LEFROY PROJECT AREA

Structural Geology Review Lefroy Goldfield Based on Pinafore Drilling, Surface Mapping and Historical Work

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EXECUTIVE SUMMARY

Recent work undertaken by Lefroy Resources (LEF) and SRK Consulting (SRK) has provided critical information in regard to the characteristics of the mineralisation at Pinafore and Native Youth in the Lefroy Goldfield.

A structural review of selected cross sections from the drill defined resource area identified key features which supported the interpretation that most of the high grade mineralisation is associated with shallow dipping and shallow east plunging shoots within well-defined shear zones. To date detailed studies of the Pinafore, Chum and Native Youth mines have been completed. This work has been supported by previous workers that have highlighted the importance of shallow east-plunging ore shoots contained within the steeper dipping easterly striking faults within the field with 90 % of historical production (including Volunteer) attributed to them (Keele, 1996).

There are some apparent inconsistencies in the structural database that need to be overcome to further develop the structural model and more importantly the relationship of the structural model to mineralization.

It is recommended that:

- Exposure by costeaning or underground access will be essential to determine the geometry of the mineralized shears. Clearly confidence would be higher if this could be conducted on Chum, Pinafore and Volunteer.
- There appears to be a correlation of mineralization with the stronger rocks, sandstone, and it will be essential to resolve the distribution of the stratigraphy on each section, taking into account the difference of stratigraphy between north-south sections hence:
    - Analysis of grain size distribution and sedimentary sequences need to be mapped carefully to establish useful sedimentary packages

    - Multi-element geochemistry is giving some indication of supporting the lithology distribution and this aspect will need to be field checked
    - Careful logging to determine whether there are upward and downward facing sequences in the mineralized zone
- The structural database be brought up to a consistent standard by developing an acceptable structural coding system
- When oriented core is not available, core axis angle analysis would be an advantage. Where possible stable fabrics such as S_2, or locally S_1 can be used to orient structures from core axis angle measurements.

1.0 INTRODUCTION

Hermitage Holdings Pty Ltd (HHL) was requested by Lefroy Resources Ltd to update a desk study of the structural controls of mineralisation in the Lefroy Goldfield in northeastern Tasmania, initially prepared by Baxter and Keele (2004). That study was based on published information including Groves (1965), Reed (2001, 2002) and Keele (2004a & b) together with aeromagnetic and radiometric data acquired by UTS Geophysics and prepared for interpretation by Andrew Boyd. This study includes surface mapping and core logging by John Baxter and Russell Fulton.

The Lefroy Goldfield was the centre of discontinuous gold mining between 1869 and 1911 during which time approximately 180,000ozs of gold was recorded as being produced. The records indicate that the average mined grade of the field was in excess of 30g/t Au, with most of the mining being restricted to a depth of approximately 30m however some mining occurred to depths of 200m. Testing of some of the reefs at depth, up to 380m, by both underground development and diamond drilling shows that the reef structures continue at depth and in places are mineralised at economic grades.

2.0 GEOLOGY

2.1 Regional Geology

Reed (2001) summarises the tectonics of the Northeastern Tasmania as follows: *"Recumbent folding in eastern Tasmania affected turbidites containing Lower to Middle Ordovician (Bendigonian Be1 to Darriwilian Da3) fossils, but not stratigraphically overlying turbidites containing Silurian (Ludlow) graptolites, and is of a timing consistent with Ordovician to Silurian Benambran orogenesis on the Australian mainland. Two subsequent phases of upright folding post-date deposition of turbidites containing Devonian plant fossils but pre-date intrusion of Middle Devonian granitoids, and are of Tabberabberan age. A closely spaced disjunctive cleavage (S_2), associated with the first phase of Tabberabberan folding, everywhere cuts a slaty cleavage (S_1) associated with the earlier formed recumbent folds. However, refolding associated with development of S_2 is not always clear in outcrop and it is proposed that coincident tectonic vergence between the two events has resulted in reactivation of recumbent D_1 structures during the D_2 event. The transition to rocks not affected by recumbent folding coincides with a marked change in sedimentology from shale to sand-dominated successions. This contact does not outcrop but coincides with the Pipers River (Figure 2), from seismic data, appears to dip moderately to the east, and can only be explained as an unconformity. The current grouping of all pre-Middle Devonian turbidites in eastern Tasmania into the one Mathinna Group is misleading in that the turbidite sequence can be subdivided into two distinct sedimentary packages separated by an orogenic event. It is proposed that the Mathinna Group be given supergroup status and existing formations placed into two new groups: an older Early to Middle Ordovician Tippogoree Group and a younger Silurian to Devonian Panama Group."*

The Lefroy Goldfield is located in the Stony Head Sandstone within 2km of the contact with the Turquoise Bluff Slate (Figure 2). The Stony Head Sandstone is a thick bedded and typically unfossiliferous sandstone dominated succession (Reed, 2004). The Turquoise Bluff Slate by contrast is predominantly fine-grained rocks (shale, mudstone, chert and fine-grained sandstone) (Reed, 2004).

The rheological contrast between these units is a likely focus of deformation and mineralisation at Lefroy. Peak metamorphism does not correlate with stratigraphic position and does not change across most of the large faults, indicating that peak metamorphism occurred after east directed thrusting and as a result of crustal thickening. This indicated metamorphism is post- D_1. All of the mineralised host rock at Lefroy is within the Tippogoree Group of the Mathinna Supergroup and virtually all is within the Stony Head Sandstone.

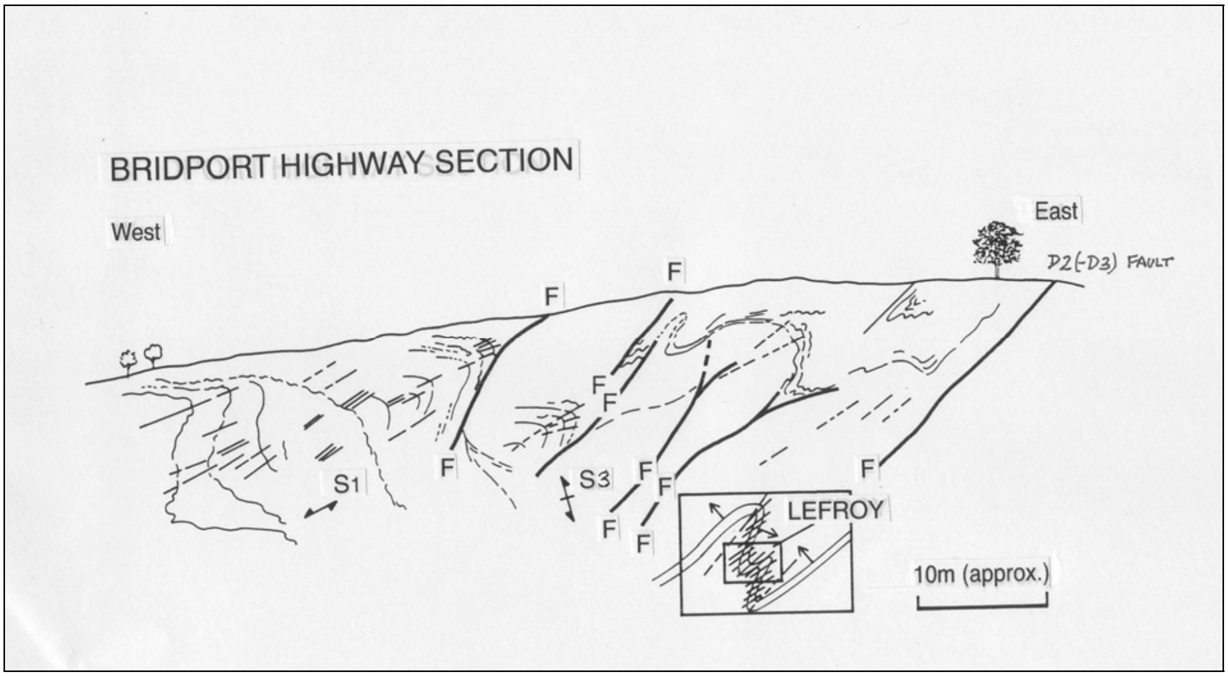

Figure 1. Sketch of the road cut at Volunteer: note the section has been made looking north from the south side of the road cut (499370E, 5448500N)

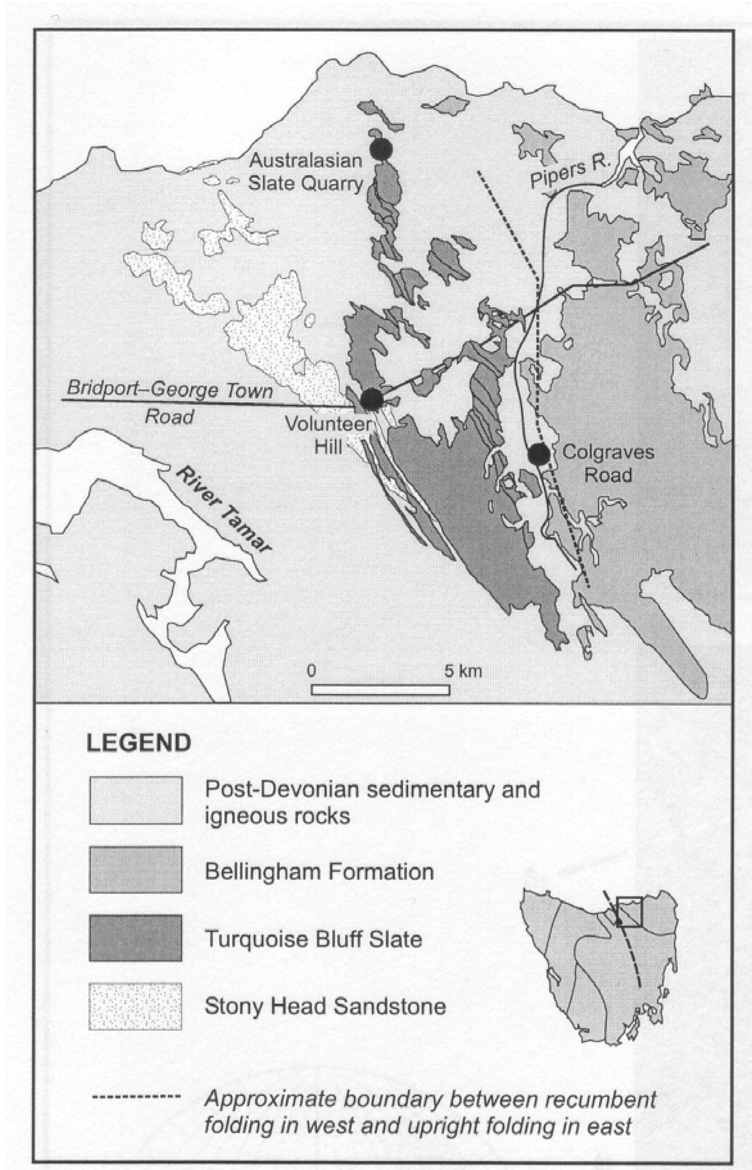

Figure 2. Map showing regional distributiuon of rocks west of the Scottsdale Batholith (Reed, 2004).

The earliest deformation is a sequence of thrusts and accompanying folds that have transport of the hangingwall to the northeast (500578E, 544713N, 148RL) similar to that seen in the Australasian Slate Quarry (504600E, 5456500N) by Reed (2004). The folds (

Figure *3*a) are associated with a flat dipping stripy cleavage (

Figure *3*b) best seen in the Stony Head Sandstone. The axial surface of the folds dip <15^{o} to the east and the folds plunge shallow to the north. Pyrite is seen smeared into the stripy cleavage. The deformation appears to be the regional D_1 deformation identified by Powell and Baillie (1992) and Reed (2004).

Figure 3. Recumbent Folds a) hinge zone of fold b) stripy cleavage axial planar to folds.

The second phase of deformation can be seen clearly in a road cutting where steeply dipping spaced cleavage cuts the stripy cleavage (Figure 4). This fabric is similar to that described by Reed 2004 (Figure 8) and seen exposed in a road cutting at 512930E, 5452394N. The axial surface of these folds dips to the southwest at 50-70^{o}. Plunge of the folds is shallow to the south. This deformation appears to be the regional D_2 identified by Powell and Baillie (1992) and Reed (2004).

Figure 4. Spaced Cleavage (D2) cutting stripy cleavage (D1) at 498527E, 5448271N.

Reed reports that only folds that are upright in style (D_2) are present east of the Pipers River leading him to speculate that there is an unconformity separating these two structurally distinct domains, in which the Benambran-aged (or late Delamerian?) recumbent structures (D_1 at Lefroy) are absent to the east.

The third deformation event (D_3) in the Lefroy district can be seen locally as brittle faults (Figure 5c) of steep dipping faults and associated drag folds (Figure 5a & b). The faults generally strike east-west and dip steeply to the north or south. The sense of movement is oblique right lateral with a significant normal component. Minor folds associated with the faults plunge shallowly to the southeast (Figure 5b). Quartz veins are deposited in the fault planes and these veins are associated with gold mineralisation. This deformation is not consistent with the regional D_3 described by Reed (2004) as the orientation is markedly different and the style of faulting is normal rather than reverse (Reed, 2004). This deformation is associated with mineralisation at Lefroy.

(a) (b) (c)

Figure 5. Normal faulting and associated folding a) oblique drag folds on fault 498516E,5448267N; b) drag fold in costean 50004E, 5448414N; c) D_3 east-west veins cut by D_4 fault veins 499747E, 5448913N.

The last deformation identified in the district (D_4) is a right lateral brittle fault array that partitions the stratigraphy. The faults strike south-southeasterly and dip steeply to the east from surface mapping. Movement on the faults appears to be limited probably less than 10m in strike slip. This deformation event was not identified by Reed (2004).

The crustal structure beneath the Lefroy deposits has been modelled by Keele et. al., (1994) and Reed (2004). The regional model is of a thrust terrain during D_1-D_2 that created the regional lithological architecture. During the D_3 event, northerly trending sinistral strike-slip faults accessed fluids from the base of the sequence and developed the easterly trending secondary shears. The fluids were sourced from D_3 detachment faults that possibly daylight beyond the Beaconsfield gold mine on the western side of the Tamar Fracture Zone (Figure 2). The steeply dipping easterly striking D_3 vein structures and accompanying faults short-circuited the gold-bearing fluids at depths of between 5 and 10 km. Arsenopyrite geothermometry data suggests that Lefroy was closer to the fluid source than Beaconsfield; Lefroy fluids were hotter (460-470° C) than Beaconsfield (370-440°C, unpublished data).

2.2 Deposit Geology

Mineralisation at Lefroy is similar to other turbidite hosted reef-style deposits in Phanerozoic terrains where competency contrast between adjacent lithologies (sandstone and shale) during deformation is recognised as a major focus for reef development and associated mineralisation. In a global sense the hanging wall of the reefs is dominated by siltstone units, while sandstone is predominant lithology in the footwall (SRK, 2005). Most mineralisation is within sandstone units, the distribution of Au in sandstone is shown in
Figure *6*. It is important to note that in the lower grades of gold; gold and arsenic correlate, but not in the higher grades of gold.

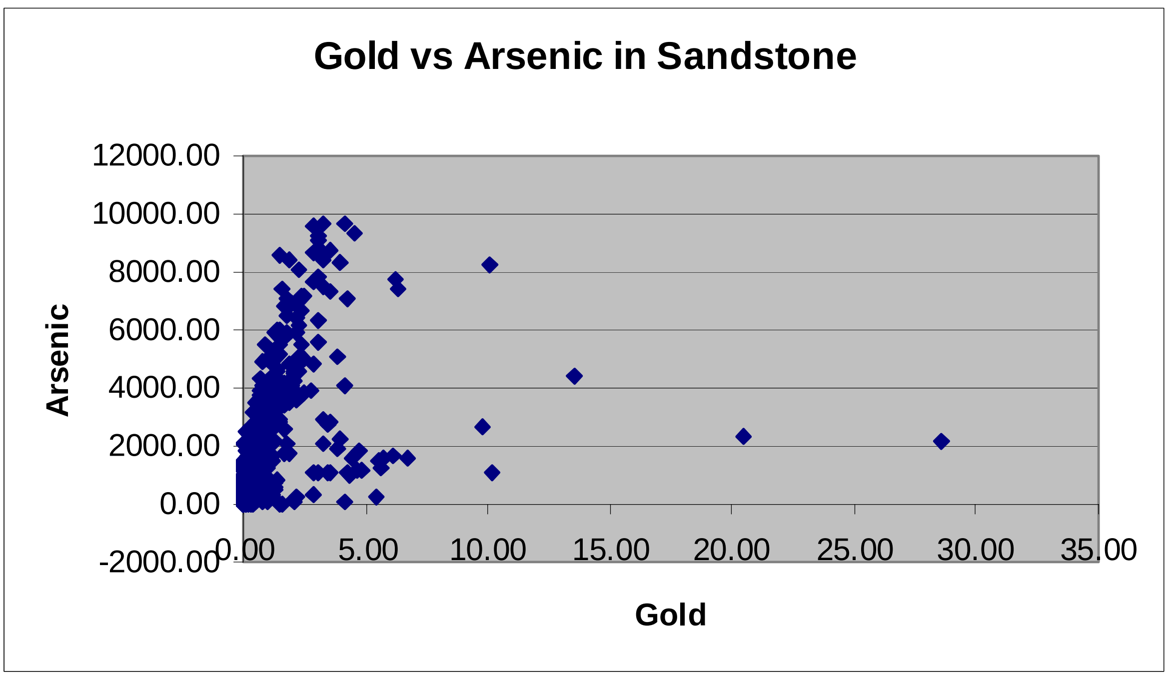

Figure 6. Arsenic vs Gold in Sandstone at Lefroy.

A similar analysis of the siltstone units (
Figure *7*) shows that in the siltstone units, gold and arsenic correlate fairly well but with low grades.

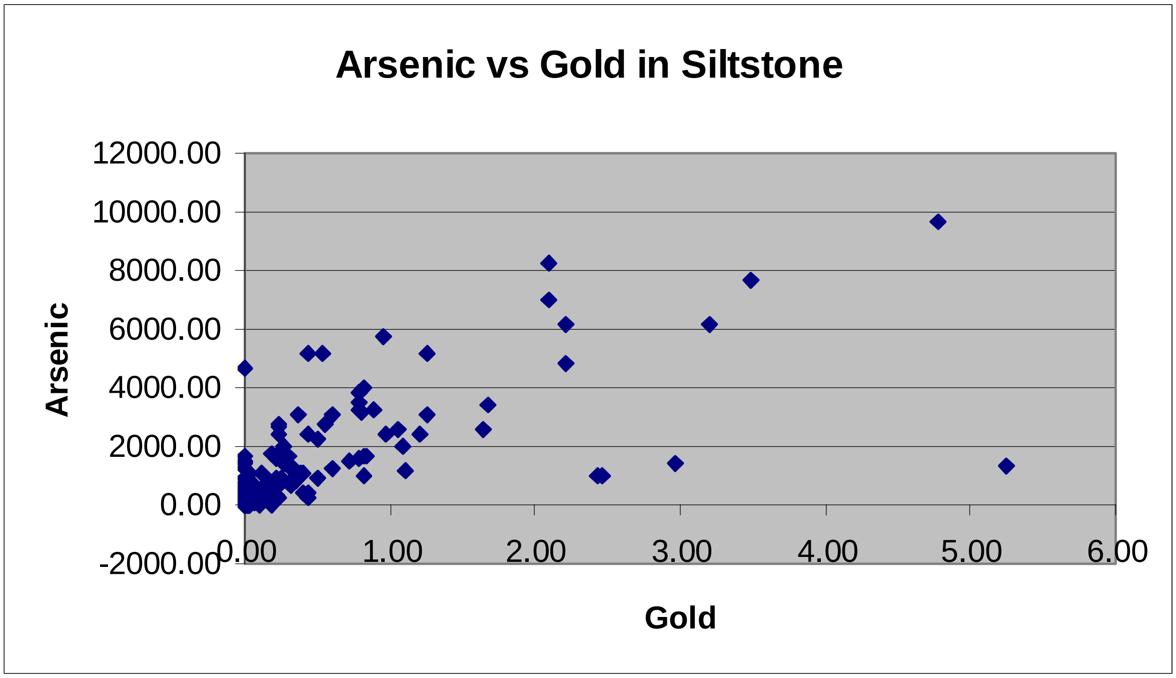

Figure 7. Arsenic vs Gold in Siltstone at Lefroy.

The analysis shows that 98.6% of all results are less than 2 g/t Au suggesting that the isolated higher grades are a separate population. This is indicative of two mineralising events.

2.3 Geological Observations

Early Deformation:

- Bedding, S_s/S_c, quartz-carbonate-chlorite$\pm$ pyrite veins and flat to shallow west dipping faults are related to this deformation
- Folds are dominantly recumbent often with faulted out limbs
- Intersection lineation, fold plunges and elongations of fragments consistently plunge $10^{o}\rightarrow340^{o}$, but locally there are flat southerly plunges
- Veins in this deformation are commonly folded, dismembered and rotated with very little to be determined from their tips
- Veins are commonly associated with the slate sandstone contacts

- Shallow west dipping to sub-horizontal stripy cleavage is very common in the sandstones
- Cleavage is refracted in the slate units (S_c)
- No mineralization is associated with these structures

Mineralising Structure (Locally known as the Orange array)

- Quasi-planar, predictable zone containing low-grade mineralization
- High grade intercepts in this plane, not yet connected down plunge
- Fabrics dip steeply north and south with lineations (mainly crenulation) plunging shallow to about 100^{o}
- Marked by vein arrays, fracture sets etc… but not faults and shear zones
- Zone likely to be the expression of a fault or shear at depth
- By analogy it looks like an oblique strike slip system with left-lateral movement (possibly)

Fault and Shear Structure (Locally known as the Blue array)

- Zones of brittle failure up to 5m wide
- Tend to have shale units involved
- Not predictable during drilling
- Appear to disrupt mineralized zones
- Geometry poorly constrained

It is likely that the mineralized and fault and shear structures are related to a single event. Russell would like the fault and shear array to be younger than mineralization.

2.4 Logging Notes

Veins:

- Early bedding/S_s parallel quartz ± chlorite ± carbonate ± pyrite.

- Narrow carbonate ± pyrite, quartz-carbonate ± pyrite and quartz veins increase in frequency near mineralization. Carbonate veins are typically cream to tan. Minor arsenopyrite in veins more typically in host rock adjacent to veins. Quartz carbonate veins typically display cream to tan carbonate rims with quartz centres.
- Minor breccia fault/veins with quartz or quartz-carbonate matrix with disseminated arsenopyrite in clasts and adjacent host rock but rarely in vein matrix.

Sulphides:

Pyrite

Host rock associated:

- Early pyrite smeared out parallel to S_1 and folded by S_2 crenulation. Especially in pyritic slates. Strings of blebs parallel to S1. e.g. LFD041 256.6-257.6 metres.
- Subhedral to euhedral, fine grained disseminated pyrite, rarely in trails parallel to S1. Increasing near mineralisation.
- Late, up to cm size, euhedral pyrite post S1 and S2. More common in finer-grained units. Rare pressure shadows parallel to S2 – LFD035 210.7 metres.

Massive:

- Within mineralized zones, rare intervals up to 10cm of massive pyrite. e.g. LFD036 149.5 metres. Grading into pyrite matrix breccia e.g. LFD047A 148.7 metres.

Breccia-related:

- Occurs as clasts, up to cm size, in late brecciated faults with siliceous matrix – LFD041 252.5 metres.
- Occurs as massive matrix and as finer network – LFD047A 148.8 metres.

Vein-related:

- Fine to cm sized anhedral masses, fracture coating, slickensides. Minor.

Arsenopyrite:

Host rock associated:

- Very fine to fine grained euhedral rods disseminated with no obvious orientation in sandstone, siltstone and fault gouge. Common.

Vein-related:

- Coarser anhedral masses of arsenopyrite up to 1-2mm in quartz veins. Rare.

Pyrrhotite:

Host rock associated:

- Strings of blebs, up to 2-3mm x 10mm, elongate parallel to S1. Associated with pyrite blebs in similar orientation. Associated with green sericitic/chloritic or black chloritic siltstone/mudstone. LFD035 198.0-199.5 metres; LFD037A 261.5-262.0 metres.

Vein-related:

- At Golden Point and Crown, 3-5mm anhedral mass of pyrrhotite in quartz vein - LFC015 metres.

Alteration:

Sulphidation:

- Disseminated subhedral to euhedral fg to mg (cg) pyrite and euhedral vfg to fg rods of arsenopyrite. No preferred orientation except for minor occurrences of S1 sub- to parallel occurrences of disseminated pyrite. Arsenopyrite predominantly associated with silicified sandstones but also occurs in fault zones in carbonaceous fault gouge, breccia and clay.
- Associated with silicification away from main mineralisation.

Silica:

- Patchy, weak to intense silicification. More prevalent proximal and within mineralization. Associated with increased quartz veining. Strongly silicification, quartz flooding and stockworking not very sulphidic within main lode.
- Away from main mineralisation, associated with sulphidation – e.g. LFD031 218.0-222.0 metres.

Carbonate:

- Increased carbonate and quartz-carbonate veining proximal to main mineralization.

- Patchy pervasive carbonate alteration within coarser sandstones – leaching gives weak to moderate honeycomb texture.
- Fracture fill tan carbonate 1-5mm euhedral rhombs – LFD043 178.9-181.4 metres.

Sericite:

- Patchy minor sericite alteration - LFD047A 149.1-151.4 metres.
- Better developed at Native Youth.

Black:

- Rare. Patchy swirls of black-dark green alteration? Biotite/chlorite? LFD048 109.0 – 109.5.

2.5 Structure:

S_s

Distinctive well-developed spaced cleavage in sandstones (stripy cleavage). Closer spacing in finer units, becoming ~ slaty.

S_c

Crenulation cleavage developed in siltstones and slates. Incipient in coarser siltstones and not apparent in sandstones

Faulting

Major faults

- Major fault at Pinafore occurs mainly south of the main lode. Referred to as the "splay fault" in the literature but appears to be a major or several structures.
- Increased ductile folding and deformation within a few metres of the fault.
- 5 to 13 metres intercept downhole. Comprises ~ 50% fault gouge and breccia and 50% broken, fissile core.
- Mostly unmineralised but in places mineralised with disseminated arsenopyrite in fault gouge (including clay) and sandstone and siltstone. No fault fabric obvious and disseminated mineralisation is randomly oriented.
- Not much quartz, where present it is broken or deformed.
- Minor yellow-brown carbonate which is more prevalent at the Native Youth where it is present in places as a matrix to clasts of randomly-oriented crenulated siltstone, e.g. LFD043 ~174.0-178.0
- LFD036 - Mineralisation occurs on each side of the splay fault but not in it. Appears to be cut by the fault?
- LFD035 – Fault occupies three distinct zones from 139 – 178 metres downhole. From 139-149; 157-160; 171-178 metres.

Minor faults

- Minor faults away from main mineralisation carry some mineralisation in adjacent host rock.

2.5.1 Summary

- Mineralisation is post S_s and S_c, arsenopyrite never shows alignment
- Mineralisation associated with faulting and carbonate and quartz-carbonate veining.
- Mineralised veining and faulting is post S_s and S_c.

The mineralization at Lefroy as typified by the historic development, geology, structure and geochemistry of the Pinafore, Chum and Native Youth lodes has the following characteristics (Baxter and Keele, 2004; SRK, 2005):

- Mineralisation is partitioned and located between NW-trending sinistral strike-slip shears formed in association with D_2 but reactivated during D_3 and possibly D_4,
- Sinistral reactivation of the NW-trending shears during D_3 resulted in the formation of an E-W striking en relai array of vertical to steeply N or S dipping mineralized shears that are the lodes in the Lefroy Goldfield,
- The Lefroy Goldfield mineralized corridor appears to propagate northward from the Turquoise Bluff-Stony Head Formation contact, a contact that dips toward the southwest,
- The E-W mineralized shears contain flexures that separate well-mineralized (>5g/t Au) and poorly mineralized (<1g/t Au), the axis of the flexures plunge shallowly to the east,
- There is an interaction between the E-W mineralized shears and pre-existing fabrics (possibly S_1 foliation, D_1 thrusts or bedding) that imposes a gross westerly plunge to ore shoots,
- Minor (generally less than 2m) right lateral faulting of the lodes has occurred with the formation of north-easterly striking D_4 faults, this has partitioned the lodes in places.

The Pinafore Lode is better understood as the majority of geological and structural data has been obtained here from drilling. However the model developed at Pinafore can be applied satisfactorily at Native Youth (SRK, 2005). Both deposits are located in brittle shear zones, both have an overall 30^{o} easterly plunge of the mineralisation.

2.5.2 Structural Analysis of Drill Hole Data

Analysis of geological mapping and logging of core has established a well-defined deformation history in the Lefroy district:

The plunge of the intersection of faults and the axis of perturbations on fault planes associated with D_3 and mineralisation, plunge shallowly to the east southeast. This direction is correlated with the plunge of high grade shoots in the historical workings.

2.5.3 Stereographic Net Analysis

Mapping of structures in the Lefroy district has been dominated by data obtained from road cuttings and isolated pits (Keele, 2004; Reed, 1994) and this is also the case with the basic data set reported herein. Orientation data from core is also reviewed however it is not as effective as might be as there are very few observations from orientation of structures associated with mineralisation.

Surface mapping (Figure 8) and the core mapping (Figure 9) from LFD064 completed during this survey clearly identified structures associated with the D_1 event consisting mainly of recumbent folds with well developed shallowly south plunging hinges and associated faults (thrusts). Lineations shown in Figure 8 are consistent with the shallow southerly plunge of recumbent folds mapped in the main road cutting by Richard Keele (Figure 1 and Figure *3*).

The folds contribute the architecture to the region with partitioning between shallow west-southwest dipping thrusts. Asymmetric recumbent anticlines provide both upright and overturned limbs within the sequence (see Figure 18 of Reed, 2004). It appears that sandstone units are more coherent during D_1 deformation whereas shale units may have deformed in a more ductile manner.

D_2 is well-defined in outcrop as an upright southerly plunging fold. The predominant structures identified during core logging (
Figure ***10***) by Russell Fulton appear to be consistent with the development of upright folds identified as D_2 in a previous section. This fold phase has folds that plunge to the south at a gentle to moderate angle as observed in outcrop. The stereographic net in
Figure ***10*** may require further verification as it is not consistent with the core readings Figure 9. From the core measurements the axial surface of the D_2 folds $70^{\circ} \rightarrow 070^{\circ}$ and is marked by a crenulation or spaced cleavage S_2 (Figure 4).

There are no folds identified with D_3 in the Lefroy area. However there are a number of faults and veins that cut the S_2 cleavage and that are known to contain mineralisation. The stereographic net data presented in Figure 11 shows the structures (only 22) that have been measured in mineralized rock and all of the faults measured in core from the district. It is clear this group of measurements comes from a dip-slip array with an intersection lineation plunges very shallowly to the east or west. Field observations suggest the fault array has an oblique normal sense of movement (
Figure *5*). This array is consistent with the lode orientation at Lefroy. The implication of this observation is that shoots of mineralisation will be sub-horizontal within the fault planes.

There is no stereographic net data that is confidently associated with D_4. However there is a suggestion of a strike-slip array marked by the distribution of quartz veins on the stereographic net. This array has an intersection lineation plunging steeply to the southeast. From mapping D_4 faults have a southeasterly strike, dipping steeply to the east that would be consistent with this array and the veins would be consistent with a right lateral strike slip array. Further work is required to define this array.

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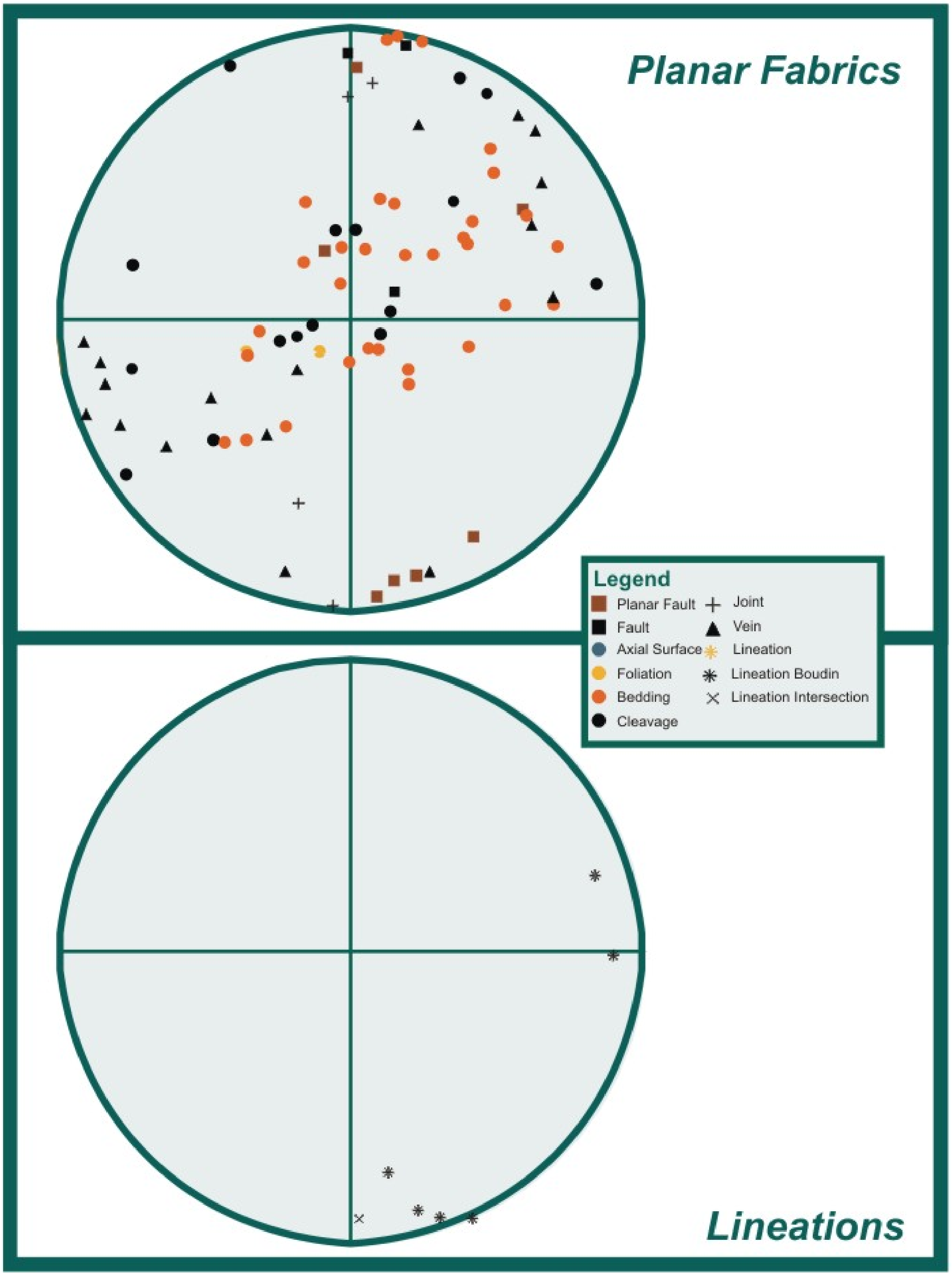

Figure 8. Stereonet from surface mapping, Lefroy District.

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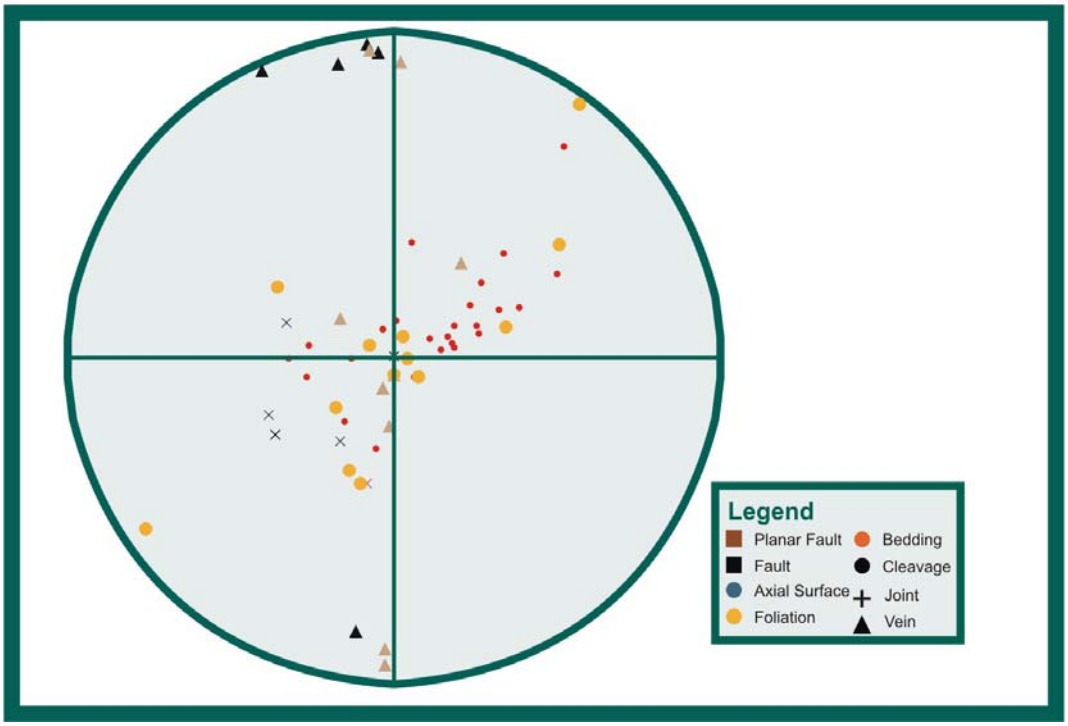

Figure 9. Core structural mapping by Russell Fulton on LFD064.

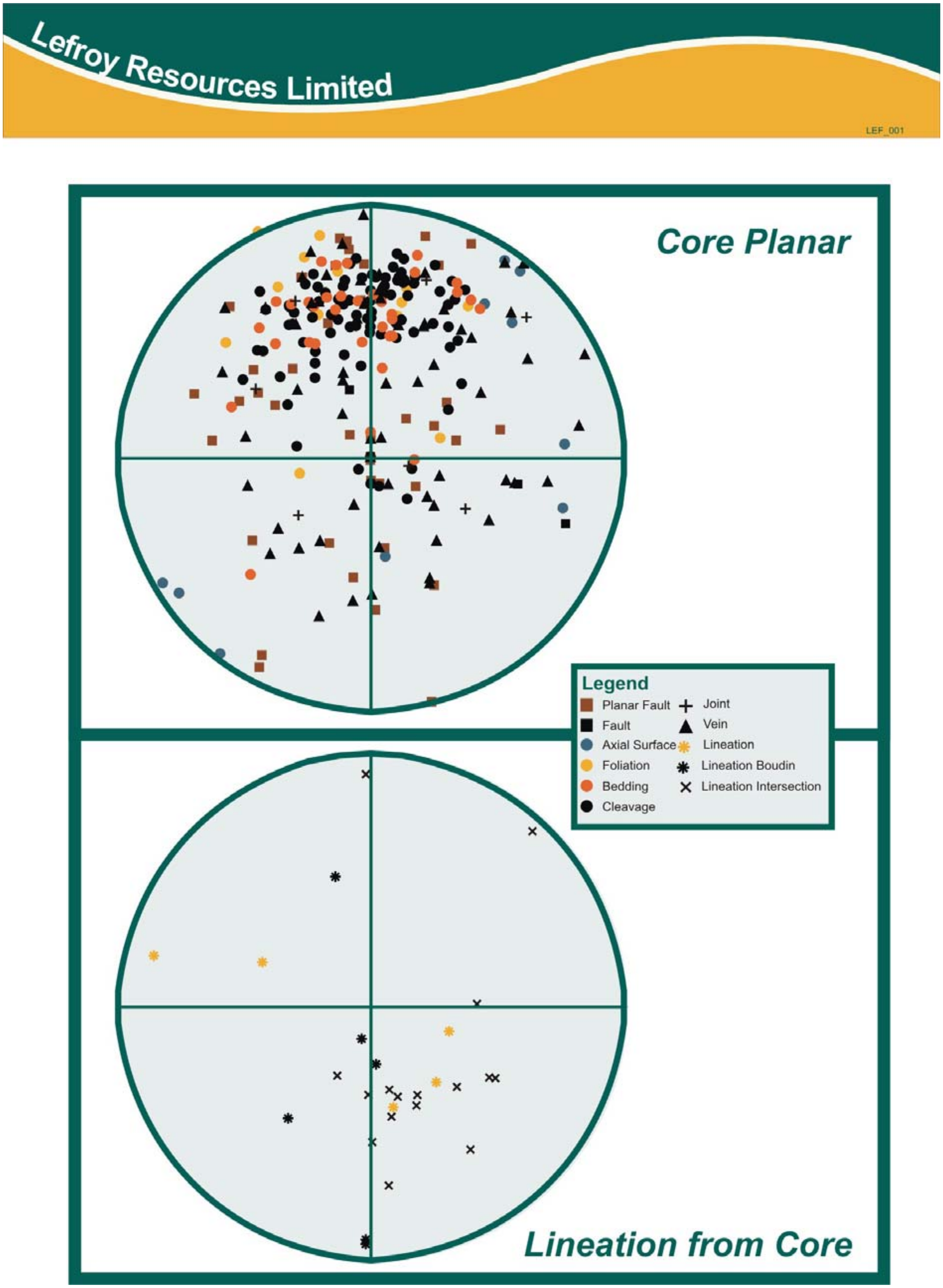

Figure 10. All core data collected by Russel Fulton.

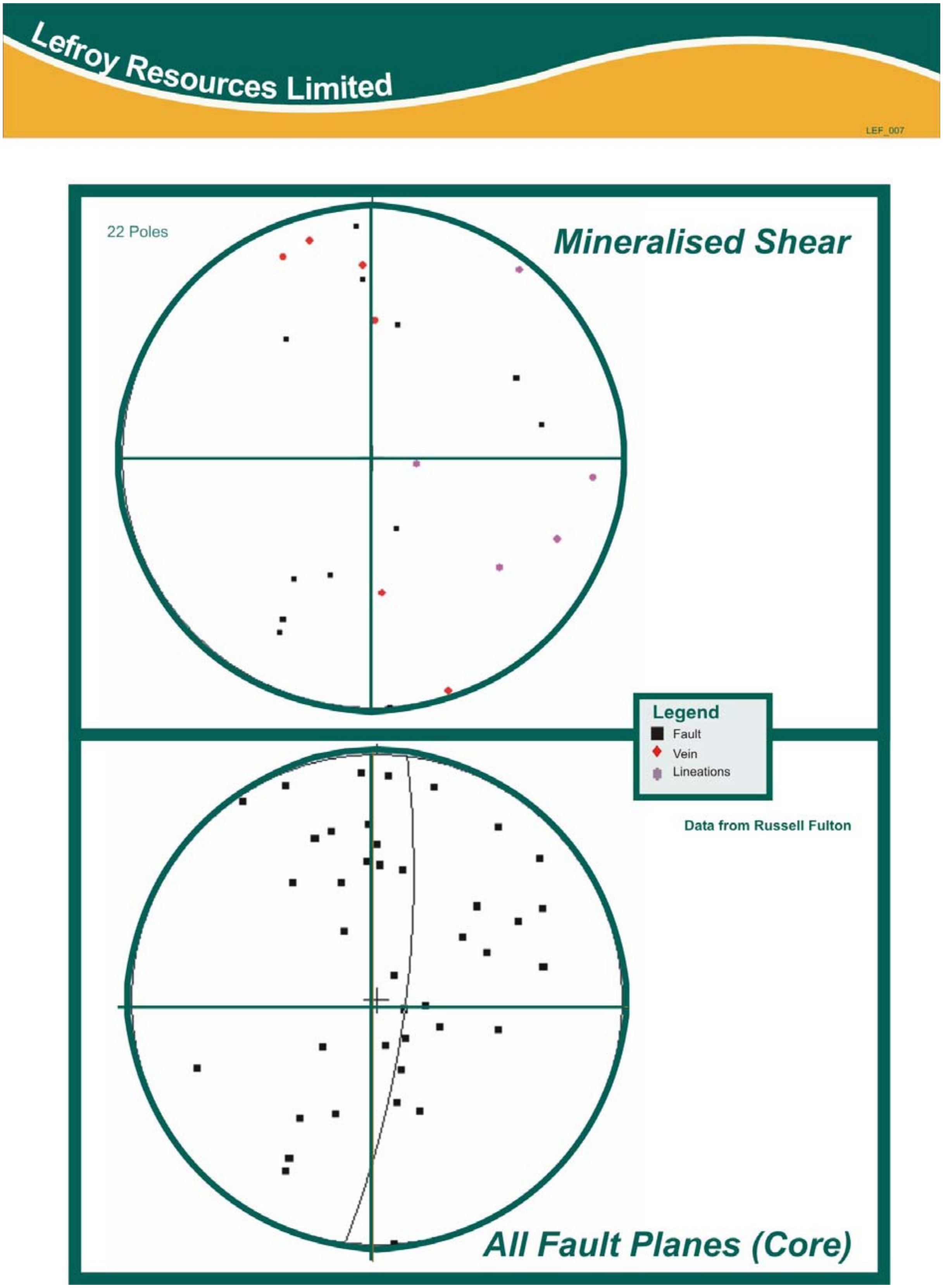

Figure 11. Core measurements in mineralized rock and fault planes.

3.0 MODELING STRUCTURES AT LEFROY

The fact that the axes of folding is nearly at right angles to the mineralized structures in the Lefroy Goldfield make it challenging to picture the relationship between stratigraphy, faulting and mineralization. In an attempt to resolve this visualization problem two attempts were made to represent the structure as currently interpreted.

3.1 Clay Modelling

Modelling clay was deformed in a similar manner to that interpreted with the result that the complicated distribution of lithological bands and structural plane could be examined in Figure 12.

The difference in patterns of the unit distribution is clear on sections perpendicular to the D_3 faults. When interpreting the sections care needs to be applied to connection lithological units.

3.2 Deformation Model

To summarize the deformation history cartoon (
Figure *13*) attempting to summarize the effects of each deformation stage and the distribution of the faults and rock units. These models show that the distribution of rock types in section is complicated by the dihedral angles between fault planes and the axial surfaces of the folds.

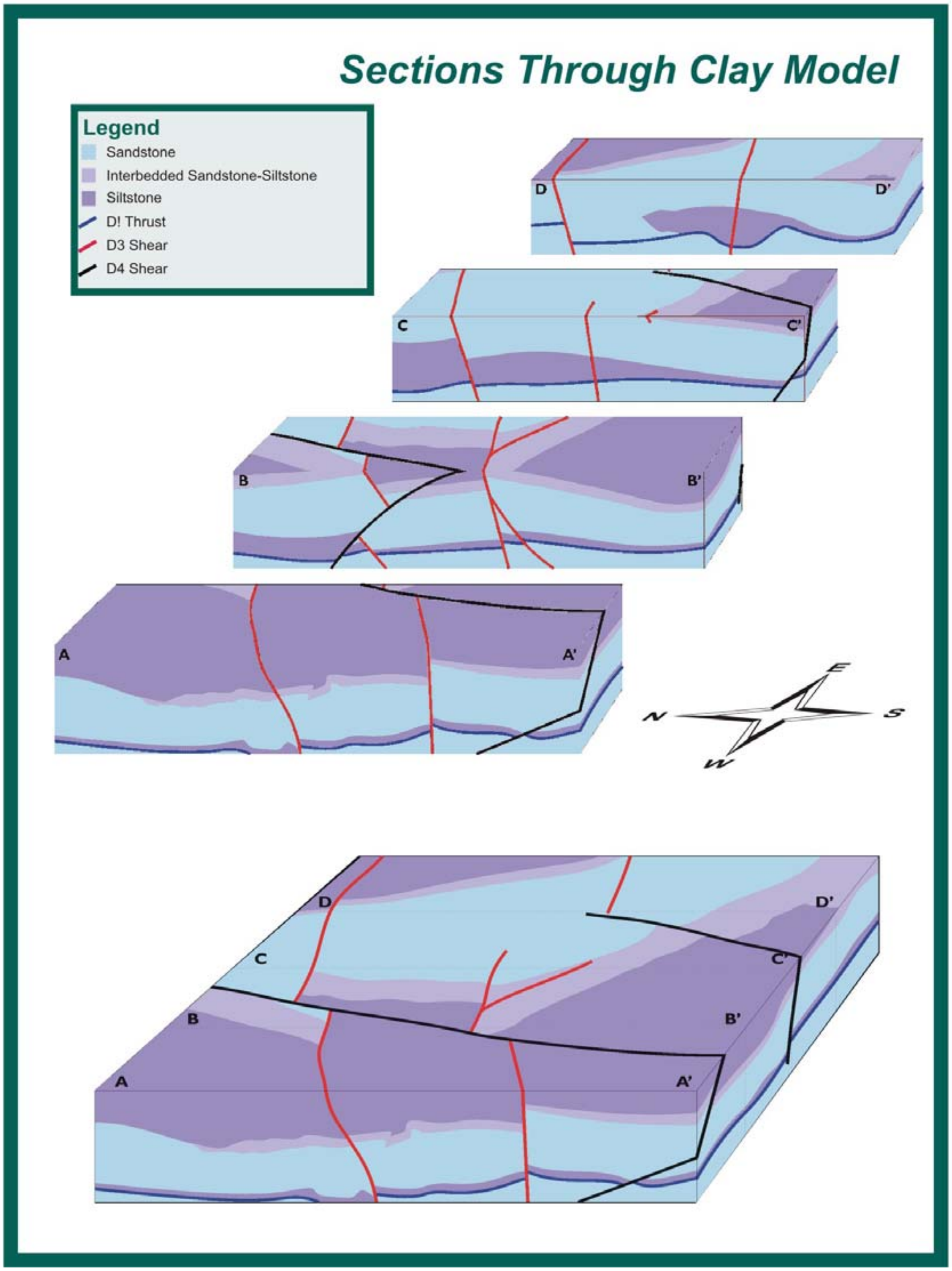

Figure 12. Clay Modelling of Deformation at Lefroy.

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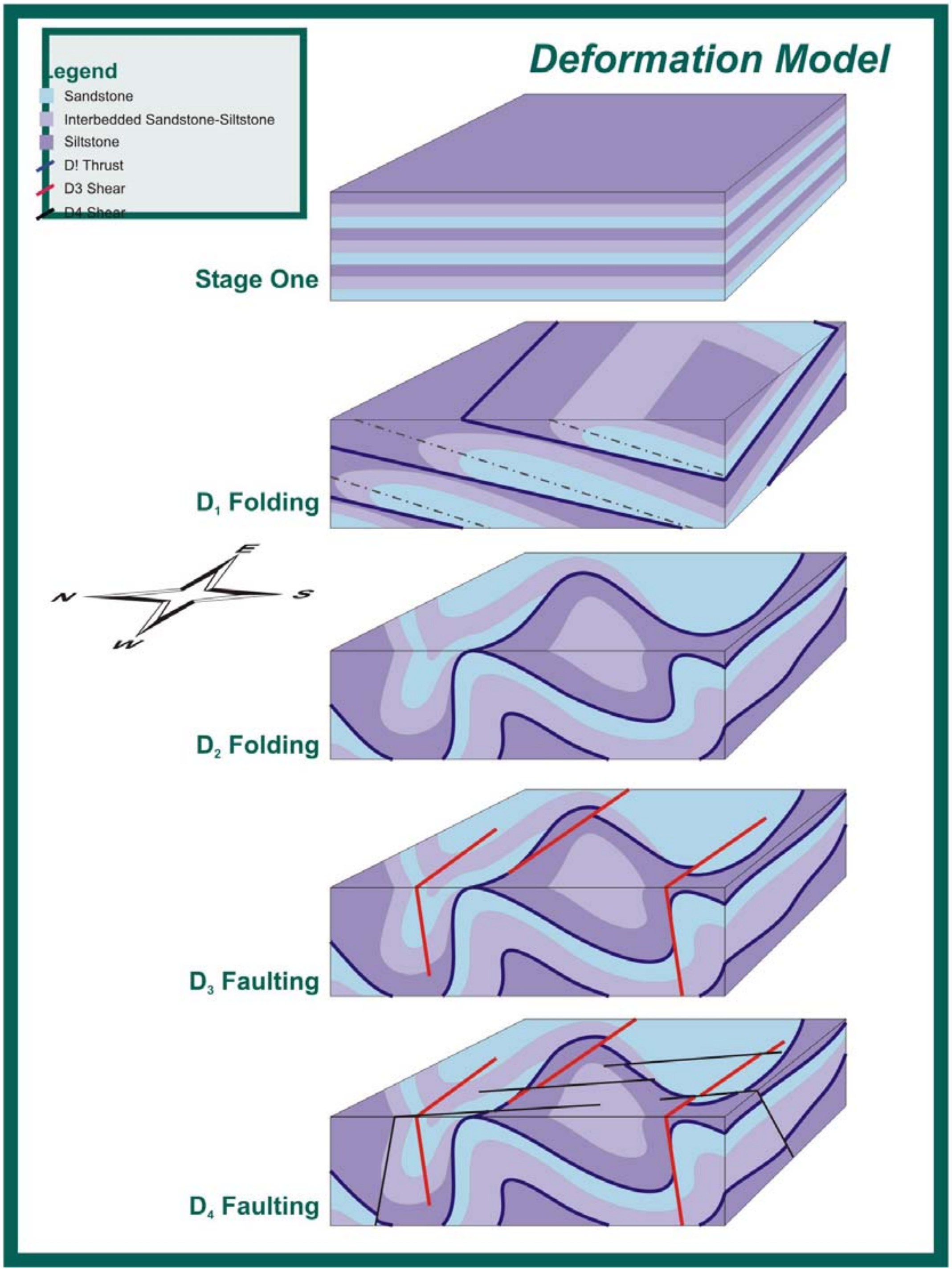

Figure 13. Deformation Model.

3.3 Structural Observations and Mineralization

There are no direct observations that can be identified to define the relationship between deformation and gold mineralisation. It is clear that pyrite mineralisation is deposited during D_1-D_3 events. Pyrite is smeared out parallel to the S_s (S_1) cleavage and folded by crenulation cleavage formed during D_2. Most pyrite associated with D_3 structures is euhedral, or brecciated. Arsenopyrite is not seen deformed in the deposits indicating late stage deposition. Carbonate and quartz veining appear to be associated with all deformation events, veins do not appear to attract gold mineralization, although (particularly the D_4 array) appears to attract arsenopyrite.

Gold mineralization clearly post-dates D_1 and D_2 cutting all fabrics associated with the deformation events.

A review of mineralization on the stereographic net is not very helpful. There is a weak association of gold with the interpreted D_3 array, arsenic appears to be associated with fabrics from both D_1 and D_4 and silver has no particular association (Figure 14).

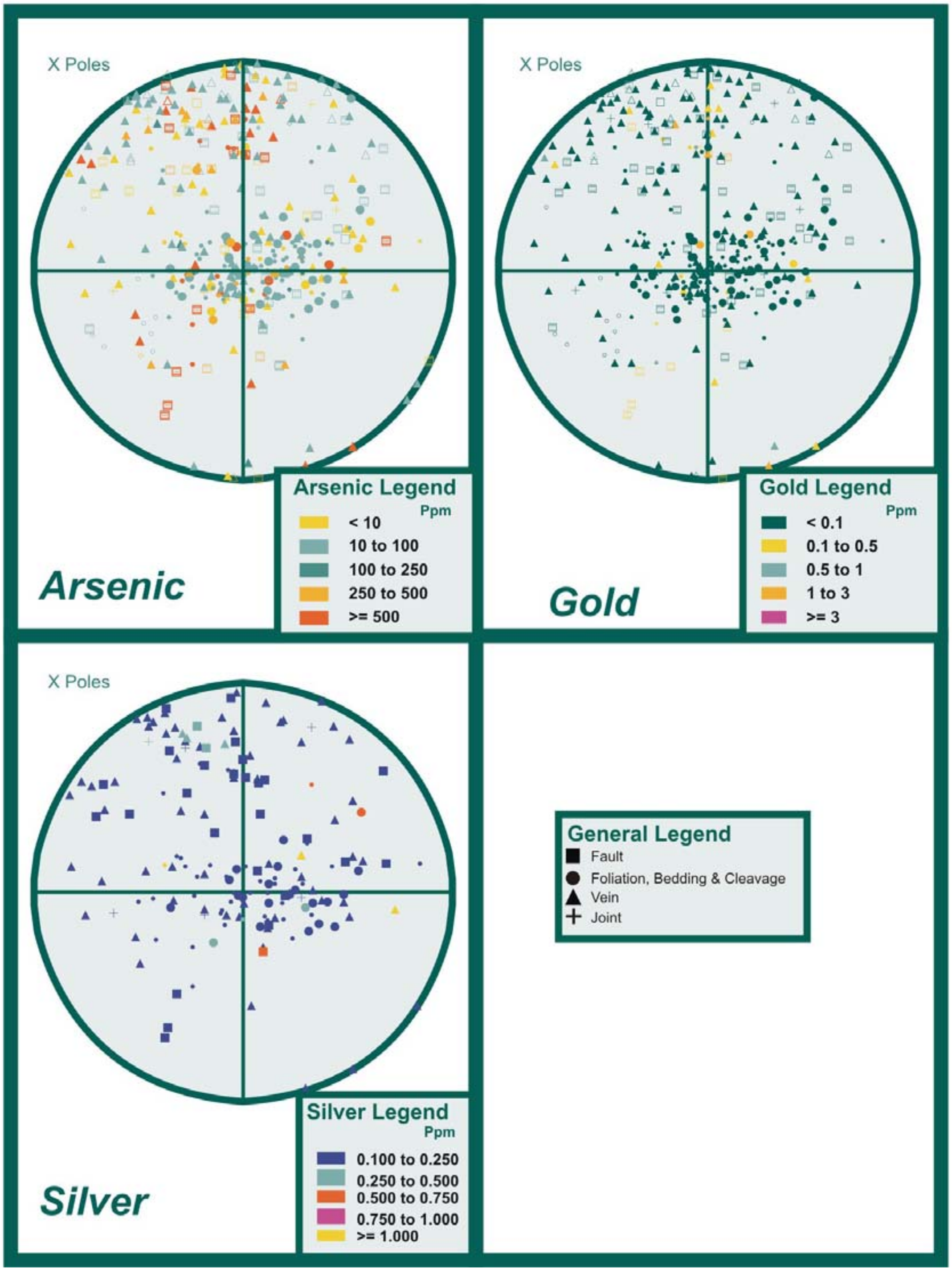

Figure 14. Distribution of Gold, Arsenic and Silver related to structures.

4.0 CONCLUSIONS AND RECOMMENDATIONS

This study has updated the structural study by Baxter and Keele (2004) by using mapping information obtained from the vicinity of the Lefroy Goldfield. It does not attempt to be a study of the regional deformation of Northeastern Tasmania such as that developed by Reed (2004).

The principal conclusions are that:

- Four phases of deformation are identified;
  - D_1 and D_2 are essentially architecture building within the Lefroy District, the axial surfaces strike northerly and fold hinges plunge southerly. Although pyrite is deposited during D_1 there is no indication of any gold mineralization associated with either event. The main contribution D_1 has in the area is that depending on whether a section is in the hinge, or on the limb of a D_1 fold the thickness of sandstone units will be greater or lesser respectively.
  - D_3 is a brittle fracture event that has pyrite, arsenopyrite and gold mineralization associated. D_3 faults focus the mineralization at Lefroy. Most of the mineralization appears to be in the cataclased wall rock of the faults. High grade shoots will plunge sub-horizontal with a tendency to plunge shallowly to the east. The westerly plunge seen in some longitudinal sections of the goldfield are likely to be because of the intersection of D_3 faults with southwesterly dipping beds associated with D_1 thrusts.
  - D_4 is a late brittle fault system, it partitions the stratigraphy and mineralization developed along D_3 faults and has some arsenopyrite associated with the fault and vein development.
- Mineralisation is associated with D_3. Although there has been no direct observation to confirm these conclusions the following can be interpreted:
  - D_3 faults are oblique normal faults
  - High grade shoots will plunge in a sub-horizontal manner, probably with some preference to plunging shallowly east

- The structural database is not stable, there are different codes used, some meaningful and some doubtful. There is a suspicion that some of the orientation data from the drill core is incorrect, particularly comparing the data from LFD064 with the rest of the data.
- There seems to be two populations of gold in sandstone units that may warrant further study

Recommendations for this report are;

- The structural database be brought up to a consistent standard by developing an acceptable structural coding system. I prefer a coding system (STYPE) that has a simple first letter coding such as:
    - C – Contacts including bedding
    - F – fault rocks and shears
    - J – Joints
    - V – Veins both compositional and tectonic
    - S – Foliation, cleavage separated by texture (S_c etc) or age (S_1, S_2..)
    - L – Lineations of all sorts
- The orientation data in the database must be consistent. It is not necessary to record in the database the alpha, beta, delta and gamma angles; the database should have dip and dip direction record for planar data and plunge and azimuth for linear data. The person who collects the data must have the responsibility for ensuring the orientation data is correct.
- When oriented core is not available, core axis angle analysis would be an advantage. Where possible stable fabrics such as S_2, or locally S_1 can be used to orient structures from core axis angle measurements.
- Exposure by costeaning or underground access will be essential to determine the geometry of the mineralized shears. Clearly confidence would be higher if this could be conducted on Chum, Pinafore and Volunteer
- There appears to be a correlation of mineralization with the stronger rocks, sandstone, and it will be essential to resolve the distribution of the

stratigraphy on each section, taking into account the difference of stratigraphy between north-south sections hence:

- Analysis of grain size distribution and sedimentary sequences need to mapped carefully to establish useful sedimentary packages
- Multi-element geochemistry is giving some indication of supporting the lithology distribution and this aspect will need to be field checked
- Careful logging to determine whether there are upward and downward facing sequences in the mineralized zone

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