

LEFROY PROJECT AREA

Additonal Information on Structural Geology based on Mapping in January, 2007



Author: John Baxter

March, 2007

Table of Contents

Table of Contents	2
Executive Summary	3
Introduction	5
Stereographic Analysis of Road cuts	5
East-West Sections	7
North-South Road Cuttings	10
Denison	10
Conclusions and Recommendations	11
References	11

Figures

Figure 1 Stereographic Net of structural readings from road cuts in the Lefroy District	5
Figure 2 Stereonet from surface mapping, Lefroy District	6
Figure 3 Section of road cut on the Bridport Highway section, looking north (Keele, 2004) – Inset shows relationship between the overturned limbs of D_1 folds and the S_1 cleavage	7
Figure 4 East-west road cuttings on Londonderry Road	8
Figure 5 North-South road cuttings on Industry Road and Weymouth Road	9
Figure 6 Stereographic analysis of Denison trench data collected by Russell Fulton	10

Executive Summary

Mapping of road cuttings in the Lefroy area and trenches in the Denison area have reinforced the structural model for northeast Tasmania as presented in Baxter (2006).

The earliest deformation fabric in the Lefroy district is recognised as an incipient flat lying cleavage (S_1). The fabric was identified by Rob Scott (2006). This cleavage is only seen in thin section, no exposure of F_1 folds occurs in the Lefroy district. D_1 is considered to be related to the development of the regional recumbent fold seen to the north. The sense of movement on this fold is west over east. The deformation even does not appear to contribute to the geometry of mineralisation at Lefroy and may be a precursor to the more evident D_2 folding.

The second 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). The folds are associated with a flat dipping stripy cleavage best seen in the Stony Head Sandstone. The axial surface of the folds dip $<15^\circ$ to the east and the folds plunge shallow to the north. The F_2 are exposed in the Richard Keele road cutting. This deformation appears to be the regional D_2 deformation identified by Powell and Baillie (1992) and Reed, 2004. It appears to control the distribution lithologies in the Lefroy Goldfield.

The third phase of deformation can be seen clearly in a road cutting where steeply dipping spaced cleavage cuts the stripy cleavage (498527E, 5448271N). Stereographic nets created from mapping in the district suggest D_1 to D_3 are demonstrations of progressive deformation as the geometry of the three events appears to be the similar. Folds (F_3) associated with D_3 and seen exposed in a road cutting at 512930E, 5452394N. The axial surface of these folds dips to the southwest at $50-70^\circ$. Plunge of the folds is shallow to the south. This deformation appears to be the regional D_3 identified by Powell and Baillie (1992) and Reed, 2004.

Reed reports that only folds that are upright in style (D_3) 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_2). This is supported from observations at Denison.

The fourth deformation event (D_4) in the Lefroy district can be seen locally as brittle steep dipping faults and associated drag folds. 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. Quartz veins are deposited in the fault planes and these veins are associated with gold mineralisation. This deformation is associated with mineralisation at Lefroy. Mineralized shoots associated with these faults will plunge sub-horizontally, and consequently the deformation event is responsible for the sub-horizontal panels of mineralisation seen in the drilling.

The last deformation identified in the district (D_5) 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. The deformation event has the potential to produce high grade shoots that plunge sub-vertically in a similar manner to some stopping on historical longitudinal sections.

It is likely the steep plunging shoots expected from this deformation event have a higher proportion of free gold with arsenic depletion (i.e. the second gold population identified in the geochemistry section).

Road section mapping along the Bridport Highway, Londonderry Road, Industry Road and Weymouth Road has highlighted the geometry of lithological units, folds and faults on north-south and east-west sections.

Introduction

In January, 2007 I had the opportunity to visit a number of road cuttings with the aim of collecting continuous photography and structural readings.

The principal objectives were to:

- establish the geometry of the sequence in east-west and north-south sections
- obtain sufficient observations of the planar structures to test the structural model developed by Baxter (2006) at Lefroy

One week of field work was completed that included a regional tour the results of which been reported separately (Lloyd et.al, 2007). This report covers the structural observations.

Stereographic Analysis of Road cuts

Mapping on all road cuts has been grouped in Figure 1. This data is very similar to that derived at Lefroy and shown here in Figure 2 from the earlier report.

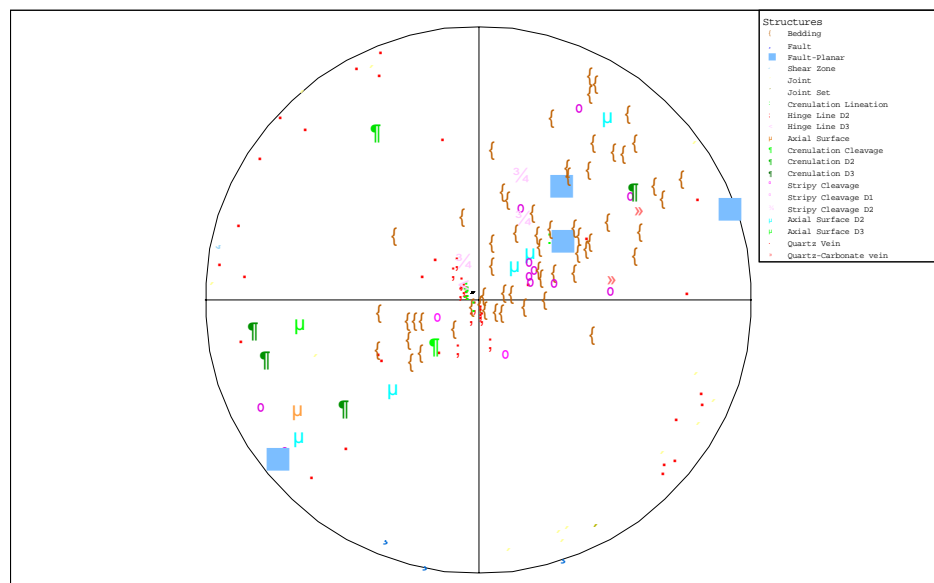


Figure 1 Stereographic Net of structural readings from road cuts in the Lefroy District

It is clear that the structural setting determined at Lefroy from limited outcrop and oriented core can be fully supported by mapping of the road cuttings.

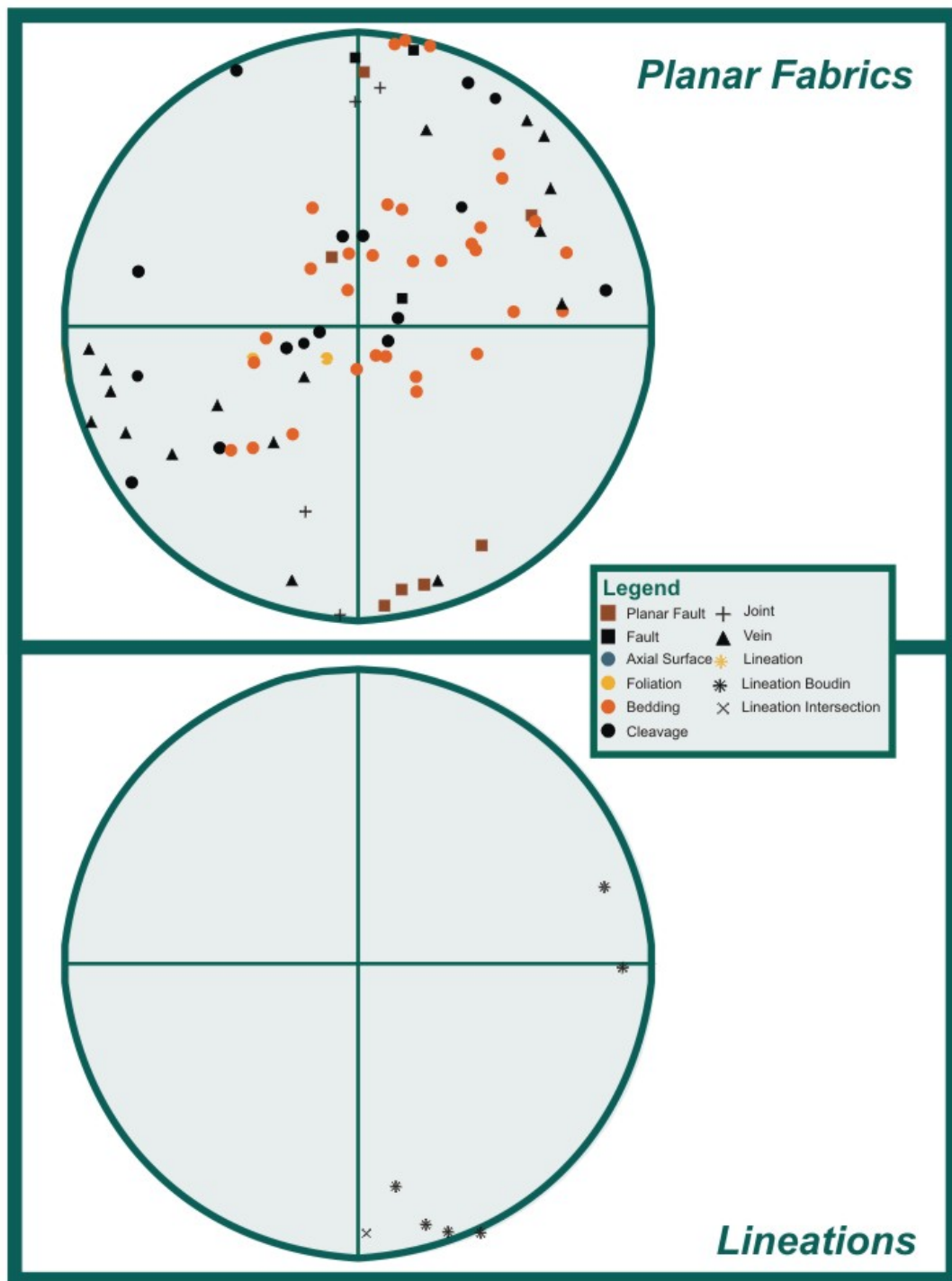


Figure 2 Stereonet from surface mapping, Lefroy District

East-West Sections

The need to obtain data from the road cuttings was highlighted by the mapping by Richard Keele in the Richard Keele Road cutting on the Bridport Highway adjacent to Lefroy (Figure 3). In the Bridport Highway section S_2 is a gently SW-dipping penetrative foliation developed in overturned sandstone-siltstone-mudstone sequences (Figure 3). A number of faults can be seen in the road cut, which make up the NW-trending “corridor” that runs through the goldfield (Keele 1996).

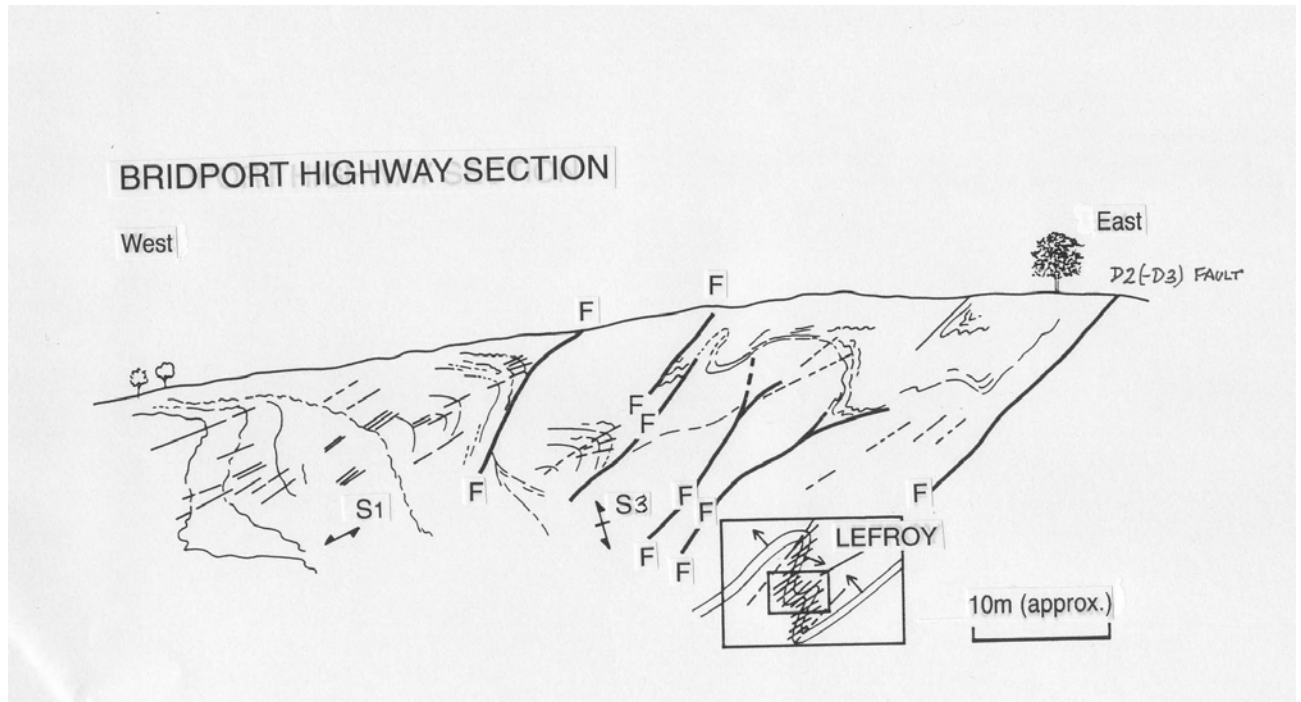


Figure 3 Section of road cut on the Bridport Highway section, looking north (Keele, 2004) –Inset shows relationship between the overturned limbs of D_1 folds and the S_1 cleavage

Mapping from this study included two east-west sections on the Londonderry Road, in the southern end of the Lefroy Goldfield. These sections are shown in Figure 4. These sections are looking north in a similar manner to Figure 3. The overturned F_1 folds and the buckling induced by F_3 are evident in the sections.

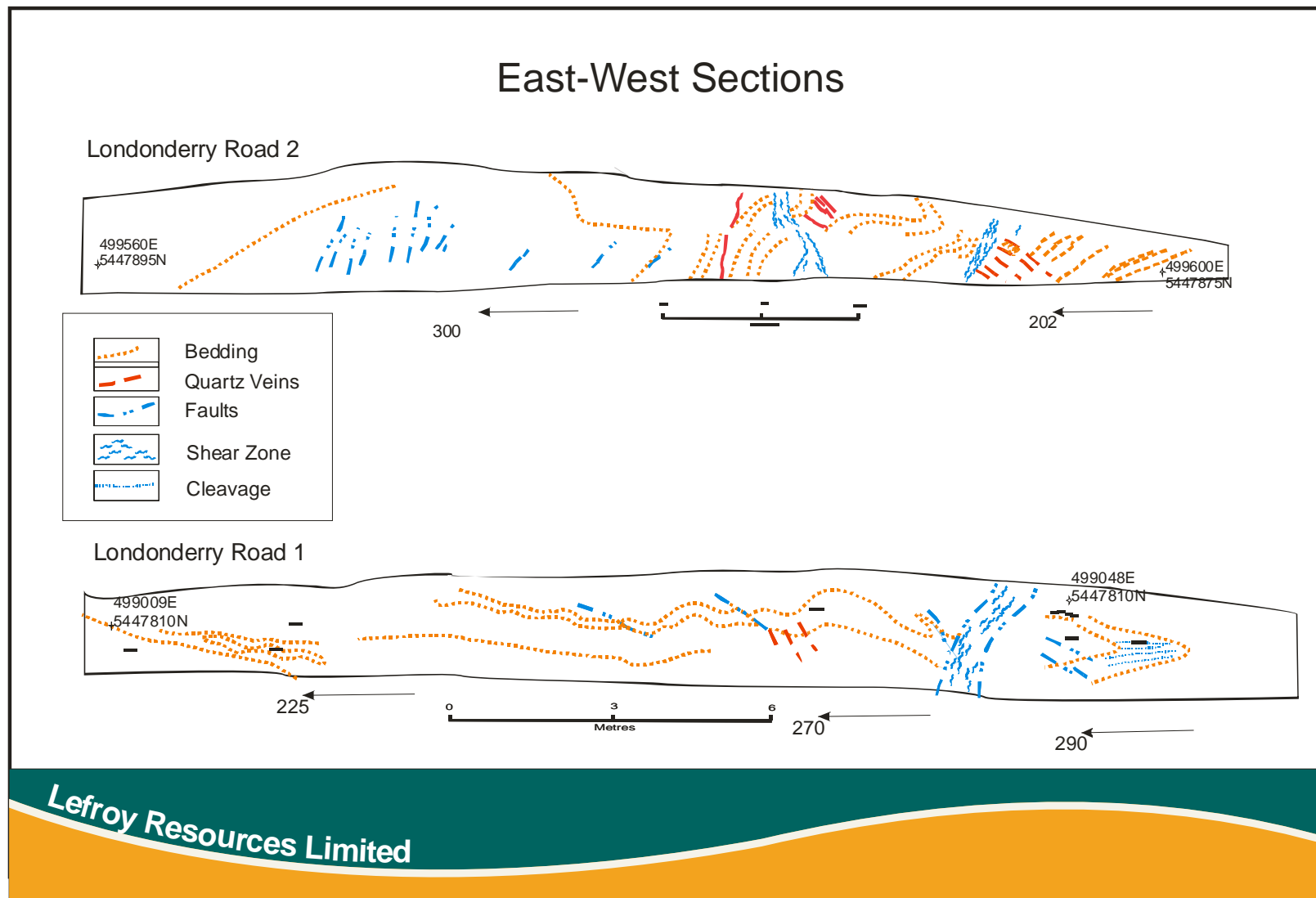


Figure 4 East-west road cuttings on Londonderry Road

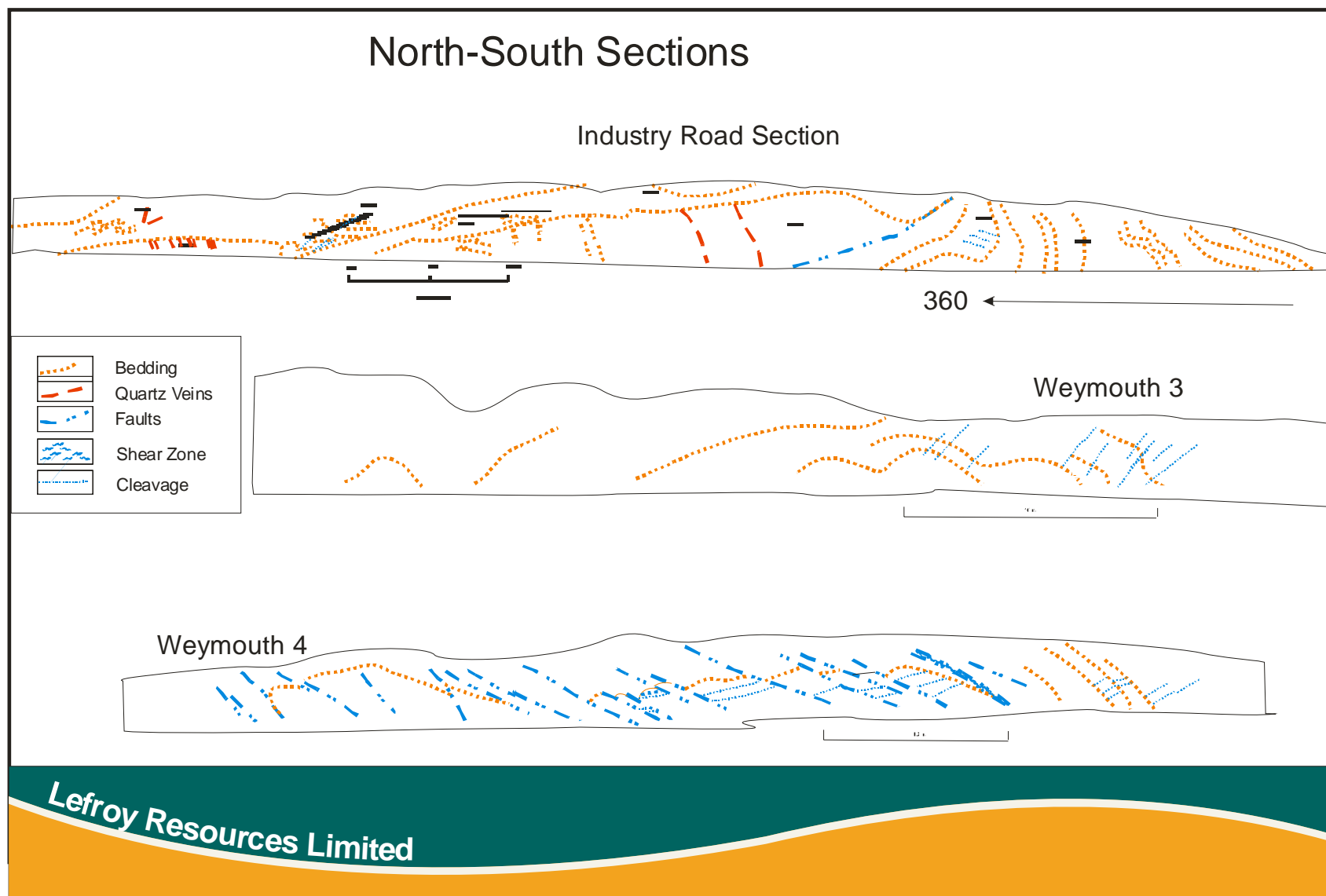


Figure 5 North-South road cuttings on Industry Road and Weymouth Road

North-South Road Cuttings

North-south sections along the roads are not particularly common. However there is an excellent section on Industry Road and some, not so well developed sections along Weymouth Road.

Photography had been obtained for the Industry Road section in May, 2006 and this provided a base for mapping. The Weymouth Road Sections were photographed in January, 2007 and have not been used to map on in the field.

As this section orientation is the same as the drill sections at Lefroy it is instructive to note the shallow dips, the variable orientation of the stripy cleavage and the varying orientation of faults in different parts of the district. The chaotic fold zone in the Industry Road section is similar to some identified in drilling at Lefroy.

Now that the Weymouth Road sections are compiled it will be worthwhile to visit the exposures and undertake detailed mapping sometime in the future.

Denison

Russell Fulton made available some mapping that had been undertaken on the trenches dug at Denison. These trenches are mainly east west and are appended to this report. The stereographic net analysis of the observations made by Russell are presented in Figure 6

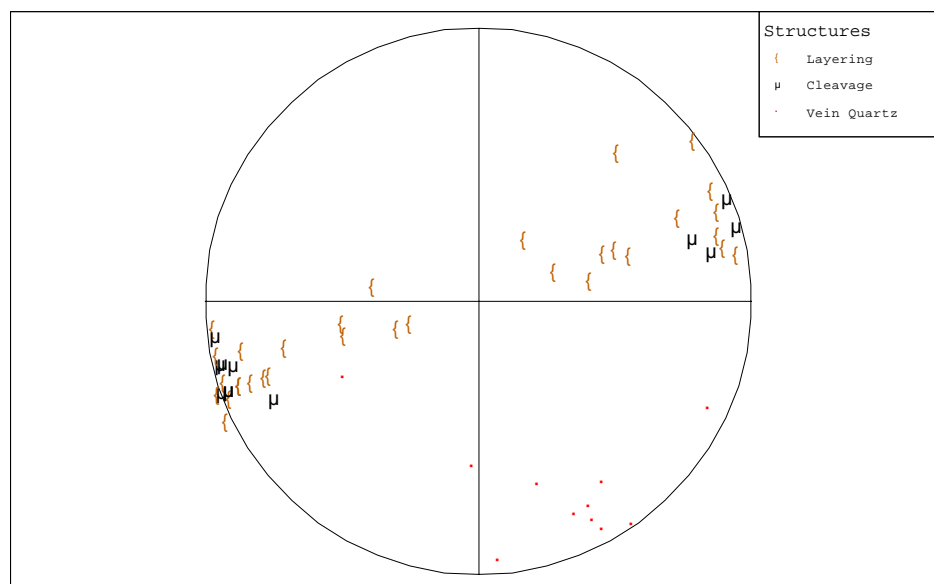


Figure 6 Stereographic analysis of Denison trench data collected by Russell Fulton

Most of the folds in this sequence are the upright F_3 folds seen in the Lefroy district and this supports the interpretation of D_3 being a follow-on from D_1 and D_2 with a similar geometry.

Conclusions and Recommendations

This study has indicated that the structural model derived from mapping and oriented core at Lefroy is applicable on a wider scale. The geometry of the deformation events is very similar across all exposures.

The implication from this is that mineralization will be in shallow plunging high grade shoots in most of the sequence. However, there is a possibility of D₅ mineralization forming locally producing steeply dipping shoots.

It is recommended that the mapping of the Weymouth road cuttings be undertaken on the photographs included on the attached CD to further define structures on a north-south section.

From a regional perspective it would add to the knowledge of the mineralisation in north-eastern Tasmania if the geometric data from Beaconsfield could be compared with the Lefroy data.

References

- Baxter, J.L., 2006, An upgrade of the structural geology of the Lefroy Goldfield based on a review of surface mapping (May, 2006) and historical work; Lefroy Resources Report October, 2006
- Baxter, J.L. and Keele, R., 2004, Structural Control of Mineralisation based on geological reports and aeromagnetics covering the Lefroy Goldfield, Tasmania: Continental Resource Management Report WA04/03
- Keele, R. A., 1996. Gold mineralisation and structure in the Mathinna Supergroup. MSc. Course Notes. Centre for Ore Deposit and Exploration Studies, Univ. of Tasmania, unpublished.
- Keele, R.A., 2004, Lefroy Structural Model: Report for Lefroy Resources Ltd October, 2004.
- Lloyd, C., Fulton, R. & Baxter, J.L., 2007, Regional Exploration Program 2006/2007: Lefroy Memorandum 8 February, 2007
- Powell, C. McA. and Baillie, P. W., 1992. Tectonic affinity of the Mathinna Supergroup in the Lachlan Fold Belt. *Tectonophysics* **214**, 193-209.
- Reed, A. R., 2004. Gold Mineralisation and the Regional Palaeozoic Structure of the Mathinna Supergroup, eastern Tasmania. *Tasmanian Geological Survey Record* 2004/01. Mineral Resources Tasmania, Hobart