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Strain partitioning near the Keith–Kilkenny Fault Zone in the central Norseman–Wiluna Belt, Western Australia. Record 1992/68.

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MINERALS AND LAND USE PROGRAM
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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SUMMARY

Regional deformation in the Leonora-Yerilla area comprised at least three folding events. The D1 event is characterised by nappe-style recumbent folding and the development of gently dipping detachment zones inferred to be related to the emplacement of granite-gneiss domes. D2 was a major deformation phase of non-coaxial ENE-WSW compression, causing the development of open to tight upright folds, a penetrative S2 axial plane cleavage, and local D2 high strain zones with oblique dextral strike-slip movement. D3 was a phase of E-W compression. This deformation phase caused local folding, the development of a spaced crenulation cleavage (S3), and a sinistral strike-slip reactivation of older faults. Post-folding deformation involved block-faulting, presumably associated with NNW-SSE extension.

Recent mapping of an area described previously as the Keith-Kilkenny "tectonic zone" and referred to in this report as the Yerilla Terrane, has outlined a number of well defined structural domains bordered by D2 shear zones. The structural complexity of the Terrane can be explained largely in terms of D2 strain heterogeneity. The eastern part of the tectonic zone consists of a series of elongate 10-30 km wide structural domains characterised by tight D2 folding and penetrative S2 cleavage development. In contrast, D2 deformation appears to have had less effect on most of the Melita Domain which comprises the 700 km^2 triangular shaped southwest corner of the Yerilla Terrane. The inferred presence of a rigid body of granite-gneiss at shallow depth underneath the Melita Domain is postulated to be the main cause for this difference in D2 strain within the Yerilla Terrane.

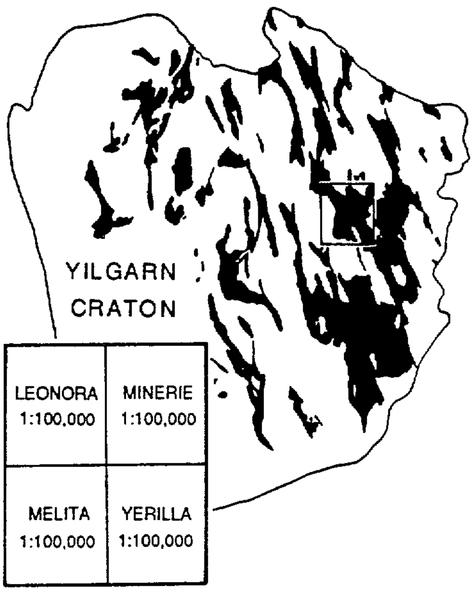

Figure 1. The Yilgarn Craton with location of map area. Greenstone belts are indicated in black.

INTRODUCTION

The Norseman-Wiluna Belt is a north-northwest trending granite-greenstone terrane within the Archaean Eastern Goldfields Province of the Yilgarn Craton, Western Australia. The Belt comprises folded and metamorphosed basic to felsic volcanics and sediments, exposed in relatively narrow "greenstone belts" which occur between extensive areas of granite and granitic gneiss. It has been widely accepted that the volcanic sequence developed during rifting of Archaean crust around 2700 Ma (McNaughton & Dahl, 1987; Claoue-Long & others, 1988), either in an intracratonic (Hallberg, 1986) or continental arc/marginal basin (Barley & Groves, 1988; Barley, & others, 1989; Perring & others, 1989) tectonic setting.

The Keith-Kilkenny Fault Zone is one of the major structures in the eastern part of the Norseman-Wiluna Belt. First described by Williams (1974), the northwest trending lineament can be traced as a clear aeromagnetic anomaly for over 300 km (Williams & Whitaker, in press). The structure is parallel to a well defined set of northwest trending regional strike-slip fault zones that transect the Norseman-Wiluna Belt and that generally define the boundaries of terranes with distinctive stratigraphy and structure (Swager & others, 1990). Differences in granite geochemistry and distribution of felsic volcanics across the Keith- Kilkenny Fault Zone have been taken as evidence by some authors that it represents an old crustal structure which was active during Archaean rifting and possibly was situated near or at the margin of the rift basin (Perring & others, 1989; Hallberg, 1986; Barley & others 1989). An alternative origin was recently suggested by Williams & Whitaker (in press) who postulated that the Keith-Kilkenny fault zone initiated as a northeasterly dipping listric splay on a low-angle detachment fault related to the development of the Raeside granite-gneiss dome southwest of Leonora.

Tracing the Lineament in the field is hampered by poor outcrop and pervasive weathering. Detailed geological studies have so far been restricted to the Kathleen Valley area (Eisenlohr, 1988, 1990) and the Leonora-Yerilla area (Hallberg, 1985, 1986; Dudley, 1987), located in the northern and central sections of the Norseman-Wiluna Belt respectively. Both areas show evidence for large scale deformation heterogeneity and strain partitioning. At Kathleen Valley the Lineament is interpreted to coincide with a fault zone along the highly sheared north-northwest trending granite contact (Eisenlohr, 1990) which defines the eastern margin of a narrow, 3-10 km wide, belt comprising strongly deformed ultramafics and mafic volcanics (Eastern Domain of Eisenlohr, 1990). Rocks to the west of this high strain zone are only weakly folded (Western Domain of Eisenlohr, 1990). Large scale deformation heterogeneity in the Leonora-Yerilla Area was addressed by Hallberg (1985, 1986) who introduced the terms "sector" and "tectonic zone" to refer to district-scale domains of low- and high-strain respectively. Hallberg (1985, page 41) stated:

> *The area to the west of the Murrin-Margaret sector is a complex zone of disrupted stratigraphy and penetrative deformation which in places exceeds 60 kilometers in width. This zone follows the trace of the Keith-Kilkenny lineament and can be considered partly coincident with it. Because of its width, the term zone is preferred to lineament and the broad area of disruption will be termed the Keith-Kilkenny tectonic zone.*

The present study looks in detail at the geology of the Keith-Kilkenny "tectonic zone" with the aim to better define the structural development of that area. The report is part of preliminary results of recent regional mapping by geologists of the Bureau of Mineral Resources (BMR) and

Figure 2. Simplified outcrop map of Archaean geology in the Leonora-Yerilla area. 1 – "Greenstone", comprising basalt, dolerite, gabbro, amphibolite, minor andesite. 2 – Ultramafic rocks. 3 – "Whitestone", sediments and rhyolitic to dacitic felsic volcanics. 4 – Polymict conglomerate. 5 – Granite-gneiss (pre- or syn-D1). 6 – Foliated granite (late D1 to syn-D2). 7 – Unfoliated granite (post-D2).

the Western Australian Geological Survey (GSWA) of a 10,000 km^2 area covering most of the Leonora (P.R. Williams, BMR), Minerie (M.B. Duggan & P.R. Williams, BMR), Melita (W.K. Witt, GSWA) and Yerilla (B.S. Oversby & F.VanderHor, BMR) 1:100.000 Sheet areas (Figs 1,2). Major new results are the recognition of possible basement (Witt, 1992) and the identification of low strain areas within the Keith-Kilkenny "tectonic zone". In order to avoid confusion about inferred strain, it is proposed that, similarly, to recent mapping in the southwestern part of the Eastern Goldfields Province (Swager, & others, 1990), major tectonic units of the Leonora-Yerilla area are described as terranes rather than sectors or tectonic zones. Terranes are distinguished on the basis of differences in stratigraphy and structural constitution (Myers, 1990; Swager & others, 1990; Williams & Whitaker, in press), and are bounded by major shear zones.

The terranes can be further subdivided into domains which exhibit a common structural history and stratigraphy, but that are separated by shear zones across which major fold structures and stratigraphic units cannot be traced (Swager & others, 1990; Williams & Whitaker, in press).

REGIONAL GEOLOGY

Terranes

Regional mapping of the Leonora-Yerilla area has outlined a number of structural- stratigraphic domains which define three larger entities referred to in this report as the Minerie, Yerilla and Leonora Terranes (Fig. 3). This report focusses on the geology of the last two terranes and only briefly deals with the stratigraphy of the Minerie Terrane.

The Yerilla Terrane corresponds to Hallberg's Keith-Kilkenny "tectonic zone". The northwest trending Keith-Kilkenny Fault Zone defines the eastern boundary of the Terrane. Near Yerilla homestead, the fault zone represents the eastern boundary of the Glenorn Domain in an area of extensive Cainozoic cover directly north of Lake Raeside. In that area, the fault zone is interpreted from high resolutution aeromagnetic data to be up to 1km wide (Whitaker, pers. comm. 1992). The exact location of the continuation of the fault zone to the northwest is the subject of ongoing geophysical studies. A preliminary position along the eastern margin of the Pig Well Graben and the eastern margin of the Possie Well Domain is inferred in Fig. 3, largely on the basis of abrupt changes in structural trends across those boundaries.

The Moriaty Shear Zone and the Mt George Shear Zone define the boundary between the Yerilla Terrane and the Leonora Terrane to the west. Unlike the Keith-Kilkenny Fault Zone, these are locally well exposed shear zones. The structures are characterised by ductile deformation textures and the presence of gently dipping mineral elongation lineations with shear textures suggesting a component of dextral strike-slip fault movement (Passchier, 1990; Witt, 1992).

Deformation history

Although the amount of strain and deformation style varies from domain to domain, evidence for a three-stage folding history (D1-D3) is preserved in both the Yerilla Terrane and Leonora Terrane (Passchier, 1990, 1991; Williams & others 1989; VanderHor, 1991). The youngest two folding stages (D2-D3) are possibly part of a continuous phase of non-coaxial compression, and

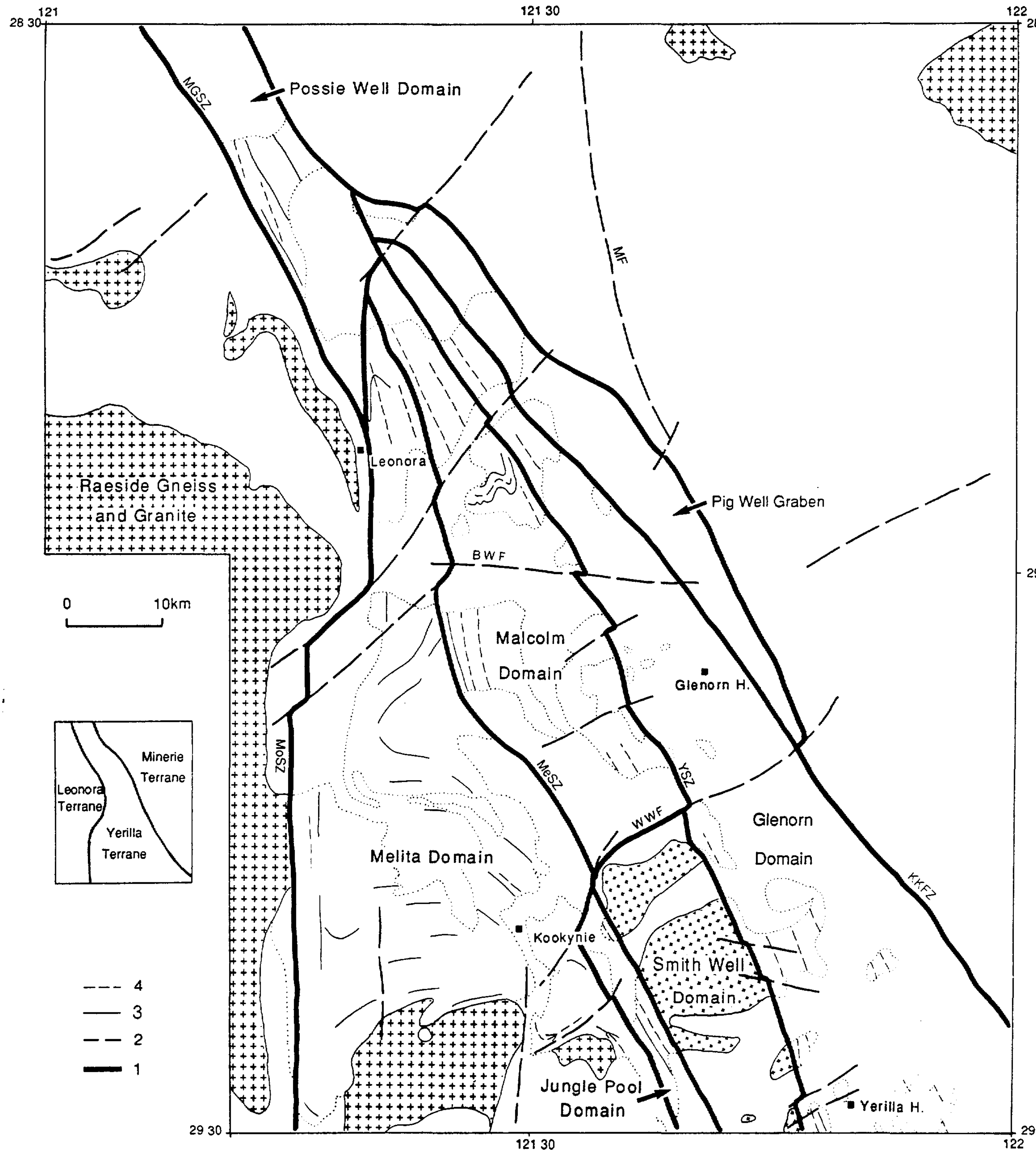

Figure 3. Structural domains of the Yerilla Terrane. 1 – Inferred domain boundary faults and shear zones. 2 – Late-tectonic brittle faults. 3 – Trends of bedding in sedimentary and volcanic units. 4 – Trend of dominant tectonic foliation. KKFZ – Keith-Kilkenny Fault Zone. MeSZ – Melita Shear Zone. MoSZ – Moriaty Shear Zone. MGSZ – Mount George Shear Zone. YSZ – Yerilla Shear Zone. BWF – Braiser Well Fault. WWF – Wandary Well Fault.

are interpreted to reflect a progressive rotation of the principal compression direction from overall ENE-WSW during D2 to E-W during D3.

D1

D1 resulted in the localised development of a gently dipping planar fabric (S1) and associated stretching lineation (L1). The S1 foliation is in places associated with nappe-style recumbent folding but near the contact of the Raeside Gneiss (Fig. 3) shows evidence for an extensional strain regime which is interpreted to have been associated with the emplacement of this granite-gneiss complex (Williams & Currie, in prep; Williams and Whitaker, in press).

Studies of shear sense indicators show a predominantly northerly transport direction during D1 (Passchier, 1991; Williams & Currie, in prep; Williams and Whitaker, 1992). This consistent D1 transport direction is taken as evidence that extension and recumbent folding were part of one continuous deformation event rather than the result of separate events of extension followed by large scale thrust shortening as suggested recently for the Laverton-Wiluna region (Hammond & Nisbet, 1990). The data from the Leonora-Yerilla area is consistent with a model of gravitational sliding (c.f. Martyn, 1987) contemporaneous with extension. The gravitational instability necessary to drive this style of thrusting may have been caused by rapid uplift of the area to the west and southwest of Leonora (Ballard magnetic domain of Williams & Whitaker, 1992) following the emplacement of gneiss domes in an extensional environment similar to metamorphic core complexes (Williams & Whitaker, in press).

D2

D2 was a major deformation event causing the development of open to tight upright macroscopic to mesoscopic folds with subvertical northwesterly trending axial planes and gently dipping fold axes. An L2 mineral elongation lineation, well developed in areas of high D2 strain, varies from gently northerly to moderately-steep northerly plunging (Passchier, 1989, 1991; VanderHor 1991).

The intensity of D2 deformation is noticeably variable. The Leonora Terrane is interpreted as a low (D2) strain area; macroscopic open D2 folding is largely restricted to the eastern margin of the terrane (Passchier, 1989). The Yerilla area, on the other hand, contains ample evidence of pervasive D2 folding although, as discussed in more detail later, D2 strain varies from domain to domain. D2 deformation appears non- coaxial and partitioned in domains of dominantly pure shear and narrow high strain zones dominated by simple shear. The latter D2 shear zones predominantly developed at granite margins and along the limbs of regional D2 folds.

A number of north-south trending dextral strike-slip shear zones are interpreted to have been activated during D2. They include narrow shear zones with offsets less than 200m near Mt Malcolm in the Malcolm Domain (Passchier, 1990, 1991), and major ductile shearzones, several tens of meters wide, at the western margin of the Melita Domain (Moriaty Shear Zone) and within the Melita Domain south of Kookynie.

D3

The third deformation stage locally produced a spaced crenulation cleavage (S3) and rare macroscopic folds. The orientation of S3 in the southern part of Fig. 3 is generally sub-vertical and trends north to north-northeast (VanderHor, 1991). Farther north, near Leonora, the foliation is more variable in orientation. Passchier (1990) reported both sub-horizontal and sub-vertical S3 depending whether the folded foliation initially was gently or steeply dipping respectively. This difference in S3 orientation may indicate that D3 comprises a number of deformation stages. However, the widespread occurrence of steeply dipping north to north-northeast trending S3 is taken as evidence that the main deformation regime during D3 was horizontal east-west compression.

Faulting

Brittle faulting, late- or post-D3, has had an important effect on the present distribution of rock types in the Leonora-Yerilla area. Two groups of faults can be recognised.

- Major strike-slip faults that re-activated older basement structures. Reactivation occurred along the Keith-Kilkenny Lineament and secondary faults like the Mertondale Fault Zone in the Minerie Terrane (Fig. 3). Structural studies of the Keith-Kilkenny Fault Zone near the Porphyry gold deposit to the south of the mapped area, indicated a sinistral movement (Allen, 1988), which is consistent with movement directions inferred for regional NNW trending wrench faults in the Kalgoorlie terrane (Swager & others, 1990). Structural observations from the Mertondale Au deposits which occur in and adjacent to the Mertondale Fault Zone suggest a complex movement history comprising a possible early component of sinistral strike-slip movement preceding a main dextral movement (Nisbet & Williams, 1990; Nisbet,1991).

- A set of conjugate faults trending NE-SW and WNW-ESE to E-W respectively. These post-D3 faults are common throughout the area and affect all other structures. The faults generally have a moderate strike-slip movement of less than 200 m. The horizontal displacement is generally dextral on NE-SW trending faults and sinistral on WNW-ESE faults. A significant component of vertical, probably dip-slip, fault movement is inferred for a number of faults from this group (for example the Braiser Well Fault and Wandary Well Fault, Fig. 3). The main effect of this block-faulting on the present outcrop pattern is shown by changes in exposed stratigraphic levels and D2 strain across the faults.

The interrelation between D3 folding/crenulation and late stage sinistral strike slip faulting along the Keith-Kilkenny Lineament is not clear but it is plausible that the two events are coeval as the interpreted D3 east-west compression is consistent with sinistral shear movement on pre-existing northwesterly trending discontinuities. The block-faulting suggests NNW-SSE extension in the latest stage of the deformation history.

Stratigraphy

A simplified Archaean geology of the Leonora-Yerilla Area is shown in Fig. 2. A detailed analysis of the stratigraphy of the area is beyond the scope of this report. However, the general distribution and interpreted structural position of rock types appears to confirm the general trend of progressive increase in felsic volcanism with time that is characteristic for many areas throughout the Eastern Goldfields (e.g. Swager & others, 1990).

Based largely on data from the eastern part of the Minerie Terrane (outside the area of Fig. 2), Hallberg (1986) proposed two major associations of rock types, an older association 1 and a younger association 2. The former association consist predominantly of thick basalt units with intercalated thin BIF horizons. High-Mg basalt appears restricted to the structurally lower part of the association; an unconformable unit of quartz-rich clastic sedimentary rocks occurs in the upper part. The lower part of Hallberg's Association 2 is characterised by abundant andesitic volcanic units interfingered with quartz-rich sedimentary rocks. This was interpreted by Hallberg to represent andesitic calc-alkaline volcanic centres and surrounding proximal alluvial fan deposits and distal subaqueous turbidites. It is overlain by a sequence of basalt, black shale and conformable gabbro- and dolerite dykes which, in turn, is overlain by predominantly pillowed basalt. The youngest part of association 2 in the Minerie area is a unit of high-Mg basalt.

In the Leonora-Yerilla Area, rocks from association 1 are restricted to the Leonora Terrane. Volcanics and sediments in the eastern part of the Yerilla Terrane (central Glenorn Domain) were assigned by Hallberg (1986) to association 2, but felsic volcanics and associated sediments common in the western part of the Yerilla Terrane were considered to post-date association 2. The differences in stratigraphy between the Minerie and Leonora Terranes in the northern part of the Leonora-Yerilla Area were outlined by Fitton (1983, and quoted in Dudley, 1987). In the Leonora Terrane, felsic volcanics, (rhyolite, dacite, and epiclastic sediments) occur structurally above andesitic pyroclastics and flows similar to those at the base of Hallberg's association 2. Tholeiitic basalts, commonly pillowed, occur both below and above the felsic volcanics. A similar sequence is found in the Minerie Terrane to the east. However, in that Terrane the andesite unit is more prominent and felsic volcanics are predominantly dacitic in composition (Dudley, 1987).

Granitoids

The petrology of granitoids in the Leonora-Yerilla Area is currently under investigation and will be reported on elsewhere. Structurally, granitoids can be classified on the basis of their tectonic fabrics and their geometrical relationships with regional structures (Witt & Swager, 1989). On this basis, the granitoids of the Leonora-Yerilla area are subdivided into three groups (Figs 2,3):

- Granite-gneiss. Orthogneiss with gneissic foliation sub-parallel to S1. Granite-gneiss is exposed in large, presumed dome shaped (Williams & others, 1989), bodies bordering greenstone belts. The Raeside Batholith is the main representative of this group in the Leonora-Yerilla area but small patches are also found within the younger Mertondale granite complex in the Minerie Terrane. Given the presence of an S1 fabric, the emplacement of the granitoids occurred syn- or pre-D1.

- Foliated granite. Granites of this group contain a penetrative steep tectonic fabric which is sub-parallel to S2 in surrounding country rock. The Smith Well Domain granite is representative of this group. The eastern and western contact of this elongate granite body are parallel to the trend of S2 and are the sites of D2 high strain zones. The S2 fabric in the granite shows evidence for high temperature deformation, suggesting syn-tectonic emplacement.

- Unfoliated granite. This group comprises granites emplaced post-D2. The granites lack a penetrative tectonic fabric although in some cases a poorly developed foliation is present at the margins. The granites generally form oval or circular bodies that cross-cut the regional foliation. In some places, for example east of Kookynie, granite emplacement followed northwesterly trending fault zones.

D2 STRAIN HETEROGENEITY IN THE YERILLA TERRANE

On the basis of exposed stratigraphy and structural style, the Yerilla Terrane can be subdivided into 6 northeasterly trending domains (Fig. 3) delineated by two major northwesterly trending high strain zones; the Melita and Yerilla Shear Zones. Field relationships suggest that these two zones structures were active during D2 and that fault movement accommodated a significant component of dextral strike-slip (Passchier, 1990; VanderHor, 1991). Oblique-slip movement along the Yerilla- and Melita Shear Zones also caused dip-slip, east-block-up, displacement (VanderHor, 1991).

A striking feature of the Yerilla Terrane is the difference between the style of post-D1 deformation in the Melita Domain, occupying the southwestern corner of the terrane, and the other five domains, collectively referred to as the eastern domains. Sediments and felsic volcanics in the eastern domains are characterised by a well developed steeply dipping S2 foliation. The foliation generally has a consistent northwesterly trend and is associated with macroscopic tight to isoclinal D2 folding. Mesoscopic evidence for D1 deformation in the eastern domains appears to have been destroyed by younger deformation events with the exception of the central section of the Malcolm Domain where macroscopic recumbent D1 folds and a gently north dipping D1 shear zone are preserved in a local D2 low-strain area (Williams & others, 1989; Passchier, 1991). An interpretive section across the Jungle Pool, Smith Well, and Glenorn Domains is shown in Fig. 4. Field mapping (VanderHor, 1991) combined with high resolution aeromagnetic studies (Whitaker, unpublished data) of the southern Glenorn Domain indicates a northwesterly trending antiform-synform structure with a wavelength in the order of 15 km. The western margin of the domain is defined by the Yerilla Shear Zone, which occupies the sheared western limb of the antiform. The Smith Well Domain, west of the Yerilla Shear Zone, comprises a northwesterly trending belt of group-2 foliated granite that can be traced for some 200km to the southeast (Boyce magnetic domain of Williams & Whitaker, in press). The Jungle Pool domain located to the west of the Smith Well Domain consist of tightly D2 folded felsic volcanics and sediments, exposed in a macroscopic D2 synform (Fig. 4).

The Melita Domain in the southwestern section of the Yerilla Terrane, west of the Melita Shear Zone, differs from the eastern domains in that D2 strain appears to have been considerably less. The central and eastern part of the area show macroscopic open to tight D1 folds that lack a regionally pervasive tectonic foliation. The D2 deformation event only locally produced a weak, northwesterly trending S2 cleavage which is oblique to a dominant east-west D1 structural trend. A penetrative sub-vertical north trending cleavage with a sub-horizontal mineral elongation lineation developed in sedimentary rocks along the western margin of the Melita Domain, adjacent to the Moriaty Shear Zone. Cleavage and lineations are sub-parallel in both the shear zone and sediments and are inferred to be related to localised D2 fault movement as discussed earlier.

DISCUSSION

A model for granite-controlled D2 strain partitioning

Any model for the structural development of the Leonora and Yerilla Terranes during D2 has to account for the following observations:

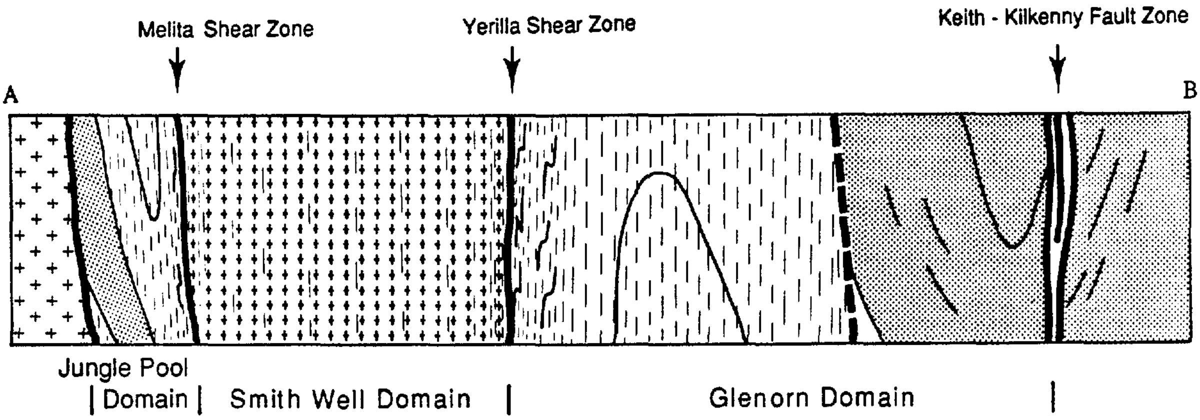

Figure 4. Interprative section across the Jungle Pool, Smith Well, and Glenorn Domains of the Yerilla Terrane (see Fig. 2 for location).

- D2 deformation appears non-coaxial and partitioned in domains of dominantly pure shear and narrow high strain zones characterised by simple shear and strike-slip transport.

- Both N-S and NNW-SSE trending shear zones were activated during D2. However, major N-S shear zones appear restricted to (group-1) granite areas.

- Large areas of inferred low D2 strain (Melita Domain west of Kookynie, Leonora Terrane northwest of Leonora) occur adjacent to group-1 granite-gneiss domains.

The role of granite intrusion in the regional deformation history of the Yilgarn Craton is a contentious issue. Some authors (Archibald & others, 1978; Campbell & Hill, 1988) postulated granite intrusion as the main cause for regionally folding. Upward movement of granite melts through the crust is inferred by those authors to have been followed by lateral movement of the melts away from the centres of intrusion, causing compression and upright folding of enclosed greenstone sequences (Cambell & Hill, 1988). This granite diapirism model, however, does not explain the structural evolution of the Kalgoorlie Terrane (Swager & others, 1990; Witt & Swager, 1989) nor can it account for the main regional upright D2 ductile folding event in the Yerilla and Leonora Terranes, where the vast majority of granite bodies either post-date or pre-date D2 (see also discussion by Williams & Whitaker, in press).

The position of large areas of low D2 strain adjacent to pre-D2 group-1 granites suggests that these granites actually may have prevented the formation of D2 folds. The areas are located in a position that would correspond to a D2 strain shadow if the granite behaved as a relatively rigid body during deformation. A possible model that accounts for the observed D2 heterogeneity in the Melita Domain is shown schematically in Fig. 5. D2 deformation in the basement granite-gneiss and lower part of the overlying greenstone sequence is localised in relatively narrow high strain zones. Higher in the sequence, farther away from the rigid granite-gneiss and in a part of the sequence that consist predominantly of relatively easy to deform sediments and felsic volcanics, D2 deformation is more penetrative and results in macroscopic D2 folding in domains of pure-shear, bordered by the basement-controlled high-strain zones. Although no significant homogeneous shortening of the granite takes place, some overall shortening can be accommodated by strike-slip movement along north-south trending faults.

The gneiss-greenstone contact in the Leonora area is interpreted to have dipped gently in a northerly direction when D1 extension ceased (Williams & Whitaker, in press). Thus, differences in the intensity of D2 deformation at the present erosion level in the Melita Domain may, in a general way, be related to exposed structural level. The area of low D2 strain west of Kookynie (Fig. 3) could correspond to level X in Fig. 5, whilst tightly folded sediments and volcanics east of Leonora and more than 50 km north of the exposed gneiss-greenstone contact could represent level Y. It should be noted that it is difficult to quantify the vertical scale of Fig. 5 because the dimensions of the D2 strain shadow will depend on a number of factors, including the lithological composition of the rock sequence and the spacing between shear zones.

Extrapolating the Melita model to the rest of the Yerilla Terrane, the pervasive D2 deformation in most parts of the Glenorn and Malcolm Domains are consistent with an exposed structural level similar to Y in Fig. 5. The development of a local low D2-strain area in the central Malcolm Domain is interpreted to be the result of the presence of a rigid granite body at relatively shallow depth. An increased metamorphic grade for the northern part of the Malcolm Domain compared with adjacent domains (amphibolite facies versus greenschist/prehnite-pumpellyite facies) reported by Passchier (1992) is consistent with this interpretation. Preliminary microstructural studies of andalusite porphyroblast from the Mt Malcolm area indicate amphibolite facies metamorphism post-D1 to early syn-D2. This timing of metamorphism may indicate that the granite underlying the Mt Malcolm area is a group-2 foliated granite rather than a group-1 granite-gneiss.

Use of the term Keith-Kilkenny "tectonic zone"

The Yerilla Terrane is an example of what is popularly known as a "tectonic zone" (Keith-Kilkenny "tectonic zone" of Hallberg, 1985). It follows from the mapping that the Yerilla Terrane comprises a number of well defined structural domains and that implied structural complexity can be explained largely in terms of D2 strain heterogeneity. The strongly deformed eastern domains exhibit the characteristics of a tectonic zone as described by Hallberg. The Melita Domain, however, shows many similarities with structural domains to the north of the Raeside Gneiss which Hallberg assigned to an unnamed geological "sector". Because of the apparent ambiguity in its definition, it is suggested that the term Keith-Kilkenny "tectonic zone" should be avoided.

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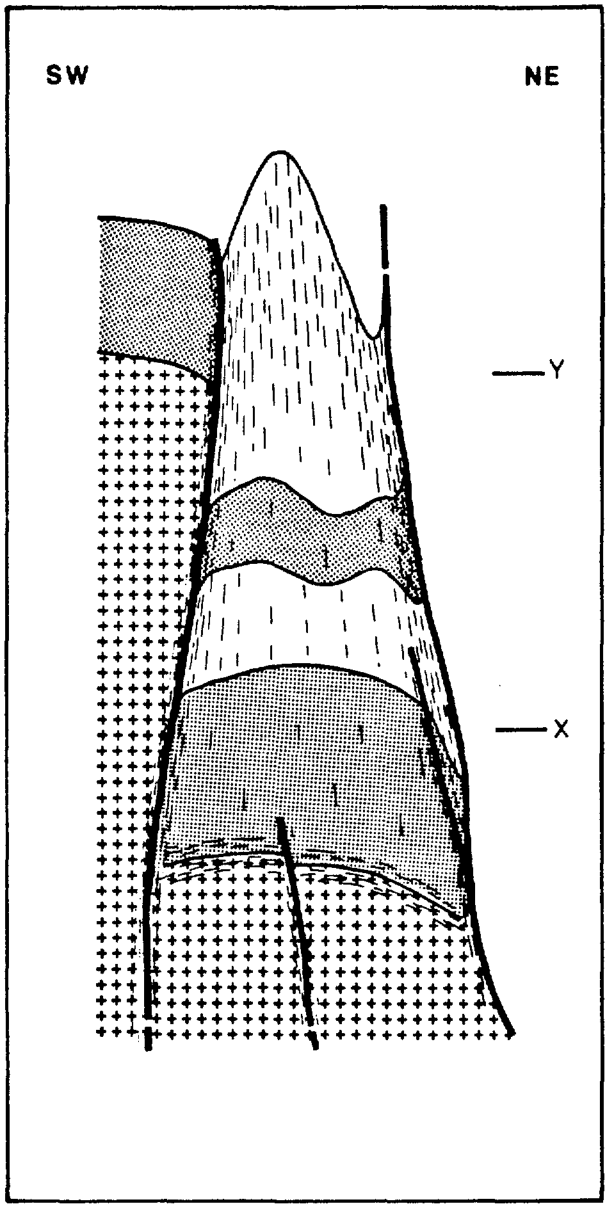

Figure 5. Schematic cross section showing inferred D2 strain distribution in an idealised rock sequence. D2 deformation is localised in relatively narrow ductile high strain zones in basement granite-gneiss (crosses) and overlying massive greenstone sequence (dark shading)(at level X). Higher in the sequence (level Y), further away from the rigid granite-gneiss, D2 deformation is more penetrative and results in the development of macroscopic D2 folds.

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