.005	0.008	0.003	0.008	0.001	0.009	0.002	0.004
Bi	0.004	0.004	0.005	0.004	0.003	0.004	0.004	0.007
M total	6.957	6.933	7.020	7.069	7.047	6.992	6.990	6.973
S	8.043	8.067	7.973	7.926	7.949	8.007	8.008	8.026
Se	0.000	0.000	0.005	0.005	0.004	0.000	0.002	0.001
Te	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000
S total	8.043	8.067	7.980	7.931	7.953	8.008	8.010	8.027
M/S	0.865	0.859	0.880	0.891	0.886	0.873	0.873	0.869

APPENDIX B	0869_po_38	08606_cp_1	17812_cp_9	08606_cp_6	08606_cp_7	1803_py_10	1803_py_12	1803_py_13
PYRRHOTITE								
S	38.59	38.64	38.89	39.20	39.27	38.84	39.38	40.02
Mn	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.02
Fe	60.45	58.22	60.56	58.59	58.31	59.12	59.71	60.07
Co	0.00	0.00	0.02	0.00	0.00	0.10	0.13	0.03
Ni	0.02	0.00	0.03	0.05	0.02	0.05	0.00	0.01
Cu	0.02	0.00	0.01	0.00	0.00	0.03	0.00	0.00
Zn	0.03	0.00	0.00	0.00	0.06	0.05	0.00	0.00
As	0.00	0.00	0.07	0.10	0.07	0.08	0.11	0.04
Se	0.04	0.00	0.05	0.06	0.01	0.02	0.00	0.02
Ag	0.02	0.03	0.03	0.00	0.00	0.00	0.08	0.00
Cd	0.00	0.00	0.10	0.00	0.07	0.04	0.03	0.00
Sn	0.06	0.04	0.01	0.01	0.03	0.00	0.01	0.01
Sb	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.05
Te	0.00	0.00	0.02	0.00	0.00	0.09	0.00	0.03
Pb	0.02	0.06	0.15	0.03	0.17	0.00	0.11	0.00
Bi	0.07	0.18	0.14	0.13	0.09	0.07	0.11	0.07
Total	99.35	97.19	100.09	98.19	98.11	98.51	99.67	100.38
Atomic %								
S	120.36	120.52	121.30	122.26	122.46	1.21	1.23	1.25
Mn	0.03	0.03	0.00	0.01	0.00	0.00	0.00	0.00
Fe	108.25	104.26	108.45	104.92	104.41	1.06	1.07	1.08
Co	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Ni	0.04	0.00	0.06	0.09	0.03	0.00	0.00	0.00
Cu	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Zn	0.04	0.00	0.00	0.00	0.09	0.00	0.00	0.00
As	0.00	0.00	0.09	0.14	0.09	0.00	0.00	0.00
Se	0.05	0.00	0.07	0.08	0.01	0.00	0.00	0.00
Ag	0.02	0.02	0.03	0.00	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.09	0.00	0.06	0.00	0.00	0.00
Sn	0.05	0.03	0.01	0.01	0.02	0.00	0.00	0.00
Sb	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Te	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Pb	0.01	0.03	0.07	0.01	0.08	0.00	0.00	0.00
Bi	0.03	0.09	0.07	0.06	0.04	0.00	0.00	0.00
Total	228.92	224.98	230.28	227.57	227.33	2.28	2.30	2.33
At 13 apfu				At apfu15		At apfu15		
Mn	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.002
Fe	7.093	6.951	7.064	6.915	6.890	6.975	6.963	6.935
Co	0.000	0.000	0.002	0.000	0.000	0.012	0.014	0.004
Ni	0.003	0.000	0.004	0.006	0.002	0.006	0.000	0.001
Cu	0.002	0.000	0.001	0.000	0.000	0.003	0.000	0.000
Zn	0.003	0.000	0.000	0.000	0.006	0.005	0.000	0.000
As	0.000	0.000	0.006	0.009	0.006	0.007	0.009	0.003
Ag	0.001	0.002	0.002	0.000	0.000	0.000	0.005	0.000
Cd	0.000	0.000	0.006	0.000	0.004	0.003	0.002	0.000
Sn	0.003	0.002	0.000	0.001	0.002	0.000	0.001	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
Pb	0.000	0.002	0.005	0.001	0.006	0.000	0.003	0.000
Bi	0.002	0.006	0.004	0.004	0.003	0.002	0.003	0.002
M total	7.110	6.965	7.093	6.937	6.919	7.013	7.002	6.951
S	7.886	8.035	7.901	8.058	8.080	7.981	7.998	8.046
Se	0.003	0.000	0.004	0.005	0.001	0.002	0.000	0.002
Te	0.000	0.000	0.001	0.000	0.000	0.005	0.000	0.002
S total	7.890	8.035	7.907	8.063	8.081	7.987	7.998	8.049
M/S	0.901	0.867	0.897	0.860	0.856	0.878	0.875	0.864

APPENDIX B	1803_py_14
PYRRHOTITE	
S	39.60
Mn	0.00
Fe	59.86
Co	0.10
Ni	0.01
Cu	0.04
Zn	0.01
As	0.00
Se	0.00
Ag	0.04
Cd	0.05
Sn	0.00
Sb	0.00
Te	0.00
Pb	0.22
Bi	0.10
Total	100.04
Atomic %	
S	1.23
Mn	0.00
Fe	1.07
Co	0.00
Ni	0.00
Cu	0.00
Zn	0.00
As	0.00
Se	0.00
Ag	0.00
Cd	0.00
Sn	0.00
Sb	0.00
Te	0.00
Pb	0.00
Bi	0.00
Total	2.31
At 13 apfu	
Mn	0.001
Fe	6.954
Co	0.011
Ni	0.001
Cu	0.004
Zn	0.001
As	0.000
Ag	0.003
Cd	0.003
Sn	0.000
Sb	0.000
Pb	0.007
Bi	0.003
M total	6.988
S	8.012
Se	0.000
Te	0.000
S total	8.012
M/S	0.872

APPENDIX B

PYRITE	**1803_py_1**	**1803_py_2**	**1803_py_6**	**1803_py_7**	**1803_py_8**	**1803_py_9**	**1807_py_1**	**1807_py_2**
S	53.17	53.60	51.16	52.50	53.18	51.72	52.75	53.12
Mn	0.00	0.04	0.00	0.00	0.01	0.00	0.01	0.00
Fe	46.09	45.63	44.46	46.06	45.57	46.93	45.40	45.83
Co	0.36	0.19	0.34	0.32	0.58	0.16	0.00	0.00
Ni	0.09	0.02	0.08	0.11	0.26	0.00	0.04	0.06
Cu	0.00	0.00	0.02	0.00	0.03	0.07	0.22	0.05
Zn	0.10	0.06	0.00	0.01	0.05	0.00	0.00	0.00
As	0.06	0.04	0.05	0.09	0.06	0.02	0.04	0.00
Se	0.06	0.00	0.00	0.00	0.07	0.00	0.01	0.00
Ag	0.12	0.00	0.00	0.00	0.02	0.06	0.10	0.00
Cd	0.00	0.00	0.00	0.10	0.00	0.02	0.00	0.00
Sn	0.02	0.01	0.04	0.00	0.02	0.02	0.00	0.00
Sb	0.04	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Te	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.06
Pb	0.18	0.11	0.18	0.17	0.23	0.21	0.17	0.31
Bi	0.17	0.13	0.18	0.08	0.20	0.21	0.13	0.14
Total	**100.48**	**99.86**	**96.52**	**99.50**	**100.29**	**99.42**	**98.88**	**99.58**
Atomic %								
S	1.658	1.672	1.596	1.637	1.658	1.613	1.645	1.657
Mn	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.825	0.817	0.796	0.825	0.816	0.840	0.813	0.821
Co	0.006	0.003	0.006	0.005	0.010	0.003	0.000	0.000
Ni	0.002	0.000	0.001	0.002	0.004	0.000	0.001	0.001
Cu	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.001
Zn	0.002	0.001	0.000	0.000	0.001	0.000	0.000	0.000
As	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000
Se	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Ag	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000
Cd	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Sn	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
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Bi	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Total	**2.498**	**2.496**	**2.402**	**2.473**	**2.494**	**2.460**	**2.466**	**2.482**
At 3 apfu								
Mn	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.991	0.982	0.994	1.000	0.981	1.025	0.989	0.992
Co	0.007	0.004	0.007	0.007	0.012	0.003	0.000	0.000
Ni	0.002	0.000	0.002	0.002	0.005	0.000	0.001	0.001
Cu	0.000	0.000	0.000	0.000	0.001	0.001	0.004	0.001
Zn	0.002	0.001	0.000	0.000	0.001	0.000	0.000	0.000
As	0.001	0.001	0.001	0.001	0.001	0.000	0.001	0.000
Ag	0.001	0.000	0.000	0.000	0.000	0.001	0.001	0.000
Cd	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Sn	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
Pb	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002
Bi	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
M total	**1.007**	**0.991**	**1.007**	**1.014**	**1.004**	**1.033**	**0.998**	**0.997**
S	1.992	2.009	1.993	1.986	1.995	1.967	2.002	2.003
Se	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
S total	**1.993**	**2.009**	**1.993**	**1.986**	**1.996**	**1.967**	**2.002**	**2.003**
M/S	**0.506**	**0.493**	**0.505**	**0.511**	**0.503**	**0.525**	**0.499**	**0.498**

APPENDIX B

PYRITE	**1807_py_3**	**1807_py_4**	**1807_py_5**	**1807_py_6**	**1807_py_7**	**1807_py_8**	**1807_py_9**	**1807_py_10**
S	52.83	53.34	52.89	53.40	51.36	53.06	52.56	51.60
Mn	0.00	0.00	0.01	0.03	0.05	0.00	0.00	0.00
Fe	46.15	46.52	46.10	45.82	45.89	45.49	45.94	46.06
Co	0.00	0.05	0.01	0.00	0.00	0.02	0.00	0.00
Ni	0.03	0.06	0.02	0.06	0.05	0.09	0.09	0.08
Cu	0.17	0.19	0.00	0.13	0.21	0.00	0.11	0.03
Zn	0.02	0.00	0.02	0.00	0.00	0.04	0.00	0.03
As	0.04	0.05	0.03	0.03	0.04	0.07	0.00	0.00
Se	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.01
Ag	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
Cd	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00
Sn	0.00	0.06	0.00	0.00	0.08	0.02	0.02	0.05
Sb	0.02	0.00	0.02	0.04	0.00	0.00	0.00	0.01
Te	0.00	0.00	0.00	0.03	0.00	0.04	0.03	0.00
Pb	0.26	0.13	0.11	0.17	0.06	0.11	0.07	0.03
Bi	0.20	0.25	0.11	0.15	0.10	0.12	0.21	0.08
Total	**99.72**	**100.66**	**99.32**	**99.98**	**97.84**	**99.10**	**99.02**	**97.97**
Atomic %								
S	1.648	1.663	1.649	1.665	1.602	1.655	1.639	1.609
Mn	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Fe	0.826	0.833	0.826	0.821	0.822	0.815	0.823	0.825
Co	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.001	0.001	0.000	0.001	0.001	0.002	0.002	0.001
Cu	0.003	0.003	0.000	0.002	0.003	0.000	0.002	0.000
Zn	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
As	0.001	0.001	0.000	0.000	0.001	0.001	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ag	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Cd	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sn	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
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000
Bi	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.000
Total	**2.481**	**2.505**	**2.478**	**2.493**	**2.431**	**2.475**	**2.467**	**2.437**
At 3 apfu								
Mn	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Fe	1.000	0.998	1.000	0.987	1.014	0.987	1.000	1.015
Co	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.001	0.001	0.000	0.001	0.001	0.002	0.002	0.002
Cu	0.003	0.004	0.000	0.003	0.004	0.000	0.002	0.001
Zn	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
As	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.000
Ag	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Cd	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sn	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.001
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.001	0.001	0.001	0.001	0.000	0.001	0.000	0.000
Bi	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
M total	**1.007**	**1.007**	**1.003**	**0.996**	**1.023**	**0.993**	**1.006**	**1.019**
S	1.993	1.993	1.997	2.004	1.977	2.006	1.994	1.981
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S total	**1.993**	**1.993**	**1.997**	**2.004**	**1.977**	**2.007**	**1.994**	**1.981**
M/S	**0.505**	**0.506**	**0.502**	**0.497**	**0.517**	**0.495**	**0.505**	**0.514**

APPENDIX B

PYRITE	1807_py_11	1807_py_12	1807_py_13	1807_py_14	1807_py_16	1807_py_17	1807_py_18	1807_py_19
S	53.67	53.53	53.70	53.44	53.64	54.08	54.19	53.75
Mn	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Fe	45.06	46.13	46.19	45.79	46.03	46.02	46.11	45.78
Co	0.97	0.08	0.05	0.00	0.00	0.00	0.00	1.05
Ni	0.07	0.25	0.06	0.08	0.01	0.04	0.01	0.08
Cu	0.19	0.29	0.16	0.31	0.06	0.01	0.04	0.14
Zn	0.01	0.00	0.05	0.00	0.00	0.01	0.02	0.00
As	0.08	0.02	0.07	0.04	0.01	0.01	0.06	0.00
Se	0.00	0.00	0.03	0.08	0.01	0.00	0.01	0.01
Ag	0.04	0.00	0.00	0.00	0.00	0.06	0.02	0.06
Cd	0.00	0.07	0.00	0.00	0.08	0.00	0.00	0.05
Sn	0.06	0.01	0.00	0.04	0.00	0.00	0.01	0.03
Sb	0.01	0.02	0.00	0.00	0.06	0.00	0.00	0.00
Te	0.06	0.04	0.00	0.00	0.03	0.00	0.04	0.00
Pb	0.15	0.13	0.09	0.11	0.16	0.09	0.00	0.07
Bi	0.12	0.15	0.12	0.06	0.07	0.05	0.08	0.12
Total	**100.49**	**100.73**	**100.53**	**99.95**	**100.17**	**100.37**	**100.59**	**101.15**
Atomic %								
S	1.674	1.670	1.675	1.667	1.673	1.687	1.690	1.676
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.807	0.826	0.827	0.820	0.824	0.824	0.826	0.820
Co	0.016	0.001	0.001	0.000	0.000	0.000	0.000	0.018
Ni	0.001	0.004	0.001	0.001	0.000	0.001	0.000	0.001
Cu	0.003	0.005	0.003	0.005	0.001	0.000	0.001	0.002
Zn	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
As	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.000
Se	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Ag	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Cd	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Sn	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
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.000
Bi	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.001
Total	**2.505**	**2.509**	**2.509**	**2.496**	**2.501**	**2.513**	**2.519**	**2.520**
At 3 apfu								
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.966	0.988	0.989	0.986	0.989	0.984	0.983	0.976
Co	0.020	0.002	0.001	0.000	0.000	0.000	0.000	0.021
Ni	0.001	0.005	0.001	0.002	0.000	0.001	0.000	0.002
Cu	0.004	0.005	0.003	0.006	0.001	0.000	0.001	0.003
Zn	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
As	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.000
Ag	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Cd	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Sn	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	0.001	0.000	0.000	0.000
Pb	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000
Bi	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.001
M total	**0.995**	**1.003**	**0.997**	**0.995**	**0.993**	**0.987**	**0.987**	**1.004**
S	2.004	1.997	2.002	2.004	2.006	2.013	2.013	1.996
Se	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000
Te	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S total	**2.005**	**1.997**	**2.003**	**2.005**	**2.007**	**2.013**	**2.013**	**1.996**
M/S	**0.497**	**0.502**	**0.498**	**0.496**	**0.495**	**0.490**	**0.490**	**0.503**

APPENDIX B

PYRITE	**1807_py_20**	**1807_py_21**	**1807_py_22**	**1807_py_23**	**1807_py_24**	**1807_py_25**	**1807_py_26**	**1807_py_27**
S	53.95	50.94	53.63	54.19	53.26	52.98	53.99	54.12
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe	45.93	47.57	46.38	46.39	46.20	45.29	45.72	45.36
Co	0.61	0.01	0.03	0.00	0.02	0.00	0.00	0.00
Ni	0.02	0.07	0.01	0.00	0.00	0.01	0.05	0.01
Cu	0.18	0.10	0.07	0.03	0.07	0.06	0.06	0.09
Zn	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00
As	0.13	0.00	0.00	0.02	0.02	0.00	0.02	0.04
Se	0.06	0.04	0.01	0.00	0.00	0.00	0.00	0.03
Ag	0.01	0.03	0.00	0.00	0.01	0.05	0.00	0.08
Cd	0.01	0.00	0.02	0.03	0.10	0.00	0.02	0.00
Sn	0.03	0.04	0.00	0.00	0.03	0.02	0.04	0.04
Sb	0.00	0.04	0.04	0.01	0.00	0.00	0.00	0.00
Te	0.03	0.07	0.00	0.00	0.02	0.00	0.01	0.00
Pb	0.24	0.15	0.23	0.26	0.21	0.10	0.05	0.22
Bi	0.14	0.09	0.15	0.11	0.08	0.10	0.06	0.16
Total	**101.38**	**99.16**	**100.56**	**101.05**	**100.03**	**98.61**	**100.01**	**100.17**
Atomic %								
S	1.682	1.589	1.672	1.690	1.661	1.652	1.684	1.688
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.823	0.852	0.831	0.831	0.827	0.811	0.819	0.812
Co	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ni	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000
Cu	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Zn	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
As	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Se	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Cd	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sn	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
Te	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.001
Bi	0.001	0.000	0.001	0.001	0.000	0.000	0.000	0.001
Total	**2.524**	**2.447**	**2.507**	**2.524**	**2.493**	**2.466**	**2.505**	**2.506**
At 3 apfu								
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.978	1.045	0.994	0.987	0.996	0.987	0.980	0.973
Co	0.012	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Ni	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.000
Cu	0.003	0.002	0.001	0.001	0.001	0.001	0.001	0.002
Zn	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
As	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Ag	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Cd	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Sn	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
Pb	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.001
Bi	0.001	0.000	0.001	0.001	0.000	0.001	0.000	0.001
M total	**0.999**	**1.051**	**0.999**	**0.991**	**1.001**	**0.990**	**0.984**	**0.979**
S	2.000	1.948	2.001	2.009	1.999	2.010	2.016	2.021
Se	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Te	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
S total	**2.001**	**1.949**	**2.001**	**2.009**	**1.999**	**2.010**	**2.016**	**2.021**
M/S	**0.499**	**0.539**	**0.499**	**0.493**	**0.501**	**0.493**	**0.488**	**0.484**

APPENDIX B

PYRITE	1807_py_28	1807_py_29	1807_py_31	1807_py_32	1807_py_33	1803_sp_3
S	53.29	53.51	53.34	52.83	52.95	53.29
Mn	0.00	0.00	0.02	0.00	0.00	0.01
Fe	44.24	43.85	44.75	44.09	43.19	45.71
Co	0.00	0.02	0.00	0.05	0.02	0.19
Ni	0.00	0.02	0.04	0.03	0.03	0.05
Cu	0.00	0.01	0.06	0.03	0.00	0.03
Zn	0.02	0.02	0.00	0.00	0.03	0.84
As	0.08	0.07	0.06	0.00	0.00	0.00
Se	0.00	0.03	0.00	0.00	0.03	0.00
Ag	0.03	0.10	0.00	0.02	0.13	0.00
Cd	0.11	0.05	0.00	0.00	0.00	0.00
Sn	0.00	0.00	0.02	0.00	0.03	0.02
Sb	0.00	0.00	0.00	0.07	0.00	0.00
Te	0.00	0.00	0.02	0.02	0.00	0.00
Pb	0.15	0.10	0.18	0.13	0.19	0.07
Bi	0.08	0.20	0.06	0.15	0.11	0.15
Total	**98.00**	**97.97**	**98.54**	**97.44**	**96.72**	**100.36**
Atomic %						
S	1.662	1.669	1.664	1.648	1.651	166.182
Mn	0.000	0.000	0.000	0.000	0.000	0.025
Fe	0.792	0.785	0.801	0.789	0.773	81.846
Co	0.000	0.000	0.000	0.001	0.000	0.317
Ni	0.000	0.000	0.001	0.001	0.000	0.084
Cu	0.000	0.000	0.001	0.000	0.000	0.046
Zn	0.000	0.000	0.000	0.000	0.001	1.292
As	0.001	0.001	0.001	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.000	0.000
Ag	0.000	0.001	0.000	0.000	0.001	0.000
Cd	0.001	0.000	0.000	0.000	0.000	0.000
Sn	0.000	0.000	0.000	0.000	0.000	0.016
Sb	0.000	0.000	0.000	0.001	0.000	0.000
Te	0.000	0.000	0.000	0.000	0.000	0.000
Pb	0.001	0.000	0.001	0.001	0.001	0.035
Bi	0.000	0.001	0.000	0.001	0.001	0.072
Total	**2.458**	**2.459**	**2.469**	**2.441**	**2.429**	**249.916**
At 3 apfu						
Mn	0.000	0.000	0.000	0.000	0.000	0.000
Fe	0.967	0.958	0.974	0.970	0.955	0.982
Co	0.000	0.000	0.000	0.001	0.000	0.004
Ni	0.000	0.000	0.001	0.001	0.001	0.001
Cu	0.000	0.000	0.001	0.001	0.000	0.001
Zn	0.000	0.000	0.000	0.000	0.001	0.016
As	0.001	0.001	0.001	0.000	0.000	0.000
Ag	0.000	0.001	0.000	0.000	0.002	0.000
Cd	0.001	0.001	0.000	0.000	0.000	0.000
Sn	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
Pb	0.001	0.001	0.001	0.001	0.001	0.000
Bi	0.000	0.001	0.000	0.001	0.001	0.001
M total	**0.971**	**0.964**	**0.978**	**0.975**	**0.960**	**1.005**
S	2.029	2.036	2.021	2.025	2.039	1.995
Se	0.000	0.000	0.000	0.000	0.001	0.000
Te	0.000	0.000	0.000	0.000	0.000	0.000
S total	**2.029**	**2.036**	**2.022**	**2.025**	**2.040**	**1.995**
M/S	**0.479**	**0.473**	**0.484**	**0.482**	**0.471**	**0.504**

APPENDIX B

SPHALERITE	180s7_1	180s7_sp_3	180s7_sp_4	180s7_sp_5	180s7_sp_2	180s7_sp_3	180s7_sp_4	180s7_sp_5
Ag	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	0.08	0.24	0.13	0.51	0.81	0.20	0.20	0.60
Pb	0.00	0.04	0.34	0.06	0.04	0.02	0.03	0.00
Fe	7.95	6.11	5.82	6.19	7.74	6.13	5.91	6.12
Mn	-	-	-	-	-	-	-	-
Zn	56.46	55.52	55.54	56.21	52.33	55.36	55.78	56.41
Bi	0.10	0.09	0.00	0.07	0.01	0.11	0.07	0.29
Sb	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.07
As	0.00	0.00	0.01	0.00	0.04	0.01	0.00	0.00
Cd	0.10	0.03	0.04	0.02	0.12	0.12	0.17	0.11
Te	0.02	0.01	0.02	0.00	0.01	0.00	0.00	0.00
Se	0.00	0.00	0.00	0.02	0.04	0.00	0.03	0.01
S	35.08	37.87	36.90	39.01	36.36	37.23	36.56	38.86
S corrected	35.08	37.87	36.90	39.01	36.36	37.23	36.56	38.86
Total	**99.78**	**99.92**	**98.81**	**102.09**	**97.55**	**99.18**	**98.74**	**102.47**
A%								
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cu	0.001	0.004	0.002	0.008	0.013	0.003	0.003	0.009
Pb	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Fe	0.142	0.109	0.104	0.111	0.139	0.110	0.106	0.109
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.864	0.849	0.850	0.860	0.800	0.847	0.853	0.863
Bi	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001
Sb	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001
As	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cd	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
S	1.094	1.181	1.151	1.216	1.134	1.161	1.140	1.212
Total	**2.103**	**2.145**	**2.109**	**2.196**	**2.089**	**2.123**	**2.105**	**2.197**
Formulae								
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cu	0.001	0.004	0.002	0.007	0.012	0.003	0.003	0.009
Pb	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Fe	0.135	0.102	0.099	0.101	0.133	0.103	0.101	0.100
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.822	0.792	0.806	0.783	0.767	0.798	0.811	0.786
Cd	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001
Total M	0.959	0.898	0.908	0.892	0.913	0.905	0.916	0.895
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
As	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
Total Me	**0.000**	**0.000**	**0.000**	**0.000**	**0.001**	**0.001**	**0.000**	**0.002**
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
S	1.040	1.101	1.091	1.108	1.086	1.094	1.083	1.103
Total S,Se,Te	**1.041**	**1.102**	**1.091**	**1.108**	**1.086**	**1.094**	**1.084**	**1.103**
% ZnS	85.785	88.564	89.039	88.562	85.149	88.429	88.825	88.652
% CdS	0.085	0.031	0.038	0.021	0.113	0.109	0.155	0.099
% FeS	14.130	11.404	10.923	11.417	14.738	11.462	11.020	11.249

APPENDIX B

SPHALERITE	180s7_sp_8	180s7_sp_9	180s7_sp_11	08606_sp_1	08606_sp_5	08612_sp_1	08612_sp_2	08612_sp_3
Ag	0.00	0.11	0.00	0.00	0.06	0.00	0.02	0.00
Cu	3.22	2.63	0.24	6.86	0.28	0.43	0.97	0.67
Pb	0.08	0.00	0.00	0.14	0.03	0.05	0.05	0.14
Fe	10.12	9.83	8.80	11.68	6.66	6.81	8.06	7.20
Mn	-	-	-	-	-	-	-	-
Zn	52.63	53.33	57.13	45.69	53.40	55.63	54.63	53.43
Bi	0.01	0.35	0.14	0.08	0.13	0.09	0.18	0.03
Sb	0.00	0.02	0.00	0.00	0.00	0.02	0.01	0.00
As	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.00
Cd	0.12	0.22	0.10	0.21	0.11	0.16	0.12	0.27
Te	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.03
Se	0.00	0.03	0.06	0.00	0.00	0.01	0.00	0.00
S	40.21	39.79	39.25	39.73	36.53	40.42	40.84	37.95
S corrected	34.18	33.83	33.36	33.77	36.53	34.36	34.72	37.95
Total	**100.35**	**100.35**	**99.85**	**98.43**	**97.21**	**97.63**	**98.85**	**99.71**
A%								
Ag	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Cu	0.051	0.041	0.004	0.108	0.004	0.007	0.015	0.010
Pb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Fe	0.181	0.176	0.158	0.209	0.119	0.122	0.144	0.129
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.805	0.816	0.874	0.699	0.817	0.851	0.836	0.817
Bi	0.000	0.002	0.001	0.000	0.001	0.000	0.001	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
As	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Cd	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.002
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
S	1.066	1.055	1.040	1.053	1.139	1.072	1.083	1.183
Total	**2.104**	**2.093**	**2.078**	**2.072**	**2.082**	**2.054**	**2.082**	**2.144**
Formulae								
Ag	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Cu	0.048	0.040	0.004	0.104	0.004	0.007	0.015	0.010
Pb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Fe	0.172	0.168	0.152	0.202	0.115	0.119	0.139	0.120
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.765	0.779	0.841	0.675	0.785	0.829	0.803	0.763
Cd	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.002
Total M	0.987	0.990	0.997	0.983	0.905	0.956	0.958	0.895
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
As	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Bi	0.000	0.002	0.001	0.000	0.001	0.000	0.001	0.000
Total Me	**0.000**	**0.002**	**0.001**	**0.000**	**0.001**	**0.001**	**0.002**	**0.000**
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
S	1.013	1.008	1.001	1.016	1.094	1.043	1.040	1.104
Total S,Se,Te	**1.013**	**1.008**	**1.002**	**1.016**	**1.094**	**1.044**	**1.040**	**1.104**
% ZnS	81.543	82.096	84.642	76.813	87.175	87.341	85.174	86.166
% CdS	0.111	0.194	0.089	0.207	0.103	0.149	0.113	0.252
% FeS	18.346	17.711	15.269	22.980	12.722	12.510	14.714	13.583

APPENDIX B

SPHALERITE	08612_sp_4	08612_sp_5	08612_sp_6	08612_sp_1	08612_sp_3	08612_sp_4	08612_sp_5	08612_sp_6
Ag	0.02	0.03	0.00	0.05	0.07	0.02	0.00	0.00
Cu	0.34	0.55	0.86	0.40	0.70	0.31	0.59	1.43
Pb	0.15	0.23	0.00	0.15	0.10	0.05	0.19	0.18
Fe	8.42	8.61	8.53	6.90	7.55	8.56	8.56	8.87
Mn	-	-	-	-	-	-	-	-
Zn	55.23	55.29	55.46	55.85	54.76	54.74	54.95	54.35
Bi	0.00	0.15	0.19	0.09	0.12	0.04	0.13	0.05
Sb	0.01	0.02	0.00	0.00	0.05	0.04	0.04	0.05
As	0.00	0.06	0.00	0.02	0.04	0.00	0.00	0.02
Cd	0.23	0.16	0.05	0.28	0.22	0.17	0.20	0.11
Te	0.00	0.04	0.03	0.00	0.08	0.00	0.00	0.00
Se	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
S	39.20	39.69	39.45	40.55	38.88	39.08	39.55	39.68
S corrected	33.32	33.74	33.53	34.46	33.04	33.21	33.61	33.73
Total	**97.71**	**98.88**	**98.65**	**98.23**	**96.73**	**97.16**	**98.28**	**98.79**
A%								
Ag	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000
Cu	0.005	0.009	0.013	0.006	0.011	0.005	0.009	0.023
Pb	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.001
Fe	0.151	0.154	0.153	0.124	0.135	0.153	0.153	0.159
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.845	0.846	0.848	0.854	0.838	0.837	0.841	0.831
Bi	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.000
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
As	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000
Cd	0.002	0.001	0.000	0.003	0.002	0.001	0.002	0.001
Te	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	1.039	1.052	1.046	1.075	1.031	1.036	1.048	1.052
Total	**2.043**	**2.066**	**2.062**	**2.064**	**2.020**	**2.034**	**2.055**	**2.067**
Formulae								
Ag	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Cu	0.005	0.008	0.013	0.006	0.011	0.005	0.009	0.022
Pb	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.001
Fe	0.148	0.149	0.148	0.120	0.134	0.151	0.149	0.154
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.827	0.819	0.823	0.828	0.830	0.823	0.818	0.804
Cd	0.002	0.001	0.000	0.002	0.002	0.001	0.002	0.001
Total M	0.983	0.979	0.985	0.958	0.977	0.981	0.979	0.981
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
As	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
Bi	0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.000
Total Me	**0.000**	**0.002**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Te	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	1.017	1.019	1.014	1.042	1.021	1.019	1.020	1.018
Total S,Se,Te	**1.017**	**1.019**	**1.015**	**1.042**	**1.021**	**1.019**	**1.020**	**1.018**
% ZnS	84.690	84.466	84.704	87.141	85.937	84.401	84.418	83.883
% CdS	0.202	0.143	0.043	0.257	0.199	0.150	0.181	0.097
% FeS	15.108	15.391	15.253	12.601	13.864	15.448	15.401	16.020

APPENDIX B

SPHALERITE	08612_sp_7	08612_sp_8	08612_sp_9	08612_sp_11	08612_sp_12	08612_sp_13	08612_sp_14	08612_sp_15
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	0.36	0.63	0.37	0.35	0.67	0.74	0.95	0.45
Pb	0.15	0.10	0.22	0.00	0.04	0.08	0.08	0.00
Fe	7.14	8.23	7.54	6.90	8.21	8.08	8.58	7.07
Mn	-	-	-	-	-	-	-	-
Zn	56.04	56.23	56.80	56.99	55.96	55.87	55.29	54.53
Bi	0.21	0.03	0.17	0.00	0.21	0.24	0.00	0.11
Sb	0.00	0.03	0.07	0.00	0.00	0.00	0.04	0.00
As	0.01	0.00	0.01	0.00	0.06	0.00	0.02	0.00
Cd	0.27	0.11	0.18	0.15	0.20	0.17	0.18	0.22
Te	0.01	0.02	0.00	0.00	0.03	0.00	0.03	0.01
Se	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00
S	39.95	41.00	39.53	40.26	40.25	40.68	40.28	37.92
S corrected	33.96	34.85	33.60	34.22	34.22	34.58	34.24	37.92
Total	**98.16**	**100.28**	**98.99**	**98.63**	**99.59**	**99.76**	**99.41**	**100.31**
A%								
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cu	0.006	0.010	0.006	0.006	0.011	0.012	0.015	0.007
Pb	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Fe	0.128	0.147	0.135	0.124	0.147	0.145	0.154	0.127
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.857	0.860	0.869	0.872	0.856	0.855	0.846	0.834
Bi	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.001
Sb	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
As	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Cd	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.002
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
S	1.059	1.087	1.048	1.067	1.067	1.079	1.068	1.183
Total	**2.054**	**2.107**	**2.062**	**2.070**	**2.085**	**2.093**	**2.085**	**2.153**
Formulae								
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cu	0.005	0.009	0.006	0.005	0.010	0.011	0.014	0.007
Pb	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000
Fe	0.124	0.140	0.131	0.119	0.141	0.138	0.147	0.118
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.835	0.816	0.843	0.842	0.821	0.817	0.811	0.775
Cd	0.002	0.001	0.002	0.001	0.002	0.001	0.002	0.002
Total M	0.968	0.967	0.982	0.969	0.974	0.968	0.975	0.901
Sb	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
As	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Bi	0.001	0.000	0.001	0.000	0.001	0.001	0.000	0.000
Total Me	**0.001**	**0.000**	**0.001**	**0.000**	**0.002**	**0.001**	**0.001**	**0.000**
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
S	1.031	1.032	1.016	1.031	1.024	1.031	1.024	1.099
Total S,Se,Te	**1.031**	**1.033**	**1.017**	**1.031**	**1.024**	**1.031**	**1.025**	**1.099**
% ZnS	86.815	85.294	86.412	87.463	85.203	85.391	84.495	86.646
% CdS	0.240	0.098	0.157	0.136	0.175	0.149	0.161	0.200
% FeS	12.944	14.608	13.431	12.401	14.622	14.459	15.343	13.154

APPENDIX B

SPHALERITE	08612_sp_16	08612_sp_17	08612_sp_18	08612_sp_19	08612_sp_20	08612_sp_21	08612_sp_22	08612_sp_23
Ag	0.00	0.05	0.00	0.00	0.00	0.00	0.07	0.00
Cu	0.24	0.40	0.29	1.31	0.47	0.23	0.19	0.25
Pb	0.20	0.07	0.00	0.27	0.01	0.03	0.01	0.01
Fe	6.65	7.18	6.81	10.07	11.28	9.74	9.74	9.74
Mn	-	-	-	-	-	-	-	-
Zn	55.57	55.35	55.16	53.90	51.94	54.99	55.11	55.93
Bi	0.19	0.14	0.02	0.26	0.02	0.00	0.12	0.23
Sb	0.04	0.00	0.00	0.00	0.05	0.02	0.00	0.07
As	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.11
Cd	0.28	0.21	0.12	0.18	0.16	0.14	0.14	0.20
Te	0.00	0.00	0.03	0.00	0.06	0.00	0.00	0.00
Se	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S	38.97	39.31	37.88	39.27	36.30	39.39	39.69	39.67
S corrected	33.13	33.41	37.88	33.38	36.30	33.48	33.73	33.72
Total	**96.30**	**96.81**	**100.32**	**99.38**	**100.30**	**98.66**	**99.11**	**100.26**
A%								
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Cu	0.004	0.006	0.005	0.021	0.007	0.004	0.003	0.004
Pb	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Fe	0.119	0.129	0.122	0.180	0.202	0.174	0.174	0.174
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.850	0.847	0.844	0.825	0.795	0.841	0.843	0.856
Bi	0.001	0.001	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	0.001
As	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Cd	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.002
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	1.033	1.042	1.181	1.041	1.132	1.044	1.052	1.052
Total	**2.011**	**2.027**	**2.153**	**2.071**	**2.139**	**2.065**	**2.075**	**2.091**
Formulae								
Ag	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Cu	0.004	0.006	0.004	0.020	0.007	0.004	0.003	0.004
Pb	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000
Fe	0.118	0.127	0.113	0.174	0.189	0.169	0.168	0.167
Mn	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zn	0.845	0.835	0.784	0.796	0.743	0.815	0.813	0.818
Cd	0.002	0.002	0.001	0.002	0.001	0.001	0.001	0.002
Total M	0.971	0.971	0.902	0.993	0.940	0.989	0.985	0.991
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
As	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Bi	0.001	0.001	0.000	0.001	0.000	0.000	0.001	0.001
Total Me	**0.001**	**0.001**	**0.000**	**0.001**	**0.000**	**0.000**	**0.001**	**0.003**
Te	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	1.028	1.028	1.097	1.005	1.059	1.011	1.014	1.006
Total S,Se,Te	**1.028**	**1.028**	**1.098**	**1.005**	**1.059**	**1.011**	**1.014**	**1.006**
% ZnS	87.485	86.647	87.276	81.927	79.613	82.719	82.767	82.926
% CdS	0.255	0.191	0.108	0.162	0.142	0.126	0.118	0.172
% FeS	12.260	13.162	12.616	17.911	20.245	17.154	17.115	16.902

APPENDIX B	
SPHALERITE	**08612_sp_24**
Ag	0.00
Cu	1.25
Pb	0.19
Fe	9.40
Mn	-
Zn	55.47
Bi	0.12
Sb	0.00
As	0.01
Cd	0.11
Te	0.00
Se	0.00
S	39.58
S corrected	33.64
Total	**100.20**
A%	
Ag	0.000
Cu	0.020
Pb	0.001
Fe	0.168
Mn	0.000
Zn	0.849
Bi	0.001
Sb	0.000
As	0.000
Cd	0.001
Te	0.000
Se	0.000
S	1.049
Total	**2.088**
Formulae	
Ag	0.000
Cu	0.019
Pb	0.001
Fe	0.161
Mn	0.000
Zn	0.813
Cd	0.001
Total M	0.995
Sb	0.000
As	0.000
Bi	0.001
Total Me	**0.001**
Te	0.000
Se	0.000
S	1.005
Total S,Se,Te	**1.005**
% ZnS	83.370
% CdS	0.096
% FeS	16.534

APPENDIX B

MACKINAWITE	08612_pyrr_4	08612_pyrr_5	08612_pyrr_6	08612_pyrr_14	08612_pyrr_15	08612_pyrr_16	08612_pyrr_17	08612_pyrr_18	08612_pyrr_19	08612_pyrr_20	08606_pyrr_1
Cu	0.65	0.22	0.34	0.08	0.58	0.07	0.12	0.00	0.37	0.06	0.74
Fe	49.75	50.64	53.75	50.56	51.25	51.64	51.07	53.49	52.11	51.48	49.24
Co	11.57	11.34	8.01	10.99	11.51	11.53	11.72	9.79	10.70	11.60	11.75
Ni	0.24	0.42	0.58	0.48	0.43	0.49	0.47	0.62	0.51	0.43	0.40
Sb	0.00	0.01	0.04	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S	42.41	42.36	42.26	42.91	43.46	43.38	43.61	43.94	43.51	43.95	43.06
Corrected S	36.05	36.00	35.92	36.48	36.94	36.88	37.07	37.35	36.99	37.36	36.60
Se	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.07	0.06
Total	**98.27**	**98.65**	**98.64**	**98.65**	**100.72**	**100.62**	**100.45**	**101.25**	**100.70**	**100.99**	**98.79**
Atomic proportions											
Cu	1.028	0.344	0.529	0.129	0.916	0.115	0.188	0.000	0.575	0.091	1.158
Fe	89.090	90.676	96.254	90.527	91.776	92.469	91.451	95.782	93.311	92.179	88.167
Co	19.635	19.234	13.593	18.645	19.539	19.572	19.881	16.609	18.153	19.678	19.943
Ni	0.414	0.716	0.985	0.809	0.733	0.842	0.804	1.059	0.871	0.725	0.689
Sb	0.000	0.012	0.032	0.059	0.000	0.000	0.000	0.000	0.000	0.000	0.000
S	112.444	112.296	112.038	113.774	115.216	115.024	115.621	116.508	115.364	116.525	114.157
Se	0.000	0.021	0.000	0.000	0.000	0.004	0.000	0.000	0.037	0.093	0.079
Total	**222.612**	**223.300**	**223.430**	**223.943**	**228.180**	**228.026**	**227.946**	**229.958**	**228.312**	**229.291**	**224.194**
(at 2 apfu)											
Cu	0.009	0.003	0.005	0.001	0.008	0.001	0.002	0.000	0.005	0.001	0.010
Fe	0.800	0.812	0.862	0.808	0.804	0.811	0.802	0.833	0.817	0.804	0.787
Co	0.176	0.172	0.122	0.167	0.171	0.172	0.174	0.144	0.159	0.172	0.178
Ni	0.004	0.006	0.009	0.007	0.006	0.007	0.007	0.009	0.008	0.006	0.006
Sb	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total M	**0.990**	**0.994**	**0.997**	**0.984**	**0.990**	**0.991**	**0.986**	**0.987**	**0.989**	**0.983**	**0.981**
S	1.010	1.006	1.003	1.016	1.010	1.009	1.014	1.013	1.011	1.016	1.018
Se	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
S(+Se)	**1.010**	**1.006**	**1.003**	**1.016**	**1.010**	**1.009**	**1.014**	**1.013**	**1.011**	**1.017**	**1.019**
M/S	**0.980**	**0.988**	**0.994**	**0.968**	**0.980**	**0.982**	**0.971**	**0.974**	**0.978**	**0.966**	**0.963**

APPENDIX B

MACKINAWITE	08606_pyrr_2	08606_pyrr_3	08606_pyrr_4	08606_pyrr_5	08606_pyrr_6	08606_pyrr_8	08606_pyrr_7	08606_pyrr_9	08606_pyrr_10	08606_pyrr_11
Cu	0.13	0.25	0.53	0.03	1.12	1.65	0.21	0.91	8.65	16.71
Fe	48.66	48.73	48.93	48.31	47.14	47.31	47.19	48.25	44.15	40.31
Co	11.98	12.52	12.30	11.30	12.17	10.27	10.87	10.96	8.63	4.61
Ni	0.49	0.43	0.36	0.61	0.68	0.49	0.37	0.54	0.33	0.34
Sb	0.00	0.03	0.00	0.00	0.01	0.02	0.00	0.08	0.05	0.03
S	42.28	42.63	42.33	42.98	42.51	41.65	37.47	42.74	41.90	41.80
Corrected S	35.93	36.23	35.98	36.54	36.13	41.65	37.47	36.33	35.62	35.53
Se	0.02	0.09	0.03	0.09	0.03	0.01	0.01	0.08	0.01	0.00
Total	**97.20**	**98.28**	**98.12**	**96.88**	**97.28**	**101.40**	**96.11**	**97.15**	**97.43**	**97.54**
Atomic proportions										
Cu	0.199	0.395	0.830	0.052	1.767	2.598	0.324	1.430	13.606	26.287
Fe	87.126	87.256	87.618	86.498	84.403	84.718	84.494	86.403	79.056	72.186
Co	20.328	21.239	20.865	19.181	20.654	17.426	18.441	18.603	14.641	7.825
Ni	0.833	0.736	0.608	1.043	1.159	0.838	0.624	0.914	0.568	0.587
Sb	0.000	0.023	0.003	0.000	0.006	0.017	0.000	0.066	0.040	0.023
S	112.083	113.015	112.224	113.964	112.694	129.910	116.879	113.310	111.102	110.835
Se	0.021	0.114	0.037	0.109	0.039	0.009	0.013	0.105	0.007	0.000
Total	**220.591**	**222.778**	**222.184**	**220.846**	**220.722**	**235.516**	**220.775**	**220.830**	**219.018**	**217.743**
(at 2 apfu)										
Cu	0.002	0.004	0.007	0.000	0.016	0.022	0.003	0.013	0.124	0.241
Fe	0.790	0.783	0.789	0.783	0.765	0.719	0.765	0.783	0.722	0.663
Co	0.184	0.191	0.188	0.174	0.187	0.148	0.167	0.168	0.134	0.072
Ni	0.008	0.007	0.005	0.009	0.011	0.007	0.006	0.008	0.005	0.005
Sb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Total M	**0.984**	**0.984**	**0.989**	**0.967**	**0.979**	**0.897**	**0.941**	**0.973**	**0.985**	**0.982**
S	1.016	1.015	1.010	1.032	1.021	1.103	1.059	1.026	1.015	1.018
Se	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000
S(+Se)	**1.016**	**1.016**	**1.011**	**1.033**	**1.021**	**1.103**	**1.059**	**1.027**	**1.015**	**1.018**
M/S	**0.968**	**0.969**	**0.979**	**0.936**	**0.958**	**0.813**	**0.889**	**0.947**	**0.971**	**0.965**

APPENDIX B

BISMUTH MINERALS	**180s7_5_1**	**08612_1_2**	**08612_1_2**	**180s7_3**	**180s7_4**	**180s7_4re n**	**180s7_5**	**180s7_6**	**180s7_7**	**180s7_9**	**180s7_10**
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00
Pb	2.82	2.52	2.70	2.43	2.16	2.27	2.30	2.38	2.01	0.00	1.98
Bi	76.87	75.74	76.08	77.28	77.85	77.08	77.07	78.90	79.56	80.00	76.56
Sb	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.07	0.00	0.02	0.00
Te	0.17	0.09	0.12	0.14	4.20	4.22	4.27	0.19	0.52	0.00	3.95
Se	16.71	16.13	15.81	15.11	13.61	13.34	13.52	13.36	13.85	0.12	15.26
S	2.69	4.39	3.75	2.65	2.75	2.73	2.80	4.08	3.89	19.08	2.20
Total	**99.26**	**98.88**	**98.46**	**97.60**	**100.67**	**99.64**	**100.05**	**98.98**	**99.87**	**99.24**	**99.96**
Atomic Proportions											
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.00
Pb	1.36	1.22	1.30	1.17	1.04	1.10	1.11	1.15	0.97	0.00	0.96
Bi	36.78	36.24	36.41	36.98	37.25	36.88	36.88	37.76	38.07	38.28	36.64
Sb	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.06	0.00	0.02	0.00
Te	0.14	0.07	0.09	0.11	3.29	3.30	3.35	0.15	0.41	0.00	3.09
Se	21.16	20.43	20.03	19.13	17.23	16.90	17.12	16.92	17.54	0.15	19.33
S	8.38	13.70	11.70	8.25	8.59	8.51	8.72	12.72	12.12	59.52	6.87
Total	**67.82**	**71.66**	**69.53**	**65.64**	**67.49**	**66.69**	**67.25**	**68.75**	**69.15**	**97.99**	**66.88**
Formulae											
	at 7apfu									at5apfu	at 7apfu
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.14	0.36	0.13	0.12	0.11	0.11	0.12	0.12	0.10	0.00	0.10
Bi	3.80	10.62	3.67	3.94	3.86	3.87	3.84	3.84	3.85	1.95	3.83
Sb	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00
Total M	3.94	10.98	3.80	4.07	3.98	3.99	3.96	3.97	3.96	1.96	3.93
Te	**0.01**	**0.02**	**0.01**	**0.01**	**0.34**	**0.35**	**0.35**	**0.02**	**0.04**	**0.00**	**0.32**
Se	2.18	5.99	2.02	2.04	1.79	1.77	1.78	1.72	1.78	0.01	2.02
S	0.87	4.01	1.18	0.88	0.89	0.89	0.91	1.30	1.23	3.04	0.72
Total S,Se,Te	**3.06**	**10.02**	**3.20**	**2.93**	**3.02**	**3.01**	**3.04**	**3.03**	**3.04**	**3.04**	**3.07**

APPENDIX B

BISMUTH MINERALS	**180s7_11**	**17810_1**	**180s7_13**	**180s7_14**	**180s7_16**	**180s7_17**	**180s7_18**	**180s7_21**	**180s7_22**	**180s7_23**	**180s7_24**
Ag	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.07	0.00
Pb	0.04	0.27	2.77	2.34	2.02	2.29	2.18	0.10	0.16	0.00	0.00
Bi	80.08	75.29	77.16	75.14	76.79	77.18	78.02	80.92	80.20	80.32	97.18
Sb	0.00	0.20	0.02	0.00	0.03	0.07	0.00	0.05	0.00	0.00	0.00
Te	0.02	21.27	0.02	3.23	3.88	4.13	0.18	0.00	0.06	0.04	0.05
Se	0.21	2.80	16.32	15.35	14.53	13.72	13.63	0.11	0.48	0.28	0.01
S	18.92	1.92	2.91	1.99	2.47	2.68	4.25	17.84	19.13	18.62	0.98
Total	**99.29**	**101.74**	**99.20**	**98.05**	**99.73**	**100.07**	**98.26**	**99.03**	**100.06**	**99.33**	**98.23**
Atomic Proportions											
Ag	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.00
Pb	0.02	0.13	1.34	1.13	0.97	1.11	1.05	0.05	0.08	0.00	0.00
Bi	38.32	36.03	36.92	35.95	36.75	36.93	37.34	38.72	38.38	38.43	46.50
Sb	0.00	0.16	0.02	0.00	0.03	0.06	0.00	0.04	0.00	0.00	0.00
Te	0.02	16.67	0.02	2.53	3.04	3.23	0.14	0.00	0.04	0.03	0.04
Se	0.26	3.55	20.67	19.44	18.40	17.38	17.26	0.14	0.61	0.36	0.02
S	59.01	5.99	9.07	6.21	7.72	8.36	13.25	55.66	59.66	58.09	3.05
Total	**97.65**	**62.53**	**68.04**	**65.27**	**66.91**	**67.07**	**69.03**	**94.61**	**98.81**	**96.97**	**49.61**
Formulae											
	at5apfu		at 7apfu					at5apfu	at5apfu	at5apfu	at1apfu
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.00	0.01	0.14	0.12	0.10	0.12	0.11	0.00	0.00	0.00	0.00
Bi	1.96	4.03	3.80	3.86	3.84	3.85	3.79	2.05	1.94	1.98	0.94
Sb	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total M	1.96	4.07	3.94	3.98	3.95	3.98	3.89	2.05	1.95	1.98	0.94
Te	**0.00**	**1.87**	**0.00**	**0.27**	**0.32**	**0.34**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**
Se	0.01	0.40	2.13	2.09	1.93	1.81	1.75	0.01	0.03	0.02	0.00
S	3.02	0.67	0.93	0.67	0.81	0.87	1.34	2.94	3.02	3.00	0.06
Total S,Se,Te	**3.04**	**2.93**	**3.06**	**3.02**	**3.05**	**3.02**	**3.11**	**2.95**	**3.05**	**3.02**	**0.06**

APPENDIX B

BISMUTH MINERALS	**180s7_25**	**180s7_26**	**180s7_27**	**180s7_28**	**180s7_30**	**180s7_35**	**180s7_36**	**180s7_37**	**180s7_38**	**180s7_39**	**180s7_43**
Ag	0.00	0.00	0.00	0.00	0.04	0.00	0.03	0.00	0.00	0.00	0.00
Pb	2.25	2.12	2.09	0.00	0.00	0.15	0.00	0.07	0.04	0.13	0.00
Bi	76.10	76.35	77.65	83.92	79.67	75.09	102.57	82.13	80.34	81.09	100.98
Sb	0.00	0.00	0.06	0.00	0.00	0.12	0.00	0.18	0.13	0.03	0.05
Te	4.12	3.85	3.65	0.00	0.02	21.52	0.06	17.97	17.61	17.73	0.07
Se	14.08	15.43	15.14	0.08	0.63	2.47	0.00	0.63	0.57	0.64	0.01
S	2.39	2.07	1.87	18.09	18.07	1.96	0.00	0.05	0.28	0.07	0.12
Total	**98.94**	**99.83**	**100.46**	**102.09**	**98.43**	**101.30**	**102.67**	**101.03**	**98.97**	**99.69**	**101.22**
Atomic Proportions											
Ag	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00
Pb	1.09	1.03	1.01	0.00	0.00	0.07	0.00	0.04	0.02	0.06	0.00
Bi	36.41	36.53	37.16	40.16	38.12	35.93	49.08	39.30	38.44	38.80	48.32
Sb	0.00	0.00	0.05	0.00	0.00	0.09	0.00	0.15	0.11	0.02	0.04
Te	3.23	3.02	2.86	0.00	0.02	16.87	0.05	14.08	13.80	13.90	0.05
Se	17.83	19.55	19.18	0.10	0.80	3.12	0.00	0.79	0.72	0.81	0.01
S	7.46	6.46	5.83	56.43	56.37	6.12	0.01	0.17	0.86	0.22	0.37
Total	**66.02**	**66.59**	**66.08**	**96.68**	**95.34**	**62.21**	**49.18**	**54.52**	**53.95**	**53.81**	**48.79**
Formulae											
	at7apfu			at5apfu	at5apfu		at1apfu				at1apfu
Ag	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.12	0.11	0.11	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Bi	3.86	3.84	3.94	2.08	2.00	4.04	1.00	5.05	4.99	5.05	0.99
Sb	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.00
Total M	3.98	3.95	4.05	2.08	2.00	4.06	1.00	5.07	5.00	5.06	0.99
Te	**0.34**	**0.32**	**0.30**	**0.00**	**0.00**	**1.90**	**0.00**	**1.81**	**1.79**	**1.81**	**0.00**
Se	1.89	2.05	2.03	0.01	0.04	0.35	0.00	0.10	0.09	0.11	0.00
S	0.79	0.68	0.62	2.92	2.96	0.69	0.00	0.02	0.11	0.03	0.01
Total S,Se,Te	**3.02**	**3.05**	**2.95**	**2.92**	**3.00**	**2.94**	**0.00**	**1.93**	**2.00**	**1.94**	**0.01**

Appendix C – EPMA detection limits

Sulphides Element	Peak Secs	Background Secs	Detection Limit (ppm)
S	10	5	0.0564
Fe	10	5	0.0423
Co	20	10	0.0467
Ni	20	10	0.0371
Cu	10	5	0.0679
Zn	10	5	0.0807
As	20	10	0.1042
Se	20	10	0.0741
Ag	20	10	0.1029
Cd	20	10	0.1196
Sn	10	5	0.1087
Sb	10	5	0.0922
Te	10	5	0.0937
Pb	10	5	0.2423
Bi	10	5	0.1731

Bismuth Mineral Element	Peak secs	Background secs	Detection Limit
S	10	5	0.0564
Se	20	10	0.0742
Ag	10	5	0.1455
Te	10	5	0.0938
Au	15	15	0.3837

Pb	10	5	0.2424
Bi	10	5	0.1732
Sb	10	5	0.0922

Silicate Package Element	Peak secs	Background secs	Detection Limit
F	10	5	0.2160
Na	10	5	0.0537
Mg	12	8	0.0348
Al	15	10	0.0274
Si	12	8	0.0292
P	10	5	0.0418
Cl	10	5	0.0358
K	10	5	0.0277
Ca	12	8	0.0415
Ti	10	5	0.0473
Cr	10	5	0.0280
Mn	12	8	0.0727
Fe	12	8	0.0662
Co	10	5	0.1039
Ni	10	5	0.1056
Zn	10	5	0.1640
Bi	10	5	0.2993

Appendix D - LA-ICPMS mean minimum detection limits – MASS1 standard (99% confidence)

Element/ isotope	Det. Limit (ppm)	Element/ isotope	Det. Limit (ppm)	Element/ isotope	Det. Limit (ppm)
Na23	0.348	As75	0.316	Au197	0.004
S33	311.02	Se82	0.286	Hg202	0.028
S34	148.66	Mo95	0.016	Tl205	0.001
V51	0.015	Ag107	0.005	Pb208	0.002
Cr52	0.116	Cd111	0.014	Bi209	0.001
Mn55	0.047	In115	0.001		
Fe57	3.22	Sn118	0.0117		
Co59	0.021	Sb121	0.004		
Ni60	0.054	Te125	0.041		
Cu65	0.057	Ba137	0.068		
Zn66	0.042	W184	0.004		
Ga69	0.006	Ir193	0.001		

APPENDIX D - LA-ICPMS MASS1 STANDARD - INTERNAL CALIBRATION

LABEL	180s5_cp_1	180s5_cp_2	180s5_py_1	180s5_py_2	180s5_po_1	180s5_cp_3	180s5_cp_4	180s5_cp_5	180s7_1	180s7_2	180s7_3	180s7_4
Na23	<1.36	<1.30	154.03	83.09	39.75	3.73	2.26	4.3	5.69	1.07	2.55	0.8
S33	425361	429189	482188	461458	933823	367934	360639	334740	191963	426847	411163	220694
S34	429682	412802	454365	430980	641714	350396	342987	324676	190617	408658	395321	219960
V51	0.186	0.124	0.74	0.461	<0.60	<0.081	0.151	0.107	<0.065	<0.070	0.139	0.078
Cr52	1.36	0.8	0.74	1.07	<7.25	1.83	1.44	1.92	<0.98	2.39	2.27	1.23
Mn55	5.31	2.05	58.66	28.65	2.69	3.03	3.13	2.56	<0.57	5.86	2.25	0.814
Fe57	268130	268130	441001	441000	441000	268130	268130	268130	304358	304358	304358	156000
Co59	2.58	61.21	2459.62	2467.59	1133.03	8.1	31.94	31	8.25	14.22	29.95	4.99
Ni60	0.53	74.56	448.49	448.38	30.71	4.78	93.89	5.29	3.85	5.88	18.59	1.205
Cu65	301768	292523	1782	1032	61	295033	300375	289433	355207	351872	347725	178491
Zn66	453.58	484.7	14.57	3.82	8.05	433.78	472.38	491.63	243.72	2121.16	486.93	241.38
Ga69	0.47	0.6	0.089	0.132	<0.233	0.66	0.51	0.44	0.435	0.657	0.613	0.21
As75	6.73	4.54	0.86	0.84	15.38	2.71	6.46	5.56	8.41	18.21	11.76	5.88
Se82	82.55	70.34	66.74	61.94	58.87	66.15	58.01	56.5	12.8	106.37	110.44	56.25
Mo95	<0.093	<0.064	0.024	0.116	<0.00	0.19	<0.066	<0.069	0.025	<0.101	<0.120	0.058
Ag107	97.66	96.62	0.74	1.19	0.49	99.29	107.36	97.78	80.94	84.01	73.53	28.56
Cd111	1.12	1.95	0.351	0.207	<0.00	1.22	1.06	1	1.45	4.06	2.29	1.07
In115	18.92	27.73	0.44	0.51	<0.059	14.7	21.18	21.76	39.96	35.45	32.08	23.01
Sn118	283.18	265.38	0.68	44.95	<0.37	191.2	302.54	235.43	152.78	460.02	458.27	70.47
Sb121	<0.044	0.132	0.185	0.112	<0.189	0.13	0.179	0.125	0.0514	0.063	0.152	0.203
Te125	1.28	0.81	<0.056	<0.050	<0.00	0.6	0.61	0.47	0.176	0.5	0.47	<0.120
Ba137	<0.23	<0.27	2.13	2.94	<0.00	0.32	<0.21	<0.20	0.74	<1.11	<1.08	<0.56
W184	<0.031	0.047	0.48	0.48	<0.00	<0.032	<0.0110	<0.0158	<0.0148	<0.046	0.055	<0.0216
Ir193	<0.0051	<0.0066	0.00155	<0.00196	<0.00	<0.0076	<0.0048	<0.0041	<0.0053	<0.0114	<0.0119	<0.0060
Au197	0.184	0.25	0.009	<0.0059	<0.00	0.222	0.168	0.113	0.062	0.217	0.068	0.136
Hg202	1.83	2.48	0.34	0.26	5.44	2.48	1	1.4	0.572	2.28	2.78	1.13
Tl205	<0.0117	0.0135	0.43	0.24	0.09	0.027	<0.0056	0.0072	0.0238	<0.0100	0.0159	0.0128
Pb208	1.75	28.37	7.46	22.72	32.68	25.05	35.21	32.24	28.65	13.39	52.48	5.14
Bi209	7.16	18.11	3.95	4.21	48.53	47.14	63.34	28.07	26.73	19.27	34.06	3.05

APPENDIX D - LA-ICPMS

LABEL	180s7_5	180s7_6	0866_cp_1	0866_cp_2	0866_cp_3	0866_cp_4	0866_cp_5	0866_po_1	0866_po_2	0866_po_3	08612_1	08612_2
Na23	0.7	1.48	8.47	3.48	8.46	1.47	3.01	4.86	7	6.29	<1.00	2.54
S33	219450	222183	405747	398663	367744	381011	393193	305362	304662	325008	396298	405285
S34	218218	217646	400943	397371	364548	375731	383132	302262	289764	314079	403921	417430
V51	0.075	0.064	0.19	0.11	0.21	0.185	0.142	0.129	0.109	9.39	0.103	0.136
Cr52	1.29	1.32	2.14	2.17	1.73	1.97	2.1	1.41	2.25	5.53	2.44	2.15
Mn55	2.63	2.73	2.19	3.72	1.81	2.55	2.44	2.67	2.97	4.75	1.42	1.91
Fe57	156000	156000	296000	296000	296000	296000	296000	492381	492381	492381	272739	272739
Co59	3.77	38.77	1.92	1.04	1.11	1.23	1.75	224.23	95.09	238.7	0.521	0.96
Ni60	2.65	44.14	<0.32	0.27	<0.26	0.54	<0.23	21.4	28.63	85.77	<0.21	<0.192
Cu65	177208	173042	334721	329876	328141	336171	336568	<1.86	68	28692	310034	306657
Zn66	1313.27	599.76	797.62	548.46	417.36	516.19	656.08	0.76	0.95	25.21	328.78	596.55
Ga69	0.212	0.3	4.06	4.31	3.4	4.3	4.23	<0.0156	0.031	0.42	3.72	3.85
As75	5.85	5.42	8.46	8.78	11.05	9.53	9.9	4.48	<1.92	3.53	13.42	12.28
Se82	55.79	55.96	159.24	159.74	126.53	133.45	166.52	98.35	98.4	96.17	46.53	45.65
Mo95	<0.041	<0.053	<0.13	<0.072	<0.094	0.069	<0.063	<0.023	0.26	<0.030	<0.108	<0.091
Ag107	48.64	48.07	14.68	16.61	19.56	21.67	32.54	0.23	0.23	3.86	14.53	12.95
Cd111	3.06	1.85	1.89	2.38	1.8	1.91	2.67	0.27	0.57	0.73	2.95	3.95
In115	17.17	20.33	22.02	18.26	15.31	15.37	25.37	<0.0038	0.021	2.96	8.78	8
Sn118	210.93	247.85	50.46	57.84	58.58	60.83	59.6	0.3	0.28	9.83	62.57	52.31
Sb121	0.02	<0.0174	0.143	0.156	0.162	0.098	0.141	0.0176	0.082	0.245	0.078	0.173
Te125	0.46	0.184	0.38	0.45	<0.27	<0.168	<0.186	<0.092	<0.136	<0.115	0.96	1.51
Ba137	<0.47	<0.64	2.51	<0.53	<1.06	<0.58	<0.50	<0.39	3.92	1.53	<1.02	<1.22
W184	<0.014	<0.0211	<0.045	<0.017	<0.025	<0.021	<0.0169	<0.0092	0.019	1.7	<0.036	<0.046
Ir193	<0.0053	<0.0068	<0.0159	<0.0091	<0.0080	<0.0078	<0.0076	<0.0028	<0.0032	<0.0056	<0.0142	<0.0098
Au197	0.186	0.113	<0.041	0.26	<0.021	0.041	<0.0165	<0.0100	0.13	0.022	<0.043	<0.036
Hg202	1.15	0.96	2.62	1.45	2.52	1.35	1.02	0.28	0.79	0.58	1.47	1.35
Tl205	0.0054	<0.0057	0.079	<0.0083	0.013	<0.0056	<0.0057	<0.0023	0.035	0.054	<0.0152	<0.0120
Pb208	6.11	1.466	19.92	21.29	6.37	26.37	24.89	22.35	129.76	7.29	9.48	6.03
Bi209	14.33	5.97	1.52	3.23	0.62	1.9	25.17	0.44	0.99	9.55	0.445	1.011

APPENDIX D - LA-ICPMS

LABEL	08612_3	08612_4	08612_5	08612_6	08612_7	08612_8	17810_1	17810_2	17812_cp_1	17812_po_1	17812_po_2	17812_po_3
Na23	<0.94	1.38	<0.69	5.07	3.72	<1.50	10722.5	2.94	<8.08	<0.85	1.62	2.98
S33	418148	381804	382528	469748	457043	480016	**********	356748	1221813	376597	395204	415239
S34	428161	381327	384874	425679	459701	439543	**********	331452	845127	354805	378910	387692
V51	0.207	0.116	0.143	<0.101	0.16	<0.098	<135.48	0.059	0.61	0.203	0.177	0.177
Cr52	2.14	2.06	2.02	2.28	1.63	2.13	2710.73	1.31	14.06	1.55	1.92	1.56
Mn55	1.5	3.02	1.34	3.3	4.01	2.34	<394.14	2.212	<1.88	2.31	1.39	1.25
Fe57	272739	272739	272739	594213	594213	594213	282259	511154	590001	590001	303000	303000
Co59	1.71	14.05	0.445	54.39	404.87	24.79	2274.16	1238.82	362.03	618.41	19.64	4
Ni60	<0.179	54.01	0.26	7.16	32.58	7.03	3411.05	302.3	149.16	187.13	458.56	39.21
Cu65	303129	293772	305156	86	5055	1	6472	18	29	<0.53	322099	331695
Zn66	736.45	419.93	359.98	1.26	50.23	0.47	<2745.67	<0.62	<9.63	4.97	748.14	574.58
Ga69	3.8	3.59	3.86	<0.046	0.516	0.051	121.63	<0.0208	<0.31	<0.013	0.75	0.81
As75	13.02	7.04	13.49	9.75	11.01	<3.42	<5246.87	<1.58	16.61	<0.84	4.63	4.83
Se82	47.82	47.63	46.28	64.02	56.25	53.45	<2181.50	56.01	49.22	35.76	37.69	42.1
Mo95	0.122	<0.093	<0.073	<0.156	<0.146	<0.15	<245.19	0.152	<0.00	<0.041	<0.085	<0.040
Ag107	9.74	13.5	23.93	0.42	1.81	0.439	<59.39	0.117	<0.29	0.019	43.36	43.97
Cd111	3.93	2.99	2.77	<0.22	0.37	0.43	1076.69	0.155	<0.00	0.78	3.58	3.49
In115	13.53	7.15	10.82	0.0168	0.393	<0.0112	21.05	<0.0058	<0.055	0.0102	14.26	9.58
Sn118	52.58	49.46	60.06	0.289	2.65	0.33	2898.92	0.353	0.29	0.46	496.75	453.07
Sb121	0.066	0.088	0.068	0.075	0.068	<0.043	280.2	<0.0219	<0.44	<0.018	<0.029	<0.031
Te125	1.52	2.18	1.75	<0.36	<0.32	0.51	<490.01	<0.184	<0.00	<0.091	0.85	1.09
Ba137	<1.04	<0.82	<0.82	<1.70	<1.54	<1.39	<2592.91	<0.62	<0.00	<0.32	<0.48	0.62
W184	<0.044	0.033	<0.027	<0.057	<0.052	<0.057	<88.93	<0.031	<0.00	<0.016	<0.029	<0.025
Ir193	<0.0128	<0.0090	<0.0086	<0.0186	0.0136	<0.014	<25.62	<0.0061	<0.070	<0.0033	0.0058	<0.0073
Au197	0.031	0.065	0.046	<0.041	<0.037	<0.042	<78.18	<0.0207	<0.00	<0.0087	<0.019	0.072
Hg202	1.25	1.65	2.92	0.58	0.32	0.9	1289.4	0.67	<2.16	0.16	0.53	0.57
Tl205	<0.0111	<0.0085	<0.0085	<0.0154	0.031	<0.0127	24.85	0.0216	0.09	0.015	<0.0069	0.0073
Pb208	5.93	2.35	5.65	1.49	6.8	4.29	641.66	0.615	0.47	0.33	2	3.59
Bi209	0.907	1.95	0.416	1.327	1.306	0.848	35.92	0.218	3.57	0.083	0.43	0.49

APPENDIX D - LA-ICPMS

LABEL	17812_po_4	17812_po_5	17812_po_6	18013_cp_1	18013_cp_2	18013_cp_4	18013_cp_5	18013_cp_6	18013_cp_7	18013_cp_8	18013_cp_9
Na23	4.08	3.51	<7.80	2567.64	2523.77	2.63	8.21	2.16	2.34	3.25	9
S33	398038	369698	1268377	23918	30361	409336	428883	411185	413991	410465	404097
S34	380166	357993	946984	23992	29886	407527	427854	397466	408007	398403	403010
V51	0.117	0.081	1.43	390.2	392.11	0.196	0.321	0.237	0.186	0.232	0.14
Cr52	1.37	1.56	15.02	289.84	270.01	1.94	1.62	2.2	2.06	2.07	1.74
Mn55	1.32	2.43	<2.33	273.18	243.66	1.79	2.01	1.64	1.45	1.6	1.71
Fe57	303000	590001	590001	305001	305001	305000	305001	305001	305001	305001	305001
Co59	2.15	456.18	299.31	116.66	138.69	0.358	5.29	1.95	1.085	0.864	0.96
Ni60	0.43	173.78	84.6	52.24	75.13	1.22	2.34	2.47	0.96	37.94	1.03
Cu65	326863	44	62	10	41	339727	347258	340334	339021	343013	342446
Zn66	632.93	3.18	14.75	188.82	175.26	471.8	790.31	1108.19	812.67	559.47	829.21
Ga69	0.91	0.134	<0.30	119.7	125.1	2.2	2.25	2.22	1.84	1.69	3.15
As75	6.33	1.7	22.93	<1.35	<1.65	4.12	4.67	5.61	4.5	5.75	5.52
Se82	41	38.36	44.78	<1.37	<1.67	31.09	31.71	32.52	32.86	29.61	32.12
Mo95	<0.055	<0.059	<0.00	0.062	0.093	<0.089	0.057	<0.060	<0.058	<0.064	0.079
Ag107	42.83	0.62	<0.239	<0.0219	0.044	18.25	16.81	34.09	131.45	11.64	11.33
Cd111	3.57	0.27	<0.00	0.308	0.159	1.91	2.38	2.22	2.03	1.5	1.72
In115	9.76	0.15	<0.076	0.138	0.163	31.64	30.86	33.59	27.68	53.59	41.82
Sn118	433.33	41.11	<0.88	14.69	14.54	193.88	199.77	245.13	248.73	202.87	335.82
Sb121	<0.028	<0.0220	0.22	0.059	0.034	0.329	0.416	1.46	0.235	0.132	0.234
Te125	1.14	0.46	<0.00	0.22	0.24	2.03	1.93	2.72	2.19	1.48	1.93
Ba137	<0.40	<0.27	<0.00	11207.82	11261	<1.25	1.77	<0.58	<0.52	<0.43	<0.59
W184	<0.029	<0.0167	0.3	5.32	6.06	<0.019	<0.0145	<0.0217	<0.0226	<0.0204	<0.0214
Ir193	<0.0071	<0.0045	<0.096	<0.0081	<0.0089	<0.0059	<0.0047	0.0071	<0.0038	<0.0059	<0.0092
Au197	0.062	<0.0125	<0.27	<0.022	<0.023	0.099	0.12	0.083	0.053	<0.017	0.029
Hg202	0.67	0.48	5.23	0.71	0.66	0.77	0.88	1.58	1.28	1.95	1.09
Tl205	<0.0047	0.022	<0.00	3.43	3.34	0.0115	0.162	0.045	0.011	<0.0040	0.0124
Pb208	4.49	1.4	1.65	40.95	37.49	0.63	2.15	4.38	0.236	0.42	0.76
Bi209	0.5	1.33	0.38	0.055	0.031	2.88	4.87	38.73	4.2	4.87	3.44

Appendix E – Petrographic Samples – Assaying results in ppm supplied by Hillgrove Resources Ltd.

Name	Depth (m)	Cu Content (ppm)	Bi Content (ppm)
180S (7)	51.1-51.2	0.5243	1114
178 (10)	125.0-125.05	1.4261	635
178 (8)	124.0-124.2	1.5554	216
178 (9)	124.9-124.98	1.5554	216
180S (5)	50.6-50.7	4.3333	124
180 (13)	253.3-253.6	0.4375	119
180S (4)	49.9-50.0	1.1427	86
178 (12)	126.0-126.05	0.2941	44
180 (7)	245.9-246	0.1642	42
178 (7)	123.4-123.6	0.373	32
180 (3)	237.85-242.0	0.0335	12
086 (6)	147.2-147.25	1.267	NA
086 (8)	148.2-148.28	1.5505	NA
086 (9)	148.28-148.35	1.5505	NA
086 (11)	150.5-150.7	1.5131	NA
086 (12)	153.75-153.80	2.5025	NA

APPENDIX F - Bulk Geochemistry Results from Amdel Ltd.

ELEMENT	Al2O3	CaO	Fe2O3	K2O	MnO	MgO	Na2O	P2O5	SiO2	TiO2	Cr	V	Sc	LOI	Ba	Ce
UNITS	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	%	ppm	ppm
SCHEME	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	GRAV7	IC4M	IC4M
Minimum Detection Limit	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.005	20	20	5	0.01A	10	1
KTDD_178 - 15	14.8	0.3	18.9	2.91	0.3	3.91	0.13	0.17	55.6	0.75	145	100	15	1.94	235	100
KTDD_178 - 2	16.8	0.22	17	2.64	0.31	2.83	0.17	0.14	58.7	0.715	190	100	15	0.28	285	85
KTDD_178 - 5	13.3	0.21	22.9	2.37	0.31	3.48	0.12	0.13	56.6	0.63	130	95	10	1.15	175	22
KTDD_178 - 7	7.17	0.13	18.4	1.28	0.15	2.08	0.07	0.09	69	0.26	90	50	<5	0.57	45	13
KTDD_180 - 10	14.4	0.25	13.8	2.84	0.19	3.15	0.09	0.18	64	0.735	125	95	10	0.53	285	75
KTDD_180 - 5	19.9	0.24	14.1	3.11	0.24	3.18	0.09	0.16	56.8	0.86	190	120	15	0.69	300	105
KTDD_180 - 14	12.2	0.29	19.4	2.27	0.36	4.06	0.06	0.17	59.5	0.695	135	80	10	1.06	200	36
KTDD_186 - 11	9.48	0.22	20.7	1.04	0.25	2.42	0.05	0.12	64.3	0.485	135	65	10	0.02	70	16
KTDD_178 - 4	13.4	0.18	20.8	1.64	0.29	3.11	0.09	0.13	57.8	0.63	125	90	10	1.01	135	15
KTDD_178 - 11	13.5	0.23	18.8	2.32	0.34	3.16	0.15	0.11	60.9	0.64	155	70	15	0.71	180	18
KTDD_180 - 9	14	0.2	12.9	2.85	0.16	3.08	0.08	0.14	64.2	0.755	135	90	10	0.53	260	42
KTDD_180 - 4	14.6	0.26	12.7	2.78	0.25	2.78	0.07	0.18	63.8	0.72	150	85	10	0.73	250	110
KTDD_180 - 13	15.2	0.23	13.8	2.82	0.23	3.32	0.09	0.16	60.3	0.71	140	105	15	0.68	290	115
KTDD_180 - 8	18	0.38	18.5	4.17	0.23	4.37	0.12	0.27	51.5	1.095	145	135	15	0.72	330	140
KTDD_180S - 2	12.6	0.17	24.5	1.48	0.36	3.46	0.09	0.1	54.8	0.58	120	75	10	1.75	75	55
KTDD_180S - 3	11.4	0.09	23.4	1.71	0.28	3.38	0.08	0.05	55.9	0.495	120	60	10	1.83	65	35
KTDD_180S - 8	10.1	0.15	20.1	1.39	0.27	2.94	0.03	0.1	61.3	0.515	115	45	10	2.24	105	75
KTDD086 - 3	9.09	0.14	17.3	1.01	0.21	2.47	0.04	0.09	66.5	0.445	105	60	5	0.9	110	19

APPENDIX F - Bulk Geochemistry

ELEMENT	La	Sn	U	W	Sr	Zr	Hf	Nb	Ta	Th	Y	As	Cu	Ni	Pb	Zn
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	IC4M	IC4M	IC4M	IC4M	IC4M	IC4M	IC4M	IC4M	IC4M	IC4M	IC4M	IC3E	IC3E	IC3E	IC3E	IC3E
Minimum Detection Limit	1	10	0.5	3	5	15	1	10	2	0.5	1	3	2	2	5	2
KTDD_178 - 15	50	<10	4	210	15	170	5	15	<2	15.5	27	6	1220	48	15	60
KTDD_178 - 2	41	35	4	275	15	135	4	15	<2	18.5	25	4	38	55	15	65
KTDD_178 - 5	11	25	5	240	15	120	3	10	<2	16	43	6	1235	44	15	75
KTDD_178 - 7	6	100	1.5	460	10	80	2	<10	<2	6	16	4	450	30	<5	70
KTDD_180 - 10	39	<10	3.5	380	15	190	5	15	<2	16	32	8	30	46	5	47
KTDD_180 - 5	55	<10	4	230	10	155	4	15	<2	20	39	8	6	55	10	60
KTDD_180 - 14	18	<10	4	230	10	310	8	10	<2	16.5	27	6	675	30	5	100
KTDD_186 - 11	8	<10	2.5	475	10	140	4	<10	<2	9.5	20	6	800	38	10	70
KTDD_178 - 4	7	10	3.5	345	15	115	3	10	<2	14	33	4	570	50	10	75
KTDD_178 - 11	9	100	4.5	260	15	120	3	15	<2	16	28	8	515	41	25	50
KTDD_180 - 9	22	<10	3	395	10	185	5	15	<2	13	31	8	590	43	5	50
KTDD_180 - 4	55	<10	4	265	15	265	7	15	<2	19.5	44	10	100	49	5	70
KTDD_180 - 13	60	<10	4	395	15	200	5	15	<2	18	31	12	4	49	<5	55
KTDD_180 - 8	70	<10	5.5	240	20	450	12	20	<2	27	39	14	1610	43	10	70
KTDD_180S - 2	29	<10	3.5	270	10	120	3	10	<2	14	39	6	910	36	15	80
KTDD_180S - 3	18	15	3.5	280	<5	75	2	10	<2	11.5	20	<3	625	37	20	90
KTDD_180S - 8	36	15	3	365	5	120	3	10	<2	11	36	8	1725	35	<5	60
KTDD086 - 3	9	<10	2	330	<5	105	3	<10	<2	8	12	4	2150	43	<5	95

APPENDIX F - Bulk Geochemistry

ELEMENT	Ag	Bi	Co	In	Mo	Cd	Sb	Se	Te	S	Dy	Er	Eu	Gd	Ho	Lu
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	IC3M	IC3M	IC3M	IC3M	IC3M	IC3M	IC3M	IC3M	IC3M	MET6A	IC4R	IC4R	IC4R	IC4R	IC4R	IC4R
Minimum Detection Limit	0.1	0.1	0.2	0.5	0.1	0.1	0.5	0.5	0.2	0.01	0.5	1	0.5	1	0.5	0.5
KTDD_178 - 15	0.6	32.5	185	0.5	0.7	0.1	<0.5	0.5	0.2	1.82	5.5	3	2	7	1	<0.5
KTDD_178 - 2	0.4	1.7	80	<0.5	1.9	<0.1	<0.5	<0.5	<0.2	0.47	4.5	2	1.5	6	1	<0.5
KTDD_178 - 5	0.6	4	95	<0.5	0.6	0.1	<0.5	2	0.2	1.7	6.5	4	0.5	5	1.5	0.5
KTDD_178 - 7	0.3	1.3	150	<0.5	1.1	<0.1	<0.5	1.5	<0.2	0.6	2.5	2	<0.5	2	0.5	<0.5
KTDD_180 - 10	0.5	0.4	60	<0.5	0.8	<0.1	<0.5	<0.5	<0.2	0.02	6	3	1.5	6	1	<0.5
KTDD_180 - 5	0.4	1.3	49.5	<0.5	0.9	0.1	<0.5	<0.5	<0.2	0.02	7	4	2	8	1.5	0.5
KTDD_180 - 14	1.1	8.5	55	<0.5	0.6	0.3	<0.5	0.5	<0.2	0.18	5	3	0.5	4	1	<0.5
KTDD_186 - 11	0.5	0.7	180	<0.5	1	0.1	<0.5	1	<0.2	0.82	3	2	<0.5	2	0.5	<0.5
KTDD_178 - 4	0.5	1.3	125	<0.5	1.4	0.1	<0.5	<0.5	<0.2	1.06	5	3	0.5	4	1	<0.5
KTDD_178 - 11	0.5	3.1	105	<0.5	0.9	0.1	<0.5	1	<0.2	0.62	4	3	0.5	3	1	<0.5
KTDD_180 - 9	0.6	2.7	65	<0.5	0.7	0.1	<0.5	<0.5	<0.2	0.15	5	3	1	5	1	<0.5
KTDD_180 - 4	0.7	5.5	65	<0.5	0.7	0.2	<0.5	<0.5	<0.2	0.1	7.5	4	1.5	8	1.5	0.5
KTDD_180 - 13	0.4	0.5	55	<0.5	0.6	0.1	<0.5	<0.5	<0.2	0.03	5.5	3	1.5	7	1	<0.5
KTDD_180 - 8	1.2	2	85	<0.5	3.7	0.2	<0.5	0.5	<0.2	0.22	7.5	4	2.5	10	1.5	0.5
KTDD_180S - 2	0.7	5.5	80	<0.5	4.2	0.1	<0.5	0.5	<0.2	0.84	6.5	4	1	6	1.5	0.5
KTDD_180S - 3	0.6	90	80	<0.5	1.9	0.1	<0.5	2	<0.2	0.57	3.5	2	0.5	4	0.5	<0.5
KTDD_180S - 8	0.9	135	100	<0.5	1	0.1	<0.5	11.5	<0.2	1.64	6	3	1	6	1	<0.5
KTDD086 - 3	0.5	12	120	<0.5	0.7	0.1	<0.5	2.5	<0.2	1.64	2	1	<0.5	2	<0.5	<0.5

APPENDIX F - Bulk Geochemistry

ELEMENT	Nd	Pr	Sm	Tb	Tm	Yb	
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	
SCHEME	IC4R	IC4R	IC4R	IC4R	IC4R	IC4R	
Minimum Detection Limit	0.5	1	0.5	0.5	1	1	
KTDD_178 - 15	43	12	8	1	<1	2	
KTDD_178 - 2	33	9	6	1	<1	2	
KTDD_178 - 5	9.5	2	2.5	1	<1	4	
KTDD_178 - 7	6	2	1.5	<0.5	<1	2	
KTDD_180 - 10	33	9	6.5	1	<1	3	
KTDD_180 - 5	47	13	9	1	<1	4	
KTDD_180 - 14	16.5	4	3.5	1	<1	2	
KTDD_186 - 11	7.5	2	1.5	<0.5	<1	2	
KTDD_178 - 4	7.5	2	2	1	<1	3	
KTDD_178 - 11	8	2	2	0.5	<1	3	
KTDD_180 - 9	18.5	5	4	0.5	<1	3	
KTDD_180 - 4	42.5	12	8	1	<1	4	
KTDD_180 - 13	44.5	12	8	1	<1	3	
KTDD_180 - 8	65	17	11.5	1.5	<1	4	
KTDD_180S - 2	23	6	4.5	1	<1	4	
KTDD_180S - 3	15.5	4	3.5	0.5	<1	2	
KTDD_180S - 8	31.5	9	6	1	<1	3	
KTDD086 - 3	8.5	2	2	<0.5	<1	1	

Appendix G - Chlorite Geothermometry

Chlorite Geothermometry results with accompanying sulphide interaction statuses, yes and no being in contact and not in contact respectively, NIDC indicating not in direct contact, but still spatially close, BC denoting in contact with Bi, and BI denoting the inclusion of a/several Bi grain(s). The equation used for calibration of temperatures was that of Cathelineau & Nieva (1985).

Label	Al iv	Al vi	Al (total)	Mg	Fe	T (C)	Sulphide interaction
180s4_8	1.440	1.505	2.945	1.746	2.690	410	YES
180s4_9	1.383	1.493	2.877	1.769	2.664	391	YES
180s4_10	1.406	1.486	2.892	1.746	2.709	399	YES
180s4_11	1.398	1.438	2.836	1.730	2.754	397	YES
180s5_2_1	1.434	1.471	2.905	1.847	2.644	407	YES
180s5_2_2	1.445	1.457	2.902	1.855	2.653	411	YES
180s5_2_3	1.440	1.471	2.911	1.839	2.658	409	YES
180s5_2_4	1.474	1.461	2.934	1.901	2.616	420	YES
180s5_2_5	1.449	1.473	2.922	1.908	2.585	412	YES
180s5_2_6	1.478	1.447	2.925	1.918	2.624	421	YES
180s5_2_7	1.476	1.417	2.893	1.789	2.800	421	YES
180s5_2_8	1.504	1.519	3.023	1.802	2.643	430	YES
180s5_2_9	1.530	1.506	3.036	1.845	2.645	438	YES
180s5_2_10	1.515	1.478	2.993	1.777	2.728	434	YES
180s5_2_11	1.492	1.435	2.927	1.870	2.685	426	YES
180s5_2_12	1.513	1.491	3.004	1.846	2.653	432	YES
180s5_2_13	1.423	1.485	2.908	1.859	2.595	404	YES
180s5_2_14	1.454	1.461	2.915	1.858	2.648	414	YES
180s5_2_15	1.479	1.479	2.958	1.813	2.679	422	YES
17812_7	1.484	1.473	2.957	1.894	2.602	423	NIDC
17812_17	1.487	1.414	2.902	1.996	2.598	424	YES
17812_18	1.509	1.442	2.952	1.956	2.603	431	YES
17812_21	1.529	1.499	3.029	1.900	2.585	437	YES
17812_22	1.536	1.483	3.020	1.868	2.657	440	YES
1787_2	1.454	1.478	2.932	1.771	2.710	414	NIDC
1787_3	1.454	1.496	2.950	1.780	2.682	414	NIDC
1787_8	1.486	1.485	2.971	1.761	2.727	425	NIDC
1787_9	1.477	1.465	2.942	1.782	2.736	421	NIDC
1787_10	1.447	1.489	2.936	1.746	2.723	412	NIDC
1787_11	1.460	1.493	2.952	1.741	2.728	416	YES
1788_1_3	1.448	1.481	2.929	1.880	2.591	411	YES
1788_1_5	1.471	1.467	2.938	1.894	2.606	419	YES
1788_1_6	1.447	1.443	2.890	1.919	2.613	411	YES
1788_1_7	1.467	1.449	2.916	1.906	2.631	417	YES
1788_1_8	1.501	1.356	2.857	1.836	2.859	429	YES
1788_1_9	1.449	1.444	2.892	1.937	2.607	411	YES
1788_1_10	1.421	1.437	2.858	1.824	2.707	403	YES
1788_1_11	1.457	1.458	2.915	1.892	2.630	414	YES
1788_1_12	1.470	1.450	2.920	1.909	2.621	418	YES
1788_1_13	1.409	1.499	2.908	1.904	2.520	399	YES
1788_1_14	1.458	1.444	2.902	1.958	2.587	414	YES
1788_1_15	1.442	1.464	2.906	1.907	2.591	409	YES

Label	Al iv	Al vi	Al (total)	Mg	Fe	T (C)	Sulphide interaction
1788_1_16	1.476	1.482	2.958	1.871	2.625	421	YES
1788_1_17	1.474	1.459	2.933	1.898	2.630	420	YES
1788_1_18	1.444	1.481	2.925	1.914	2.562	410	YES
1788_1_19	1.443	1.484	2.927	1.945	2.526	409	YES
1788_2_1	1.451	1.459	2.909	1.897	2.625	412	YES
1788_2_2	1.437	1.433	2.870	1.952	2.593	408	YES
1788_2_3	1.425	1.466	2.892	1.885	2.576	404	YES
1788_2_15	1.464	1.459	2.923	1.870	2.641	417	YES
1789_1_1	1.442	1.517	2.960	1.785	2.647	410	YES
1789_1_2	1.509	1.502	3.010	1.860	2.618	431	YES
1789_1_3	1.445	1.504	2.949	1.863	2.587	411	YES
1789_1_4	1.410	1.518	2.928	1.799	2.613	400	YES
1789_1_5	1.484	1.464	2.948	1.838	2.686	423	YES
1789_1_6	1.471	1.477	2.949	1.840	2.665	419	YES
1789_1_7	1.442	1.506	2.948	1.803	2.639	410	YES
1789_1_8	1.426	1.448	2.874	1.885	2.637	404	YES
1789_1_9	1.416	1.539	2.955	1.750	2.628	402	YES
1789_1_10	1.468	1.522	2.990	1.810	2.626	418	YES
1789_1_11	1.529	1.495	3.024	1.832	2.656	437	YES
1789_1_12	1.464	1.505	2.969	1.813	2.640	417	YES
1789_1_13	1.478	1.489	2.967	1.805	2.682	422	YES
1789_1_14	1.484	1.486	2.971	1.859	2.633	423	YES
1789_2_7	1.358	1.393	2.750	1.786	2.765	383	YES
1789_2_9	1.519	1.485	3.004	1.837	2.673	435	YES
1789_2_10	1.441	1.447	2.889	1.862	2.671	410	YES
0866_2_2	1.520	1.536	3.056	1.996	2.424	433	YES
0866_2_3	1.470	1.465	2.935	2.112	2.383	417	YES
0866_2_4	1.504	1.517	3.021	2.034	2.408	428	YES
0866_2_5	1.465	1.453	2.918	2.023	2.499	416	YES
0866_2_6	1.451	1.491	2.942	2.026	2.419	411	YES
0866_2_7	1.503	1.472	2.976	2.125	2.392	427	YES
0866_2_8	1.457	1.448	2.906	2.152	2.372	413	YES
0869_26	1.471	1.505	2.976	1.861	2.597	419	BC
0869_29	1.439	1.471	2.911	1.601	2.885	411	BC
0869_30	1.482	1.490	2.972	1.915	2.587	422	BC
0869_31	1.460	1.524	2.984	1.972	2.461	414	BC
0868_3_1	1.408	1.376	2.784	2.099	2.507	398	NIDC
0868_3_2	1.393	1.414	2.807	2.078	2.474	393	NIDC
0868_3_3	1.381	1.417	2.798	2.069	2.475	389	NIDC
0868_3_4	1.385	1.423	2.807	2.069	2.466	390	NIDC
0868_3_5	1.458	1.462	2.920	2.011	2.510	414	NIDC
0868_3_6	1.404	1.452	2.856	2.040	2.456	396	NIDC
0868_3_7	1.412	1.397	2.809	2.049	2.535	399	NIDC
0868_3_8	1.439	1.428	2.867	1.997	2.555	408	NIDC
0868_3_9	1.392	1.400	2.792	2.056	2.501	392	NIDC
0868_3_10	1.408	1.368	2.776	2.062	2.563	398	NIDC
0868_3_11	1.440	1.380	2.820	2.081	2.553	408	NIDC

Label	Al iv	Al vi	Al (total)	Mg	Fe	T (C)	Sulphide interaction
0868_3_12	1.355	1.381	2.736	2.070	2.510	381	NIDC
0868_3_13	1.356	1.419	2.775	2.035	2.476	381	NIDC
0868_3_14	1.378	1.404	2.781	2.045	2.509	388	NIDC
0868_3_15	1.383	1.417	2.800	2.093	2.440	389	NIDC
18013_2_5	1.408	1.437	2.845	2.107	2.412	397	YES
18013_2_7	1.419	1.452	2.871	2.062	2.434	401	YES
18013_2_11	1.390	1.425	2.815	2.074	2.457	392	NO
18013_2_12	1.410	1.435	2.846	2.080	2.438	398	NO
18013_2_13	1.394	1.429	2.823	2.104	2.420	393	NO
18013_2_14	1.379	1.422	2.801	2.120	2.405	388	NO
18013_2_15	1.392	1.432	2.824	2.111	2.401	392	NO
18013_4_4	1.434	1.501	2.935	2.031	2.422	406	NIDC
18013_4_5	1.465	1.484	2.949	2.049	2.431	416	NIDC
18013_4_6	1.455	1.468	2.924	2.081	2.421	412	NIDC
18013_4_7	1.450	1.491	2.940	2.021	2.447	411	NIDC
18013_4_8	1.441	1.490	2.931	2.040	2.418	408	NIDC
18013_4_9	1.459	1.496	2.956	1.973	2.485	414	NIDC
18013_4_10	1.444	1.486	2.930	2.026	2.451	409	NIDC
18013_4_11	1.471	1.479	2.950	1.984	2.510	418	NIDC
18013_4_12	1.436	1.485	2.921	1.979	2.466	407	NIDC
180s7_1_1	0.763	1.247	2.011	0.146	4.313	184	-
180s7_1_2	0.881	1.176	2.057	0.143	4.470	222	-
180s7_1_5	0.953	1.249	2.202	0.203	4.340	245	-
180s7_1_17	0.885	1.296	2.181	0.237	4.215	223	-
180s7_1_24	0.875	1.132	2.007	0.202	4.510	220	-
180s7_1_25	0.814	1.102	1.916	0.202	4.523	200	-
0866_2_1	1.298	1.436	2.734	0.939	3.537	356	-
08612_2_1	1.193	1.282	2.475	0.957	3.689	322	YES
08612_2_2	1.159	1.272	2.431	0.943	3.708	311	YES
08612_2_3	1.139	1.225	2.364	0.987	3.724	305	YES
08612_2_4	1.151	1.264	2.415	0.960	3.708	309	YES
08612_2_7	1.176	1.261	2.437	0.927	3.759	317	YES
08612_2_8	1.162	1.211	2.372	0.982	3.759	312	YES
08612_2_9	1.057	1.159	2.217	1.231	3.539	279	YES
08612_2_10	1.028	1.150	2.178	1.188	3.585	269	YES
08612_2_11	0.986	1.138	2.124	1.240	3.531	256	YES
08612_2_15	0.836	1.122	1.958	1.352	3.354	207	YES
08612_3_1	1.154	1.329	2.483	0.938	3.626	310	YES
08612_3_2	1.155	1.280	2.435	0.968	3.662	310	YES
08612_3_3	1.142	1.247	2.389	0.946	3.729	306	YES
08612_3_4	1.077	1.158	2.235	1.160	3.618	285	YES
08612_3_5	1.043	1.148	2.191	1.214	3.574	274	YES
08612_3_6	0.923	0.866	1.788	1.268	3.882	235	YES
08612_3_9	0.860	1.106	1.966	1.475	3.278	215	YES
08612_3_10	0.890	1.077	1.967	1.528	3.282	225	YES
08612_3_15	0.887	1.177	2.064	1.178	3.480	224	YES
08612_4_1	1.171	1.314	2.485	0.877	3.712	315	YES

Label	Al iv	Al vi	Al (total)	Mg	Fe	T (C)	Sulphide interaction
08612_4_3	1.111	1.222	2.332	1.179	3.525	296	YES
08612_4_4	0.912	1.073	1.985	1.284	3.539	232	YES
08612_4_7	0.864	1.048	1.912	1.512	3.331	216	YES
08612_4_10	0.882	1.181	2.062	1.156	3.488	222	YES
0869_21	1.272	1.512	2.784	0.778	3.562	348	BI
0869_22	1.443	1.523	2.966	1.506	2.917	403	BC
0869_23	1.319	1.460	2.779	0.632	3.814	363	BI
0869_25	1.206	1.364	2.570	1.265	3.254	326	BC
0869_27	1.176	1.350	2.526	0.588	3.947	317	BI
0869_28	1.293	1.512	2.805	0.762	3.572	354	BI
0869_32	1.218	1.340	2.558	0.981	3.601	330	BI
0869_33	1.239	1.353	2.592	1.014	3.552	337	BI
1803_1	1.248	1.460	2.709	1.146	3.264	340	YES
1803_2	1.258	1.449	2.707	1.110	3.318	343	YES
1803_3	1.259	1.434	2.693	1.046	3.404	344	YES
1803_9	1.253	1.395	2.648	1.067	3.437	341	YES
1803_10	1.056	1.334	2.390	0.910	3.590	278	YES
1803_11	1.306	1.426	2.732	1.159	3.323	359	YES
1803_14	1.316	1.443	2.759	1.172	3.291	362	YES
1803_15	1.144	1.384	2.529	1.038	3.425	307	YES
1803_17	1.302	1.399	2.702	1.137	3.392	357	YES
1803_18	1.302	1.456	2.758	1.080	3.367	357	YES
1803_22	1.295	1.459	2.754	1.078	3.364	355	YES
1803_21	1.356	1.367	2.724	1.065	3.541	375	YES
1803_24	1.318	1.339	2.657	0.998	3.631	362	YES
08611_2_5	0.631	0.997	1.628	1.259	3.521	141	NO
08612_2_5	1.144	1.271	2.415	0.886	3.764	306	YES
08612_2_6	1.142	1.259	2.401	0.932	3.736	306	YES
08612_2_12	0.707	1.094	1.801	1.473	3.213	166	YES
08612_2_13	0.732	1.119	1.851	1.420	3.238	174	YES
08612_2_14	0.796	1.132	1.928	1.381	3.298	194	YES
08612_3_7	0.823	1.082	1.905	1.487	3.286	203	YES
08612_3_12	0.781	0.504	1.285	1.103	4.505	190	YES
08612_3_14	0.785	1.188	1.974	1.259	3.328	191	YES
08612_4_2	1.148	1.272	2.420	0.900	3.738	308	YES
08612_4_5	0.813	1.087	1.900	1.488	3.272	200	YES
08612_4_6	0.823	1.147	1.970	1.444	3.231	203	YES
08612_4_9	0.880	0.702	1.582	0.881	4.482	221	YES
180s7_1_14	1.451	1.431	2.882	1.458	3.092	405	-
180s7_2_15	1.339	1.458	2.797	1.432	3.004	369	-
1789_1_15	1.304	1.444	2.748	1.678	2.780	358	NIDC
1789_2_2	1.307	1.380	2.688	1.704	2.813	359	NIDC
1789_2_3	1.125	1.285	2.410	1.583	3.048	300	NIDC
1789_2_8	1.026	1.201	2.227	1.402	3.275	268	NIDC