1 THE GRANITES-TANAMI BLOCK SYNTHESIS

Compiled by Lesley Wyborn

1.1 Executive Summary - Geology

Gold was first discovered in The Granites-Tanami Block in 1900 and was mined intermittently between 1904 and 1961. More recently it has been the focus of significant exploration efforts with several major new mines operating since 1986. The area as a whole is poorly exposed and is mostly covered by thick regolith. The regional geology of The Granites-Tanami Block was described by Blake et al. (1979) and very little has been published on the regional geology since then. More detailed geological descriptions are available in papers on the gold deposits in the region (e.g., Ireland and Mayer 1984; Mayer 1990; Ireland 1995) and new structural interpretations are available in Ding (1996, 1997) and Ding and Giles (1996).

Traditionally, The Granites-Tanami Block was believed to consist of two major subdivisions separated by a major unconformity (Blake et al. 1979). The lower subdivision, the Tanami Complex, was deformed and metamorphosed prior to the eruption of volcanics of the Mount Winnecke Formation and deposition of the overlying Supplejack Sandstone. The lowermost Tanami Complex rocks were believed to rest unconformably on Archaean basement (Page and Sun 1994; Page et al. 1995). The Tanami Complex comprises the Killi Killi Beds, Mount Charles Beds, Nanny Goat Creek Beds, Nongra Beds and the Helena Creek Beds. These units consist of greywacke, siltstone, arenite, chloritic and sericitic shale, as well as carbonaceous shale, banded iron formation, and mafic and felsic volcanics. Most of the mineralisation is hosted by the Mount Charles Beds, which contain some of the more reactive rock types of the Tanami Complex including banded iron formation and carbonaceous shale.

Recently Ding (1997) in an abstract has provided a reinterpretation of The Granites-Tanami Block in which he identifies five major stratigraphic packages ranging in age from at least 2450 Ma (Tanami Group) to 1815 Ma. Each package is separated by a major unconformity, and the basal group lies unconformably on basement that is ~2500 Ma old (Ding 1997).

Ding (1997) reports a single crystal zircon age of 2450 Ma on a granite sill which intrudes the Tanami Group. The earliest known Proterozoic ‘granites’ dated by conventional means occur at ~1880 Ma. These are partial melts of late Archaean gneisses which occur in the Browns Range Dome. Some felsic volcanics have been identified within the Tanami Complex, but only one has been dated at around ~1800 Ma. The dated rock is presumed not to come from the Tanami Complex, but from volcanics belonging to the Granites Supersuite which are dated from about 1825 Ma to 1795 Ma. The members of this suite were intruded mostly after the deformation that affected rocks of the Tanami Complex.

Most felsic igneous rocks in The Granites-Tanami Block are Sr-depleted and Y-undepleted, indicating a plagioclase-residual source.

1.2 Executive Summary - Metallogenic Potential

The only suite with recognised metallogenic potential is the Granites Supersuite which consists predominantly of non-magnetic, reduced, fractionated, metaluminous rocks. The highly reduced nature of the early phases of this suite is anomalous, as gold-bearing granites are usually assumed to be oxidised and magnetic. It is suggested that the reduced nature of this suite results from infusion of H₂ from carbonaceous country rocks into the magma early in the magmatic history. With increasing evolution, the Supersuite then became more oxidised either because the H₂ stopped passing into the magma chamber from the country rock, or because H₂ diffused into the atmosphere (Czamanske and Wones 1973; Wyborn 1983).
The gold deposits in The Granites-Tanami area are hosted by predominantly iron-rich, graphite-rich or sericite/chlorite-rich rocks. All the deposits appear to have precipitated from reduced fluids and have pyrite-quartz-sericite alteration associated with the mineralising event. As the majority of granites within the area are reduced fractionating I-types it seems more than likely that fluids derived from these granites are a component of the mineralising fluids, a suggestion that is supported by fluid inclusion work (e.g., Tunks 1995, Valenta and Wall 1996). There is a possibility that Sn may be found around the Lewis Granite and there is also potential for W mineralisation. It is also possible that there may be some mineralisation related to the late magmatic phases of the granite, although these will probably have hosts of different composition from those in The Granites-Tanami Block that are associated with reduced fluids.

The better known deposits are located in an area where the granite intrusions are interpreted to be relatively deep (Blake et al. 1979; Wall 1989). In the north, the Winnecke Granophyre has intruded to a much shallower depth and has altered and greisenised its own comagmatic volcanics in the Mount Winnecke Formation. If any mineralisation exists in this area it is more likely to be of an epithermal or porphyry style, and hosted within or close to the volcanics or the granophyre. The limiting factor in this model may be that the magmas in this northern area are also the most fractionated and may have already lost metals such as Au or Cu.

It is accepted that the connection to a granite source for the mineralisation could be regarded as tenuous, as all known mineralisation is distant from the granites. Ding (1997) has argued that the Granites Gold Deposit is an example of a stratly-bound pre-orogenic deposit (pre-1980 Ma) whilst Wall (1989) and Valenta and Wall (1996) argue for a granite-related model. The point at issue with this study is that The Granites Supersuite shows clear evidence of fractionation and is a type of granite that is similar to those found in both the Pine Creek and Telfer areas. Hence, the granites of this Supersuite must be considered as viable components in any model trying to explain at least some of the controls on the distribution of mineralisation in The Granites-Tanami Block.

### 1.3 Future work

The felsic igneous rocks of The Granites-Tanami Block are poorly defined both in terms of their chemistry and their ages. The single crystal ages reported by Ding (1987) need to be confirmed by SHRIMP analyses to determine just how representative these individual zircon ages are, not only of the samples dated, but also of the intrusions that each individual sample is taken from.

A systematic granite sampling program also needs to be carried out, firstly to better define the metallogenic characteristics of this suite, and secondly and more importantly, to try to classify the numerous unnamed granite outcrops scattered throughout the area and to try to define whether they are part of the Granites Supersuite or belong to the 1880 Ma or the Archaean suites.

### 1.4 Methods

**Information Sources:** 1:250 000 maps and notes, 1:100 000 maps and commentaries where available, published ages, AGSO OZCHEM database, AGSO MINLOC database, AGSO magnetics and gravity.

**Classification of Granites:** In this report the granites have been divided into suites based on the age, geographic location, and geochemistry of each pluton. Only one major suite was recognised (Table 1.1).

**Host Rocks:** The country rocks which are thought to be intruded by each suite have been summarised, and classified according to mineralogical characteristics thought to be important in determining the metallogenic potential of a granite intrusive event.

**Relating Mineralisation:** As the granites occur only as scattered outcrops, it has been difficult to relate mineralisation to known outcrops of granites, particularly as so few have been sampled.
1.5 Acknowledgements

This study has benefited greatly from the input of Dave Blake.

1.6 References


### 1.7 Table 1.1

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</table>
2 THE GRANITES SUPERSUITE

2.1 Timing

~1810 Ma

2.2 Individual Ages

Primary Ages:

Mount Winnecke Formation\textsuperscript{1,2,3} & $1824 \pm 5$, SHRIMP  \\
 & $1770 \pm 15$, initial $0.7052 \pm 0.0038$ Rb-Sr  \\
Winnecke Granophyre\textsuperscript{1,2,3} & $1815 \pm 5$, SHRIMP  \\
 & $1764 \pm 15$, initial $0.7074 \pm 0.0036$ Rb-Sr  \\
Felsic volcanic\textsuperscript{1} & $1800 \pm 13$, SHRIMP  \\
Tanami Complex (intrusive?)\textsuperscript{1,2} & $1800 \pm 14$, SHRIMP  \\
The Granites Granite\textsuperscript{1,2,3} & $1795 \pm 6$, SHRIMP  \\
 & $1742 \pm 24$, initial $0.7066 \pm 0.0019$ Rb-Sr

Reset ages:

Slatey Creek Granite\textsuperscript{1,2} & $1733 \pm 55$, initial $0.709 \pm 0.019$ Rb-Sr  \\
Lewis Granite\textsuperscript{1,2} & $1684 \pm 8$, initial $0.7091 \pm 0.001$ Rb-Sr


2.3 Regional Setting

The Granites Supersuite was emplaced over at least 30 Ma from about 1825 Ma to 1795 Ma. Some volcanics reported at 1848 Ma may also be part of this supersuite. Because of its extensive time range and the variation of both highly magnetic to non-magnetic units, this group of plutons has been termed a ‘Supersuite’. Members of this suite intrude or unconformably overlie folded and deformed metasediments of the Tanami Complex. The Tanami Complex consists mainly of a sequence of greywacke, siltstone, carbonaceous shale, banded iron formation and felsic and mafic volcanics.

Although the mineralogical character of the granites and volcanics of the Granites Supersuite changes through time, the chemical differences are so subtle that all members are considered part of one supersuite. Wall (1989) argued that The Granites Granite was emplaced over a protracted period of time, and that the granite emplacement and metamorphism were intimately related, with the last stage of the granite intruding its own contact aureole. Wall (1989) and Ding and Giles (1993) believed that some of the granites were emplaced prior to the earliest deformation and some later in the history. There are insufficient data to precisely define the regional setting of this suite, however Blake (1976) noted that the felsic volcanics of the Mount Winnecke Formation were overlain by shallow marine deposits of the Supplejack Downs and Pargee Sandstones. The Granites Supersuite would be earlier than or synchronous with the Leichhardt Event of Etheridge and Wall (1994), a major extensional basin forming event throughout northern and central Australia between 1810-1740 Ma.

2.4 Summary

The Granites Supersuite is a reduced, fractionated I-(granodiorite) suite with potential for Au, and possibly Sn and Cu mineralisation. In the area around The Granites Gold Mine the granites intruded at relatively deep levels, have wide contact aureoles, and the mineralisation is hosted within the contact aureole. The fluid associated with the mineralisation is reduced and the associated granites are also reduced. There is no known mineralisation associated with the later magnetic variants. It is also to be noted
that Ding (1997) argues that The Granites Gold mine is an example of a pre-orogenic stratabound deposit.

In the northern part of The Granites-Tanami Block, the Supersuite occurs as shallow-level intrusives and extrusive volcanics. Alteration has been noted in these and it is possible that any potential mineralisation will be hosted within the Winnecke Granophyre or within volcanics of the Mount Winnecke Formation rather than external to them. Some of the samples from these northern areas are magnetic, and hence any late fluids derived from these units would be oxidised and would probably require a different host from the rocks which host most of the mineralisation in the region.

2.5 Potential

The Granites Supersuite is an unusual reduced I-type supersuite which becomes more oxidised with time. As the fluids in the Au deposits are reduced and if we assume that the Au is derived from the granites, then the banded iron formation and the carbonaceous shale offer potential hosts, as would any carbonate-rich facies. There is also the potential for precipitation by mixing of a magmatically derived fluid with meteoric or basinal fluids. The Lewis Granite is reduced and has high Sn values; there may be potential for Sn within the numerous pegmatites located in the vicinity of this granite. If sufficient carbonate rocks were in the vicinity of these granites then W skarns may be a possibility, as well as small Pb/Zn deposits, similar to those in the area surrounding the Cullen Supersuite (Pine Creek, Northern Territory), and to a limited extent the Telfer Supersuite granites (of the Paterson area).

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2.6 Descriptive Data

Location: The Granites Supersuite is located throughout the northern and central part of The Granites-Tanami Region. It is also likely that many of the unnamed granite plutons within the northern and central Tanami are part of the suite, but there are insufficient data to fully determine which of the unnamed muscovite granite plutons are fractionated parts of the Granites Supersuite and which are related to either the Archaean or Barramundi Events. Recent unpublished AGSO Sm-Nd data suggest that the Archaean basement is not as extensive as was inferred by Page et al. (1995).

Dimensions and area: The suite occurs in an area of about 300 by 250 km. Much of the Supersuite is covered by Cainozoic cover and the actual extent of outcrop is 870 km².

2.7 Intrusives

Component plutons: Winnecke Granophyre and The Granites Granite. Probable members include the Slatey Creek Granite and the Lewis Granite: on Rb-Sr age determinations these units are much younger, but the initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratios are anomalously high and may have possibly been reset by subsequent deformation. Other potential members include any post-Tanami Complex unnamed granites on almost all of the 1:250 000 Sheet areas of the Granites-Tanami Block.

Form: Most of the intrusive rocks form sparse scattered outcrops separated by Cainozoic cover. Regional gravity data suggest that the granites intruded as circular plutons some of which are quite large. The Lewis Granite has been recorded as intrusive sheets up to 30 m thick (Blake et al. 1973). The scattered outcrop of the Slatey Creek and Lewis Granites overlie substantial near-elliptical gravity lows.

Metamorphism and Deformation: Local deformation and shearing are commonly recorded. Specifically: The Granites Granite - locally foliated and sheared with radioactivity 4 times background in some shear zones.

Dominant intrusive rock types: Medium to fine grained biotite monzogranite which is locally porphyritic with K-feldspar phenocrysts up to 1 cm long. Specifically: The Granites Granite -
medium to fine-grained biotite monzogranite, locally porphyritic with K-feldspar phenocrysts up to 1 cm long. Winnecke Granophyre - porphyry, monzogranite and granophyre. Lewis Granite - coarse-grained muscovite-biotite monzogranite, with biotite monzogranite and granodiorite in the west. Slatey Creek Granite - muscovite, biotite-muscovite and biotite monzogranite and minor biotite granodiorite, medium to fine-grained with tabular feldspars up to 1 cm long.


**Veins, Pegmatites, Aplites, Greisens:** Pegmatites, greisens and aplites are commonly recorded. Veins of granite containing pyrite intruding the Mount Charles beds have been recorded 20 km southwest of the Granites (Blake et al. 1973). Specifically: The Granites Granite - minor aplite and pegmatite, cross-cutting quartz veins common. Winnecke Granophyre - small druses filled with quartz and quartz veins very common, aplite dykes also recorded. Lewis Granite - cross-cutting sheets of pegmatites and aplites. Slatey Creek Granite - veins of muscovite-quartz-feldspar pegmatite and aplite.

**Xenoliths:** Small dark biotite-rich xenoliths recorded in most units, particularly in the Winnecke Granophyre.

**Distinctive mineralogical characteristics:** The ferromagnesian minerals of the Granites Supersuite are dominated by biotite: hornblende has been recorded only in one specimen of the Winnecke Granophyre, despite SiO$_2$ values of as low as 60 wt%. Tourmaline is commonly recorded, both within the granite and in the associated country rocks. Specifically: The Granites Granite - plagioclase, K-feldspar (up to 1 cm long), quartz, biotite, with accessory allanite, fluorite, muscovite, apatite. Winnecke Granophyre - sodic plagioclase, biotite (dominant ferromagnesian mineral), K-feldspar (up to 3 cm long) with accessory allanite, apatite, clinozoisite, opaque iron oxides and fluorite. Over one magnetic high, green hornblende and pseudomorphs after fayalite occur 19 km southeast of Mount Winnecke. One porphyry sample contains hypersthene and blue tourmaline. Lewis Granite - K-feldspar phenocrysts up to 1 cm long, quartz, plagioclase, biotite, muscovite, apatite, fluorite, zircon and some tourmaline. Slatey Creek Granite - K-feldspar, biotite muscovite, quartz, allanite, fluorite, titanite, zircon, opaques and tourmaline.

**Breccias:** None recorded.

**Alteration in the granite:** Alteration rock types recorded include ‘greisenisation’ and tourmalinisation. Specific mineralogical changes include: The Granites Granite - chlorite, epidote, white mica and sporadic calcite. Winnecke Granophyre - sericite, kaolinite, chlorite. Lewis Granite - chlorite, sericite, epidote and calcite. Slatey Creek Granite - chlorite, biotite, calcite.

### 2.8 Extrusives

Extrusive rocks include the Mount Winnecke Formation and some outcrop of volcanics which were formerly mapped as Nanny Goat Creek Beds on the Tanami Mine-Lajamanu road near Wilson Creek. The lavas of the Mount Winnecke Formation are pale buff, grey, deep maroon, or purplish. Most lavas contain up to 20% K-feldspar. Blake et al. (1972) noted that the lavas of the Mount Winnecke Formation are altered both by weathering and hydrothermal alteration. They record pyrophyllite and diaspore in the Mount Winnecke Formation 17 km south of Mount Winnecke and suggest that they may be after alunite.

### 2.9 Country Rock

**Contact metamorphism:** Hornfelsing commonly recorded around the plutons, but only very narrow zones are noted around the Winnecke Granophyre, whilst the zone around The Granites Granite has been liked to a ‘regional thermal aureole’ and is several kilometres wide (Blake et al. 1979; Wall 1989).

**Reaction with country rock:** Some tourmalinisation noted and generation of micaceous hornfelses, particularly where the Winnecke Granophyre intrudes the Winnecke Formation.

**Units the granite intrudes:** Mount Charles Beds, Killi Killi Beds, Helena Creek Beds, Nanny Goat Creek Beds and Mount Winnecke Formation.

**Dominant rock types:** Quartzite, schist, gneiss, greywacke, chert, basalt, felsic volcanics, siltstone, carbonaceous shale, banded iron formation, jaspilite, conglomerate.
Potential hosts: The Mount Charles Beds, although dominated by quartzite, schist and gneiss, contain several important reductants including carbonaceous shale and quartz-rich ironstone, some of which are carbonate- and sulphide-rich.

2.10 Mineralisation

The Granites-Tanami area is a significant gold producer, with gold mining operations in The Granites, Dead Bullock Soak and Tanami areas producing over 8 t of gold during 1993 (Lovett et al. 1993). All deposits are structurally controlled and none are located within granites.

The Granites mine itself is hosted by highly reduced, pelite-dominated sedimentary successions which contain iron formation and other ferromagnesian schist deformed under hornblende hornfels facies conditions within a contact aureole. Several workers suggest that the gold mineralisation was deposited during prograde metamorphism and is associated with high-temperature metasomatism early in the metamorphic deformation history (Wall 1989; Ding and Giles 1993; Valenta and Wall 1996). The ore fluid was believed to be dominated by reduced sulphur species. Carbonate and silicate-sulphide host rocks are better mineralised than silicate facies or oxidised facies-host units (Mayer 1990). No significant mineralisation is hosted by either the granite or the basic intrusions (Mayer 1990).

Mineralisation at Dead Bullock Soak, some 40 km west of The Granites, is at lower metamorphic grades. Total resources are 6 608 000 tonnes of ore at an average 5.4 g/t (Lovett et al. 1993). The mineralisation is either disseminated through banded iron formation and graphitic units (Triumph Hill, Dead Bullock Ridge, Colliwobble Ridge), confined to a complex quartz vein network within a fine-grained quartz-sericite chlorite schist (Callie), or hosted by a mixture of both (Villa and Fumerole; Lovett et al. 1993; Ireland 1995).

The Tanami Gold Mine, some 40 km southwest of The Granites Mine, produced 7.2 Mt of ore at 2.1 g/t. The deposit is structurally controlled and is hosted by the Tanami basalt, an informal unit within the Mount Charles Beds. The host rocks at the mine are basalt, hematitic sandstone and carbonaceous siltstone, and the dominant alteration assemblage is sericite-quartz-pyrite±carbonate±biotite. The fluids associated with the mineralisation are reduced and pyrite-stable (Tunks 1996; Tunks et al. 1994; Nicholson 1990). The Redback, Dogbolter and Jims Find discoveries south of the Tanami mine are also structurally controlled and record similar alteration and mineralisation assemblages (Henderson et al. 1995).

2.11 Geochemical Data

Data source: Thirty-eight samples were used in this review. Most were collected as part of a regional 1:250 000-scale BMR regional mapping program carried out between 1971-1974. Nearly all samples analysed are geochronological samples collected in 1971, 1972 and 1973 for Rb-Sr dating or else collected during 1987, 1988 and 1992 for U-Pb SHRIMP dating.

Data quality: Good; all of the samples collected during the 1970’s were reanalysed in 1990 as part of an AGSO analytical upgrading program.

Figure 2.1 Histogram of SiO\textsubscript{2} values for the Granites Supersuite
Are the data representative? No. Samples collected for Rb-Sr dating tend to be biased towards more felsic end members and aplites, whilst the U-Pb zircon samples are single samples only, some of which are altered.

Are the data adequate? No, in view of the metallogenic significance, further sampling is warranted.

SiO$_2$ range (Fig. 2.1): Given the rock descriptions, the high SiO$_2$ range in Figure 2.1 is not believed to reflect the full range of SiO$_2$ values for this suite. Most of the samples used in analysis are Rb-Sr age determination samples and hence are biased towards the high SiO$_2$ end members.

Alteration (Figs. 2.1 & 2.2):
- SiO$_2$: Some evidence of silicification.
- K$_2$O/Na$_2$O: One aplitic sample of Slatey Creek Granite has a high K$_2$O/Na$_2$O ratio. Within the other samples analysed there is no evidence of strong sodic or potassic alteration.
- Th/U: The Th/U ratios are close to the normal range.
- Fe$_2$O$_3$(FeO+Fe$_2$O$_3$): A few samples are relatively oxidised. The most oxidised sample of the Granites Granite comes from an area overlying a circular magnetic high. Some of the higher values may come from slightly weathered samples.

Fractionation Plots (Fig. 2.3):
- Rb: Increases with increasing SiO$_2$ particularly within the Lewis Granite and the Winnecke Granophyre.
- U: Increases with increasing SiO$_2$.
- Y: Increases with increasing SiO$_2$.
- P$_2$O$_5$: No significant change with increasing SiO$_2$.
- Th: No significant change with increasing SiO$_2$.
- K/Rb: Decreases with increasing SiO$_2$.
- Rb-Ba-Sr: At least one sample from each intrusive group plots in or near the strongly differentiated field.
- Sr: Decreases with increasing SiO$_2$.
- Rb/Sr: Increases strongly with increasing SiO$_2$ particularly within the Lewis Granite and the Winnecke Granophyre.
- Ba: Decreases with increasing SiO$_2$.
- F: No data available.

Metals (Fig. 2.4):
- Cu: Values are relatively low.
- Pb: Values are moderate.
- Zn: Values decrease with increasing SiO$_2$.
- Sn: Values increase with increasing SiO$_2$, particularly in the Lewis Granite. As this granite is reduced, there is a possibility that there may be Sn mineralisation with this intrusion.

High field strength elements (Fig. 2.5):
- Zr: Decreases with increasing SiO$_2$. Values are relatively low.
- Nb: No significant change with increasing SiO$_2$. Values are relatively low.
- Ce: No significant change with increasing SiO$_2$. Values are relatively low.

Classification (Fig. 2.6):
- The CaO/Na$_2$O/K$_2$O plot of White, quoted in Sheraton and Simons (1992): Samples plot mainly in the granodiorite to granite field.
- Zr/Y vs Sr/Sr*: All samples are Sr depleted.
- Spidergram: Typical Proterozoic Sr-depleted, Y un-depleted pattern.
- Oxidation plot of Champion and Heinemann (1994): Most samples are reduced, although some are oxidised: this may be an effect of weathering. The reduced nature of this supersuite is anomalous, as Au is usually more commonly associated with oxidised or
magnetite-bearing granites. The increasing oxidation state of a magma during fractionation has been noted before (e.g., Czamanske and Wones 1973; Wyborn 1983) and has been attributed to diffusion of H$_2$ from reduced country rocks into the magma chamber, with increasing oxidation resulting from the subsequent loss of H$_2$ through venting to the atmosphere by volcanic processes.

- **ASI:** The most mafic sample, a biotite-muscovite bearing Lewis Granite is metaluminous: all other samples are weakly to strongly peraluminous.
- **A-type plot of Eby (1990):** The samples straddle the boundary for A-type and normal granites for the derived for Palaeozoic Granites.

Granite type (Chappell and White 1974; Chappell and Stephens 1988): I-(granodiorite) type.

**Australian Proterozoic granite type:** Cullen.

### 2.12 Geophysical Signature

**Radiometrics (Fig. 27):** Most samples would appear white in a RGB image, although the Slatey Creek Granite appears to have relatively lower U and would possibly appear yellow.

**Gravity:** The Granites Granite, the Lewis Granite and the Slatey Creek Granite all occur as sparse outcrops on significantly larger gravity lows. The Winnecke Granophyre in part plots over a low and in part over a gravity high.

**Magnetics:** The magnetic signature is highly variable. The Lewis Granite plots totally on a magnetic low, whilst the Winnecke Granophyre is mainly on a magnetic high. Within the Slatey Creek and The Granites Granite outcrops there are distinctive near-circular magnetic highs. One of these domes lies underneath the main outcrop of The Granites Granite just east of The Granites gold mine. The age determination site was from this mass. The circular nature of these highs suggest that they are relatively late intrusions. As the ore fluid appear to have been reduced, then these late magnetic intrusions are unlikely from either structural (Ding and Giles 1993) or chemical reasons (Wall 1989) to have anything to do with the mineralisation.

### 2.13 References


THE GRANITES SUPERSUITE

Legend

- Lewis Granite
- Mount Winnecke Fm
- Slatey Creek Granite
- The Granites Granite
- Winnecke Granophyre

2.2A: Na₂O vs K₂O

2.2B: Th/U vs SiO₂

2.2C: Fe₂O₃/(FeO+Fe₂O₃)
THE GRANITES SUPERSUITE

2.3G: Rb-Ba-Sr

Strongly differentiated granite

Granite

Anomalous granite

Monzogranite

Tonalite

Legend

* Lew's Granite

Mount Winnecke Fm

Slatey Creek Granite

The Granites Granite

Winnecke Granophyre

2.3H: Sr vs SiO₂

2.3I: Rb/Sr vs SiO₂
THE GRANITES SUPERSUITE

2.3J: Ba vs SiO$_2$

Legend

- Lewis Granite
- Mount Winnecke Fm
- Slatey Creek Granite
- The Granites Granite
- Winnecke Granophyre

NO FLUORINE DATA AVAILABLE

2.4A: Cu vs SiO$_2$
2.4B: Pb vs SiO$_2$

2.4C: Zn vs SiO$_2$

2.4D: Sn vs SiO$_2$

Legend

* Lew's Granite
- Mount Winnecke Fm
△ Slatey Creek Granite
▽ The Granites Granite
■ Winnecke Granophyre
THE GRANITES SUPERSUITE

2.6A: CaO-Na₂O-K₂O

Legend

* Lewis Granite
☐ Mount Winnecke Fm
△ Slatey Creek Granite
☒ The Granites Granite
■ Winnecke Granophyre

2.6B: Zr/Y vs Sr/Sr*

SiO₂ range: 69.6 to 77.0 wt.% SiO₂
THE GRANITES SUPERSUITE

Legend

- * Lew's Granite
- □ Mount Winnecke Fm
- △ Slatey Creek Granite
- ◊ The Granites Granite
- ■ Winnecke Granophyre

2.6D: Redox plot

2.6E: ASI vs SiO₂

2.6F: Ga/Al vs HFSE (Eby 1990)
## Lewis Granite

**MEANS AND STANDARD DEVIATIONS**

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# Slatey Creek Granite

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## Winnecke Granophyre

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3 OTHER SUITES

3.1 Introduction  This section contains a brief discussion of other units that have not been included in the previous chapters. None are considered to be of economic significance.

3.2 Browns Range Suite  A suite of quartzofeldspathic rocks crops out in the core of the Browns Range Dome (which is possibly a core complex). All units are poorly exposed. They may be granites metamorphosed to upper amphibolite facies or may be quartzofeldspathic metasediments. Two ages have been determined of 1882 ± 14 Ma for partially remelted Archaean granite and 2505 ± 4 Ma for an enclave within a granitic gneiss (Page and Sun 1994). Chemically, all of the samples collected are peraluminous high-SiO₂ quartzofeldspathic rocks which show no convincing evidence of fractionation.

3.3 Billabong Complex  A second suite of quartzofeldspathic gneisses occurring 50 km east of The Granites Gold Mine has given an age of 2514 ± 3 Ma. Little is know of the unit other than what is published by Page and Sun (1994) and Page et al. (1995).
